This chapter provides an archive of courses offered by UBC. For current course sections and schedules, please visit the online Course Schedule (http://www.students.ubc.ca/courses).

Introduction

This chapter provides an archive of courses offered by UBC. For current course sections and schedules, please visit the online Course Schedule.

Course Numbering

This section contains descriptions of all regular courses offered by the University. Some common notations found in course descriptions are illustrated below.

In most faculties the courses numbered 100 to 199 are primarily for first-year students. Similarly, courses numbered 200 to 299 are primarily for second-year students, courses numbered 300 to 399 are for third-year students, and courses numbered 400 to 499 are for fourth-year students. Courses numbered 500 to 699 are considered graduate-level and are only available to undergraduates by permission of the department and the Faculty of Graduate Studies. Courses numbered 700 and above are clinical courses and cannot be counted towards graduate degree programs. Where a faculty uses a different style of course classification, the level of study will be indicated in the study program description.

Credit

The credit value of a course, where given, is shown in parentheses following the course number. In general, one credit represents one hour of instruction or two to three hours of laboratory work per week throughout one term of a Winter Session (September to December or January to May). A credit is approximately one semester hour.

Courses with Variable Credits

Some courses are listed with a choice of credit value. The form (2-6) implies that the course may be taken for any number of credits from 2 to 6 inclusive. The form (2/6) implies that the course will be offered for either 2 credits or 6 credits.

Where the parentheses are followed immediately by "C," the credit value of the course will be determined by the student in consultation with the department. Where the parentheses are followed immediately by "D" the credit value of the course in any particular session will be determined by the department.

In all cases, the maximum credit value is that which may be obtained by a student during the complete program of study (i.e., it is not the maximum for a given year).
Credit/D/Fail Grading

Students in some direct-entry undergraduate programs may elect to attempt percentage-graded elective courses with Credit/D/Fail standing instead of a percentage grade. See Credit/D/Fail Grading for Elective Undergraduate Courses for more information.

Prerequisites & Corequisites

If specific studies are required as background to a certain course they are notated as such in the course description. A prerequisite is a course that the student must have completed prior to registering for the selected course. A corequisite is a course that the student must take prior to or concurrently with the selected course. In some instances, prerequisites and corequisites may be waived at the discretion of the instructor. General prerequisites that apply to all courses in a list are frequently given just before the list. In a dispute over the adequacy of prerequisites, the course instructor will make the decision. In all cases where prerequisites are indicated, the implication is "or the equivalent" and "or the consent of the instructor."

Equivalents

An equivalent course indicates that it is a duplicate of the course selected.

Hours

The number of hours assigned each week to lectures (first digit) and to laboratories (second digit) are shown in square brackets at the end of a course description. Where a third digit appears it refers to periods where discussions, tutorials or assigned problems are done. An asterisk (*) indicates alternate weeks. The first set of digits refers to the first term (September to December) and the second set to the second term (January to May); when only one set is given it means either term. Graduate courses and courses in some faculties are not so designated.

Courses Offered

Not all courses listed are offered each year. Most courses offered in a Winter Session, as well as places and times of class meeting and names of instructors, appear in the online Course Schedule (https://courses.students.ubc.ca/cs/main). For those courses not so listed, contact the department concerned.

Credit Exclusion Lists

Some faculties maintain lists of courses that are sufficiently similar that credit may only be obtained in that faculty for one of the selections. Refer to faculty or program listings for exclusion lists, or see your program advisor.
This chapter provides an archive of courses offered by UBC. For current course sections and schedules, please visit the online Course Schedule (http://www.students.ubc.ca/courses).

Courses by Subject Code

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<th>Subject</th>
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<td>Adult and Higher Education</td>
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COHR  Commerce Human Resources
COMM  Commerce
CONS  Natural Resources Conservation
CPSC  Computer Science
CSIS  Critical Studies in Sexuality
CTLN  Catalan
DENT  Dentistry
DHYG  Dental Hygiene
DSCI  Data Science
ECON  Economics
EDCP  Curriculum and Pedagogy
EDUC  Education
ELEC  Electrical Engineering
ENDS  Environmental Design
ENPH  Engineering Physics
ENVR  Environmental Science
EPSE  Educational Psychology and Special Education
FHIS  French, Hispanic and Italian Studies
FISH  Fisheries Research
FMPR  Family Practice
FNEL  First Nations and Endangered Languages Program
FNIS  First Nations and Indigenous Studies
FOPR  Forest Operations
FREN  French
FSCT  Biochemistry and Forensic Science
GEM  Geomatics for Environmental Management
GEOB  Geographical Sciences
GERM  German
GREK  Greek
GRSJ  Gender, Race, Sexuality and Social Justice
HEBR  Hebrew
HGSE  Haida Gwaii Semesters
HIST  History
HUNU  Human Nutrition
IEST  European Studies
INDE  Interdepartmental Medicine
INDS  Interdisciplinary Studies
ISCI  Integrated Sciences
ITST  Italian Studies
JAPN  Japanese
KIN  Kinesiology
LAIS  Library, Archival and Information Studies
LASO  Law and Society
LATN  Latin
COLX  Computational Linguistics
COMR  Commerce Minor
CPEN  Computer Engineering
CRWR  Creative Writing
CSPW  Coordinated Science Program Workshop
DANI  Danish
DES  Design
DMED  Digital Media
ECED  Early Childhood Education
ECPS  Educational & Counselling Psychology, & Special Education
EDST  Educational Studies
EECE  Electrical and Computer Engineering
EMBA  Executive M.B.A.
ENGL  English
ENPP  Engineering and Public Policy
EOSC  Earth and Ocean Sciences
ETEC  Educational Technology
FIPR  Film Production
FIST  Film Studies
FMST  Family Studies
FNH  Food, Nutrition and Health
FOOD  Food Science
FRE  Food and Resource Economics
FRST  Forestry
GBPR  Green Bioproducts
GENE  Genetics
GEOG  Geography
GPP  Global Public Policy
GRS  Global Resource Systems
GSAT  Genome Science and Technology
HESO  Health and Society
HINU  Hindi-Urdu
HPB  High Performance Buildings
IAR  Institute of Asian Research
IGEN  Integrated Engineering
INDO  Indonesian
INFO  Information Studies
ITAL  Italian
IWME  Integrated Water Management Engineering
JRNL  Journalism
KORN  Korean
LARC  Landscape Architecture
LAST  Latin American Studies
LAW  Law
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This chapter provides an archive of courses offered by UBC. For current course sections and schedules, please visit the online Course Schedule (http://www.students.ubc.ca/courses).

### Applied Animal Biology, Faculty of Land and Food Systems

**AANB: Applied Animal Biology**

- **AANB 500 (3) Graduate Seminar**
  
  Participation in this course is compulsory for all graduate students in Applied Animal Biology.  
  *This course is not eligible for Credit/D/Fail grading.*

- **AANB 504 (3) Research Methodology in Applied Animal Biology**
  
  *This course is not eligible for Credit/D/Fail grading.*

- **AANB 515 (3) Animal Welfare and Animal Ethics**
  
  Credit will be granted for only one of APBI 315, ANSC 515, or AANB 515.  
  *This course is not eligible for Credit/D/Fail grading.*

  **Prerequisite:** Standing as a graduate student.

- **AANB 530 (2-6) c Directed Studies**
  
  *This course is not eligible for Credit/D/Fail grading.*

- **AANB 549 (12/18) c Master's Thesis**
  
  *This course is not eligible for Credit/D/Fail grading.*

- **AANB 550 (3) Topics in Animal Welfare**
  
  *This course is not eligible for Credit/D/Fail grading.*  
  Corequisite: APBI 315.

- **AANB 551 (3) Tutorials in Animal Welfare Research**
  
  *This course is not eligible for Credit/D/Fail grading.*

- **AANB 649 (0) Doctoral Dissertation**

### Asian Studies, Faculty of Arts

**ACAM: Asian Canadian and Asian Migration Studies**

- **ACAM 250 (3) Asian Canadians in Popular Culture**
  
  Popular culture's role in the production of Asian Canadian and diasporic communities, with emphasis on race, gender, sexuality, and other identity categories.

- **ACAM 300 (3) Dis/Orienting Asian Canada**
  
  The histories, cultures, social dynamics, and life experiences of Asian communities in Canada in the context of global migrations.  
  Restricted to students with second year status or higher.

- **ACAM 320 (3/6) d Selected Topics in ACAM Studies**
  
  Selected Asian Canadian Asian Migration topics. Consult acam.arts.ubc.ca for this year's offerings.  
  *Prerequisite:* Restricted to students with at least Second year standing; a previous course in Asian Canadian and Asian Migration Studies is recommended.

- **ACAM 350 (3) Asian Canadian Community-Based Media**
  
  Digital media production in the context of community engagement. Includes critical media literacy, community-based research ethics, project design, training in media forms such audio, video, photography, and web publishing.

- **ACAM 447 (3/6) c Directed Studies in Asian Canadian and Asian Migration**
  
  General reading and/or a research undertaking within the scope of Asian Canadian and Asian Migration.  
  *Prerequisite:* Permission of the Chair of the ACAM program.

### Educational Studies, Faculty of Education
ADHE: Adult and Higher Education

ADHE 313 (6) Organization of Adult Basic Education Programs
Rationale, structures, and functions of basic education completion. [3-0-0]
Equivalency: ADED 313.

ADHE 314 (6) Adult Correctional Education
Planning prison education; methods and techniques as they are affected by historical, philosophical, structural, and organizational contexts of penal institutions. [3-0-0]
Equivalency: ADED 314.

ADHE 327 (3) Teaching Adults
Planning, conducting and evaluating instruction for adults. Consideration is given to different beliefs and ways of thinking about teaching. [3-0-0]
Equivalency: ADED 327.

ADHE 328 (3) Institutions of Adult Education
The history, roles, and activities of institutions in the field of adult education. Institutions in Canada, Great Britain, and the United States are emphasized, and some experiences in other countries are examined. [3-0-0]
Equivalency: ADED 328.

ADHE 329 (3) Developing Short Courses, Workshops and Seminars
Organization and administration of adult education events such as short courses, seminars, workshops, conferences and institutes. [3-0-0]
Equivalency: ADED 329.

ADHE 330 (3) The Community Practice of Adult Education
Community based adult education with particular emphasis on the application of knowledge of the social, economic, cultural and political environment in developing and conducting adult education programs with an for individuals and groups. [2-3-0]
Equivalency: ADED 330.

ADHE 375 (6) Diploma Seminar and Internship in Adult Education
[2-3-0]
Equivalency: ADED 375.

ADHE 412 (3) An Overview of Adult Education
Survey of adult education theory and practice in Canada and the world. The focus is on the purpose and participation in, adult education, characteristics of learners, and the training of adult educators. [3-0-0; 3-0-0]
Equivalency: ADED 412.

African Studies, Faculty of Arts

AFST: African Studies

AFST 250 (3/6) d Introduction to African Studies
Cultural, historical, and geographical issues of African Studies.

AFST 351 (3/6) d Perspectives in African Studies: Literary and Theoretical Approaches
Major issues and theoretical approaches.
Corequisite: AFST 250. Credit will not be given for both AFST 350 and 351

AFST 352 (3/6) d Perspectives in African Studies: A Social Science Approach
Major issues and theoretical approaches.
Corequisite: AFST 250. Credit will not be given for both AFST 350 and 352

AFST 380 (3/6) d Study of Sociolinguistics of a Selected African Language
Selected African language with emphasis on major syntactic structures, vocabulary, conversation patterns, reading short texts, and the cultural and historical contexts of language use.

AFST 450 (3/6) d African Diasporic Culture in African Canadian Communities
African diasporic culture in Canadian society, fostering dialogue with members of African Canadian communities on cultural
values, traditions, memory, adaptation and change.

Agricultural Economics, Faculty of Land and Food Systems

**AGEC: Agricultural Economics**

Undergraduate courses have been re-named as Food and Resource Economics (FRE). Please see that section.

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**AGEC 530 (2-6) c Directed Studies**
*This course is not eligible for Credit/D/Fail grading.*

**AGEC 549 (12) Master's Thesis**
*This course is not eligible for Credit/D/Fail grading.*

Cellular and Physiological Sciences, Faculty of Medicine

**ANAT: Anatomy**

As of Summer Session 2013, ANAT 390 and ANAT 391 have been renamed to CAPS courses with equivalent numbers and move to CAPS course listings.

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**ANAT 392 (4) Gross Anatomy of the Limbs and Trunk**
Lectures and laboratory sessions on the human gross and functional anatomy of the limbs and trunk. The course includes the study of predissected specimens. For credit only in the Department of Physical Therapy.

**ANAT 393 (4) Human Anatomy for Physical Therapy Students**
Microscopic systems anatomy and regional anatomy of the nervous system. [3-0-0]
*Prerequisite:* Registration in Rehabilitation Sciences (RSPT) is required.

**ANAT 400 (16) Human Anatomy**
A correlated course of study for medical and dental students of the structure of the human body including gross and radiological anatomy and embryology. Clinics are held in cooperation with the Departments of Medicine, Orthopaedics, Surgery and Family Practice. Both terms.
*This course is not eligible for Credit/D/Fail grading.*

**ANAT 401 (8) Microscopic Human Anatomy**
A survey course for medical and dental students of the microscopic structure of the human body as studied by light and electron microscopy. Lectures and laboratory sessions. Both terms.
*This course is not eligible for Credit/D/Fail grading.*

**ANAT 425 (4) Elements of Neuroanatomy**
An introduction to the structure of the human nervous system. Given only in conjunction with PHYL 425. (Open to Medical and Dental students only.)

**ANAT 448 (1-6) d Directed Studies in Anatomy**
Permission of the Head and supervisor required.

**ANAT 500 (12) Gross Human Anatomy**
An advanced laboratory course in the structure of the human body. *This course is not eligible for Credit/D/Fail grading.*

**ANAT 501 (6) Microscopic Human Anatomy**
An advanced lecture and laboratory course in the microscopic structure of the human body. *This course is not eligible for Credit/D/Fail grading.*

**ANAT 502 (8) Microscopic Anatomy**
The microscopic anatomy of tissues and organs in man. *This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* ANAT 401.

**ANAT 504 (3) Cell Structure and Function**
Seminar discussions of current topics in vertebrate cell biology. *This course is not eligible for Credit/D/Fail grading.*
ANAT 505 (6) General Cytological Biophysics
An examination of selected properties of the cell and underlying mechanisms based on the ultrastructure of the cell and on the physical chemistry of open systems. This course is not eligible for Credit/D/Fail grading.

ANAT 510 (4) Neuroanatomy
The gross and microscopic study of the nervous system in man. This course is not eligible for Credit/D/Fail grading.

ANAT 511 (3) Fundamentals of Body Design: Basic Principles in Human Anatomy as Illustrated by the Organization of the Back and Upper Limb
This course is not eligible for Credit/D/Fail grading.

ANAT 512 (3) Functional Human Anatomy of Head and Neck Systems
This course is not eligible for Credit/D/Fail grading.

ANAT 513 (3) Functional Human Anatomy of the Respiratory, Cardiovascular and Gastrointestinal Systems of the Thorax and Abdomen
This course is not eligible for Credit/D/Fail grading.

ANAT 514 (3) Functional Human Anatomy of the Urogenital Systems: Pelvis and Perineum
This course is not eligible for Credit/D/Fail grading.

ANAT 515 (3) Functional Human Anatomy of the Musculoskeletal Systems: Back, Limbs and Joints
This course is not eligible for Credit/D/Fail grading.

ANAT 516 (3) Functional Human Neuroanatomy: Central Nervous System
This course is not eligible for Credit/D/Fail grading.

ANAT 517 (3) Functional Human Microscopic Anatomy: Basic Tissues, Organs and Systems
This course is not eligible for Credit/D/Fail grading.

ANAT 527 (3) Muscle Biophysics
Selected topics in muscle contraction at an advanced level Permission of Head required. This course is not eligible for Credit/D/Fail grading.
Equivalency: PHYL 530.

ANAT 548 (2-6) Directed Studies in Anatomy & Cell Biology
This course is not eligible for Credit/D/Fail grading.

ANAT 549 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

ANAT 550 (3) Current Topics in the Morphological Sciences
Lectures, demonstrations, discussions and student seminars on selected and current topics in cell biology and the anatomical sciences. Attendance is required of all M.Sc. and Ph.D. students in Anatomy & Cell Biology. This course is not eligible for Credit/D/Fail grading. [1-0-0]
Prerequisite: Students must be registered in graduate-level studies in Anatomy & Cell Biology.

ANAT 590 (6) Introduction to Functional Human Anatomy: Survey of Microscopic Anatomy, Neuroanatomy and Gross Anatomy
This course is not eligible for Credit/D/Fail grading.

ANAT 649 (0) Doctoral Dissertation

Animal Science, Faculty of Land and Food Systems

ANSC: Animal Science

ANSC 549 (12/18) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

ANSC 649 (0) Doctoral Dissertation
Anthropology, Faculty of Arts

ANTH: Anthropology

ANTH 100, 103, 201, 202, 203, 204, 205, 206, 213, 214, 215, 217, 218, 220, 221, 222, 225, 231, 232 and 329 are general courses open to all students. ANTH 100 is a prerequisite to all other third- and fourth-year courses, unless permission of the instructor is obtained. Some courses have additional prerequisites, as listed in the descriptions. For details of current listings, consult the departmental website at www.anth.ubc.ca.

ANTH 100 (3/4) d Introduction to Cultural Anthropology
Basic concepts and methods of anthropology; culture and race; comparative study of social systems, religion, symbolism, art, and other institutions. Examples are drawn from a variety of cultures.

ANTH 200 (3) Introduction to Problems in Method and Theory in Anthropology
A survey of basic concepts and procedures in the cross-cultural study of human societies.
Prerequisite: ANTH 100.

ANTH 201 (3) Ethnic Relations
An introduction to the study of the relations between ethnic groups and of the interplay between ethnicity and other social factors.
Equivalency: SOCI 201.

ANTH 202 (3/6) d Contemporary Social Problems
Cultural background to contemporary events; problems of nationalism and regional conflicts, economic and social development, gender, religion and social change. Course may stress a different region of the world in different years.

ANTH 210 (3) Eating Culture
An anthropological exploration of how the collection, cultivation and consumption of food shapes human society and culture. This course is not eligible for Credit/D/Fail grading.

ANTH 213 (3) Sex, Gender, and Culture
An anthropological exploration of how understandings of sex and gender are culturally and historically shaped.

ANTH 214 (3/6) d The Family in Cross-Cultural Perspective
A cross-cultural comparison of family and kinship to provide an understanding of variations in the structure and meaning of marriage relations; forms of domestic organization; and the sexual division of labour, property, and inheritance.

ANTH 215 (3) Japanese Popular Culture
Television shows, dramas, movies, advertising, marketing, manga (Japanese style "comics"), anime (Japanese animation), theatrical forms, popular literature, popular music, fashion fads, tourism, toys, and sports.

ANTH 217 (3) Culture and Communication
The study of communication; the relation between communication and its cultural context with emphasis on verbal and non-verbal communication, cross-cultural communication, and cultural differences in the use of oral, literate, and electronic media.

ANTH 220 (3) First Nations of British Columbia
The cultures, languages, and resources of First Nations, with anthropological perspectives on colonization and development.

ANTH 221 (3) Contemporary Indigenous Cultural Expressions
Forms and styles of indigenous expressive arts, and their current place in the lives of Indigenous Peoples.
Prerequisite: ANTH 220 is recommended.

ANTH 227 (3) Introduction to Medical Anthropology
An examination of health and illness, in their social and cultural contexts.

ANTH 241 (3) Introduction to Museums and Museology
The critical study of anthropology museums as social institutions and material culture research and classification from the late 19th century to the present day.

ANTH 300 (3/6) d Contemporary Anthropological Theory
Contemporary approaches to society and culture in anthropology.
Prerequisite: ANTH 200 is recommended.

ANTH 301 (3) Ethnography of Eurasia
Eurasia, including the Russian Federation, Central Asia, and Mongolia, with an emphasis on issues of power, identities, and transnational mobility in the region.

ANTH 302 (3/6) Ethnography of South Asia
A specialized study of ethnographic and theoretical problems relating to South Asia.

ANTH 303 (3/6) Ethnography of Special Areas
A specialized study of ethnographic and theoretical problems in one area. Different culture areas or regions may be selected each term. Consult the Department for this year's offerings.

ANTH 304 (3/6) Ethnography of the Northwest Coast
Specialized study of ethnographic and theoretical problems of the region.

ANTH 307 (3/6) Ethnography of Korea
An exploration of ethnographic, topical, and theoretical issues.

ANTH 308 (3/6) Ethnography of Sub-Saharan Africa
An exploration of ethnographic, topical, and theoretical issues.

ANTH 312 (3) Introduction to the Anthropology of Gender
Theoretical approaches to, and the ethnographic study of, gender in cross-cultural contexts.

ANTH 315 (3) Japanese Culture and Society
Japanese culture and society: patterns of organization, value systems, family, education, work, minorities and diversity, harmony and conflict, urban/rural differences, gender, sexuality, youth, tradition, continuity, change, and future prospects.

ANTH 316 (3/6) Political Anthropology
Comparative study of political organization; leadership and non-centralized and centralized political systems.

ANTH 317 (3/6) Linguistic Anthropology
A survey of the ethnographic uses of language data and the techniques of linguistic analysis.

ANTH 329 (3/6) Contemporary First Nations Issues
Anthropological perspectives on contemporary issues of public policy, law, and political activity, as they affect the place of First Nations people in British Columbia and Canada.
Prerequisite: ANTH 220 is recommended.

ANTH 330 (3) Anthropology of Rural Peoples and the Global Economy
A comparative study of rural peoples (such as small-scale horticulturists, artisans and craft workers, peasants, fisherfolk, or industrial/manufacturing workers) in the global economy.

ANTH 331 (3/6) Art, Aesthetics and Anthropology
Anthropological perspectives on art, aesthetics, and expressive culture.

ANTH 332 (3/6) Oral Tradition
An ethnographic perspective on the dynamics of oral tradition in various oral and literate cultures; the characteristics and roles of oral genres including folktales, genealogy, oral history, autobiography, and myth in these societies; and the relationship between orality and literacy.

ANTH 333 (3) Language and Power
A sociolinguistic examination of the role of language in articulating, maintaining, and subverting power relations in society.

ANTH 341 (3/6) Museums, Heritage and Memory
Museums, galleries, monuments, and other cultural institutions' relations to our perception of history and geography.

ANTH 350 (3/6) Ethnography of the Pacific Islands: Polynesia and Micronesia
Major cultural groupings in Polynesia and Micronesia, emphasizing both traditional cultures and the incorporation of the region into modern international institutions.

ANTH 351 (3/6) Ethnography of the Pacific Islands: Melanesia
Major cultural groupings in Melanesia, emphasizing both traditional cultures and the incorporation of the region into modern international institutions.

ANTH 353 (3) Ethnography of Latin America
Indigenous peoples of Latin America, emphasizing both pre-Columbian cultural traditions and socioeconomic and cultural changes from the Colonial period to the present.

**ANTH 360 (3)** Introduction to Ecological Anthropology
Analysis of the relations between human societies and the ecological aspects of their environment (including technology, society, and ideology). Previously ANTH 460.

**ANTH 378 (3)** Anthropology of Media
Analysis of contemporary mass media and of the anthropological use of media (photography, film, digital audio and video, etc.).

**ANTH 400 (3/6)** d History of Anthropology
The development of anthropological theory and practice in institutional contexts.
*Prerequisite:* ANTH 300.

**ANTH 401 (3)** First Peoples of North America
Anthropological perspectives of indigenous cultures and societies of North America.
*Prerequisite:* ANTH 329 is recommended.

**ANTH 402 (3/6)** d Ethnography of China
Advanced studies in the ethnography of China, premodern and contemporary. Topics may include kinship, rural and urban social structure, stratification and mobility, religion, national power structures, and social change in Chinese society.

**ANTH 403 (3/6)** d Ethnography of Special Areas
An advanced study of ethnographic and theoretical problems. A different region may be studied each term.

**ANTH 404 (3/6)** d Ethnography in Circumpolar North: Comparative Perspectives
An examination of relationships between indigenous people and nation states in Greenland, Canada, Alaska and Siberia, using ethnographic methods.

**ANTH 407 (3)** Principles of Field Work
An examination of field work as the basic setting for ethnographic research. Research design; relationships with study participants, field techniques, and data analysis and presentation.

**ANTH 408 (3/6)** d Field Methods
Intensive examination and application of selected methods of ethnographic data-collection, e.g., visual anthropology, anthropological interviewing, genealogies, ethnographic semantics, life histories, oral traditions. Consult department for current description.

**ANTH 409 (3/6)** d Topics in Applied Anthropology
Advanced study of the theory and practice of applied, action, and consultancy anthropology. Topics may include the application of anthropology to questions of aboriginal rights and title, education, medicine, development, women and development, tourism, and other social issues.

**ANTH 412 (3)** Advanced Topics in the Anthropology of Gender
Contemporary theory employed in the anthropological study of gender.
*Prerequisite:* ANTH 312.

**ANTH 413 (3/6)** d Relatedness: Family, Kinship, and Social Relations
A cross-cultural survey of the social and cultural bases of relatedness including changing family relationships, kinship, and social organization, based on theoretical analysis and case studies.

**ANTH 414 (3)** Anthropology of Globalization
Theories on the global flow of people, commodities, images, and ideas with critical ethnographic attention to the different ways people respond to globalization.

**ANTH 415 (3/6)** d Religion and Society
Comparative study of religious beliefs, practices, and movements; relations between religious, social, and political institutions; religion as a force for stability and change; anthropological/sociological theories of religion.

**ANTH 416 (3)** The Ethnography of Japan
Ethnographies about Japan and processes of conducting fieldwork on Japan, covering topics such as work, leisure, identity, tradition, popular culture, rural/urban lifestyles, gender, sexuality, internationalization.
*Prerequisite:* One of ANTH 215, ANTH 315.

**ANTH 417 (3/6)** d Language, Culture, and Cognition
The relationships between linguistic and cultural phenomena; how language affects normative and cognitive systems of thought.
and behaviour.
Prerequisite: One of ANTH 100, LING 200. May be taken as co-requisites.

ANTH 418 (3) Anthropological Statistics
Applications of statistical techniques to quantitative and qualitative data in Anthropology.

ANTH 421 (3/6) d The Anthropology of Place and Space
An anthropological understanding of the spatial dimensions of social practice, and the relationships of space to culture, history, and power.

ANTH 422 (3) Modes of Subsistence
The nature of subsistence systems antedating or alternative to modern commercial systems. Introductory survey with basic readings; focus on problems such as the development of complex cultures without agriculture, the ambiguity of hunting and gathering, agricultural and other "intensification", "orchestration" of the use of adjacent microenvironments. Of interest to students of archaeology, anthropology and cultural geography.

ANTH 423 (3) Ethnography of East Africa and the Swahili Coast
The everyday lives of people who inhabit East Africa and the Swahili Coast, and consideration of slave trade, long distance migration, colonialism, nationalism, independence movements, religion, identity politics, music, gender, sexuality, health, ecotourism and conservation. This course is not eligible for Credit/D/Fail grading.

ANTH 427 (3) Topics in Medical Anthropology
Anthropological perspectives on health, illness, and disability as represented by classic and contemporary research in selected topics in medical anthropology including disease and human evolution, illness and human ecology, culture and epidemiology, ethnomedical systems, the relationship between folk and biomedicine and the cultural construction and social organization of health care, illness and disability. Specific content will vary from year to year. Consult the Department brochure.
Prerequisite: One of ANTH 100, SOCI 100.

ANTH 428 (3) Medicine, Technology, Culture, and Society
A medical anthropological perspective on medical science, technology, translational research, and clinical practice, in laboratory, clinic, family, social, and cultural contexts. Topics include explanatory models of health, acute and chronic illness, disability; social and cultural dimensions genetics; clinical interaction.

ANTH 429 (3) Global Health in Cross-Cultural Contexts
Includes examination of the social and cultural dimensions of specific life-threatening emerging and re-emerging infectious diseases, the political economy of health, cultural interpretations of illness and healing, medical pluralism, therapy management, and the cultural construction of efficacy.

ANTH 431 (3/6) d Museum Practice and Curatorship
Management of museum collections and their public presentation, addressing questions of access, collaboration, and cultural property. The public interpretation of anthropological concepts and materials utilizing the programs and facilities of the Museum of Anthropology.
Prerequisite: ANTH 341.

ANTH 432 (3/6) d The Anthropology of Public Representation
The public presentation and interpretation of anthropological concepts and materials utilizing the programs and facilities of the Museum of Anthropology.
Prerequisite: ANTH 341. Permission of the department is also acceptable.

ANTH 433 (3/6) d Directed Studies
General reading and/or a research undertaking, with the agreement, and under the supervision, of a Department faculty member selected by the student. No more than six credits of Directed Studies may be taken for credit toward the Major or Honours program.

ANTH 435 (3) The Japanese Tea Ceremony: Ethnography of Performance, Practice, and Ritual
An exploration of Chanoyu, Japanese Tea Practice, as a culturally embedded ritual, performance, and aesthetic form, and as a way of understanding underlying elements of Japanese culture. This course has a studio component and a nominal fee may be charged.

ANTH 449 (6/12) d Honours Tutorial
Will usually require the presentation of at least one research paper.

ANTH 451 (3/6) d Conservation of Organic Materials
Conservation of organic materials within a museum environment; the nature of materials, mechanisms of deterioration and
principles of preventive conservation. Recommended for students intending to work with cultural materials.

Prerequisite: Permission of instructor required.

ANTH 452 (3) Conservation of Inorganic Materials
Conservation of inorganic materials within a museum environment; the nature of materials, mechanisms of deterioration and principles of preventive conservation. Recommended for students intending to work with cultural materials.

Prerequisite: Permission of instructor is required.

ANTH 461 (3) Anthropological Study of Local Ecological Knowledge
Analysis of the concepts of ecological anthropology via the medium of local ecological knowledge. ANTH 360 is recommended as background.

ANTH 462 (3) Special Topics in Ecological Anthropology
May include environmental discourse and social movements, anthropological contributions to ecological management systems, or examination of emerging issues in the field. ANTH 360 is recommended as background.

ANTH 470 (3/6) d Topics in Contemporary Theory
Selected topics in contemporary social and cultural theory which contribute to anthropological analyses. Topics may include Marxist anthropology, critical theory, theories of culture, phenomenology, behavioural ecology, structuralism, hermeneutics, formal theory and examination of specific social theorists.

ANTH 471 (3) Anthropology of Law
Cross-cultural study of the operation of law within contested systems of meaning, the social organization of law, and forms of consciousness of the participants in legal/justice practices.

ANTH 472 (3) Anthropological Study of Social Inequality
An anthropological perspective on the historical origins and theoretical explanations of social inequality.

ANTH 478 (3/6) d Ethnographic Film Methods
Ethnographic digital video production, including methods of ethnographic fieldwork, creation of field notes, and research design; basics of digital video planning, production, and editing. Production fees are charged for this course. Prerequisite: ANTH 378 is recommended.

ANTH 480 (3/6) c Urban Ethnographic Field School (UEFS)
A combination of approximately 50 hours of volunteering and fieldwork based in community organizations with theoretical approaches to urban spaces. Students will engage in collaborative research while considering a range of theoretical and methodological approaches.

Prerequisite: ANTH 100.

Equivalency: SOCI 480.

ANTH 495 (3/6) d Advanced Studies in Anthropology
An intensive examination of selected topics in Anthropology. Consult the Department for this year's offerings.

ANTH 500 (6) History of Anthropological Thought
Various approaches to anthropology, from classical to contemporary. This course is not eligible for Credit/D/Fail grading.

ANTH 501 (2-6) d Social Structure and Kinship
This course is not eligible for Credit/D/Fail grading.

ANTH 502 (2-18) d Advanced Ethnography of a Special Area
This course is not eligible for Credit/D/Fail grading.

ANTH 505 (2-6) d Religion and Society
This course is not eligible for Credit/D/Fail grading.

ANTH 506 (3/6) d Current Research in Anthropology
The relationship between current theoretical issues and research methods. This course is not eligible for Credit/D/Fail grading.

ANTH 510 (3-6) c Comparative and Developmental Studies in Archaeology
This course is not eligible for Credit/D/Fail grading.

ANTH 512 (2-6) d Language and Culture
This course is not eligible for Credit/D/Fail grading.

ANTH 513 (3-6) d Advanced Studies in Feminist Anthropology
Feminist approaches to ethnography, theory, methodology; current issues in feminist anthropology; gender relations; feminist
anthropology and postmodernism. This course is not eligible for Credit/D/Fail grading.

ANTH 515 (2-6) d Cultural Evolution and Cultural Ecology
This course is not eligible for Credit/D/Fail grading.

ANTH 516 (3) Qualitative Methods in Anthropology
A discussion of selected methods used to observe, describe, and interpret cultural phenomena and social organization, including participant observation, interviewing, ethnographic semantics, life histories, componential analysis, and photography. Attention will also be given to ethics in anthropological research and writing and to such analytic matters as the nature of description, conceptualization, generalization, and content analysis. This course is not eligible for Credit/D/Fail grading.

ANTH 517 (3) Archaeological Methods
A discussion of selected basic data-gathering methods in their relation to the development of ideas about the archaeological record. This course is not eligible for Credit/D/Fail grading.

ANTH 518 (3/6) d Museum Methods
Analytical approaches to the study of museums and collections. Methods of field collecting, collections research, laboratory procedures, visitor studies, social organization of museum and related cultural industries, exhibit and program evaluation techniques and the ethics of museum research and practice. This course is not eligible for Credit/D/Fail grading.

ANTH 519 (3/6) d Seminar in Medical Anthropology
This course is not eligible for Credit/D/Fail grading.

ANTH 520 (2-6) c Advanced Prehistory of a Special Area
This course is not eligible for Credit/D/Fail grading.

ANTH 527 (3) Advanced Archaeological Methods
An intensive review of analytical approaches to the study of archaeological data and their applications. Includes research design; sampling strategies; analytical lab procedures; classification and typology; and multivariate analysis and other statistical procedures. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ANTH 517.

ANTH 528 (3) Advanced Quantitative Methods
Introduction to the anthropological application of a variety of quantitative techniques: sampling designs, analysis of variance and regression, multi-way contingency tables, multivariate analysis. A series of lectures will outline the logic and exhibit applications that have been made. Students will then generate their own application and presentation. Access to data files specific to the substantive field of cultural anthropology, archaeology, physical anthropology is provided. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ANTH 418.

ANTH 530 (2-6) d Social Change
This course is not eligible for Credit/D/Fail grading.

ANTH 532 (2-6) d Field Methods
This course is not eligible for Credit/D/Fail grading.

ANTH 534 (2-6) d Special Advanced Courses
This course is not eligible for Credit/D/Fail grading.

ANTH 540 (2-6) d Advanced Seminar
This course is not eligible for Credit/D/Fail grading.

ANTH 541 (3/6) d Advanced Seminar in Critical Museum Anthropology
This course is not eligible for Credit/D/Fail grading.

ANTH 545 (2-6) d Graduate Research Seminar
This course is not eligible for Credit/D/Fail grading.

ANTH 548 (0) Major Essay

ANTH 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

ANTH 551 (3/6) d Cultural Studies in Communication and Interpretation
History, theories, principles and techniques of communication and interpretation of cultural materials. Topics include examination of how various media (script, objects, film, video) are used to interpret histories, society, and culture in museums, art galleries,
historic sites and related areas; and how communication programs are planned, implemented and assessed.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: ANTH 431. Permission of the instructor is also acceptable.

ANTH 649 (0) Doctoral Dissertation

Faculty of Land and Food Systems

APBI: Applied Biology

APBI 100 (3) Soil and the Global Environment
Soil as the base of the Earth's ecosystem pyramid. The interconnection between soil, climate change and human activity, the carbon cycle, water resources, food security, food safety, and biofuel production. Strategies for sustaining soil resources.

APBI 200 (3) Introduction to Soil Science
Physical, chemical and biological properties of soils; soil formation, classification, use and conservation. There are no prerequisites for this course, but background in Biology 12, Chemistry 12, and Physics 12 (or first-year university-level) is strongly advised. [3-2]

APBI 210 (4) Vascular Plants
A comparative study of pteridophytes, gymnosperms and angiosperms, integrating form, function, and ecology. [3-3]
Prerequisite: Either (a) all of BIOL 121, BIOL 140 or (b) all of SCIE 001, BIOL 140. Or (c) 7 credits of first-year biology.

APBI 222 (3) Introduction to Horticulture
The cultivation of key temperate fruits, vegetables, greenhouse, ornamental and nursery crops in BC, integrated with scientific and practical aspects of their sustainable production and marketing.

APBI 235 (3) Biotechnology in Agricultural Food Production
Genetics, genomics, and biotechnology concepts with applications to agricultural food production and food safety. [3-3]
Prerequisite: All of BIOL 112, BIOL 121, BIOL 140.

APBI 244 (3) Introduction to Biometeorology
Basic principles and processes of climatology. Energy and water balance concepts. Weather systems and climate change, microclimate of soils, crops, forests, and animals. [3-2-0]
Equivalency: GEOB 204.

APBI 260 (6) Agroecology I: Introduction to principles and techniques
Biophysical and socioeconomic factors affecting systems management and production in selected agroecosystems. Credit will be granted for only one of APBI 260 or APBI 265.

APBI 265 (3) Sustainable Agriculture and Food Systems
Principles and practices necessary to understand practical concerns of sustainable food systems. Credit will be granted for only one of APBI 265 or APBI 260. [1-3-0]

APBI 290 (3) Introductory Topics in Applied Biology
Analysis and interpretation of current issues in applied biology. Topics will vary from year to year.

APBI 311 (3) Comparative Cardiovascular, Respiratory and Osmoregulatory Physiology
Cardiovascular, respiratory and osmoregulatory physiology of vertebrates.
Prerequisite: BIOL 204 and one of BIOL 260, BIOL 361. And 3rd year standing.
Equivalency: BIOL 364.

APBI 312 (3) Reproductive and Digestive Physiology
Reproductive and digestive physiology, and current technologies applied to these systems in domestic and wild animals.
Prerequisite: One of BIOL 204, BIOL 260. 3rd year standing.

APBI 314 (3) Animals and Society
Contemporary use of animals for food production, companionship, recreation and science; social and ethical issues concerning human impacts on animals; animals in human culture; protection of animals by society and the law.
Prerequisite: At least third-year standing in any faculty.

APBI 315 (3) Animal Welfare and the Ethics of Animal Use
Scientific assessment of animal well-being, ethical concepts applied to animal use, and animal welfare issues arising in agriculture, biomedical research and other areas. Credit will be granted for only one of APBI 315, ANSC 515, or AANB 515. [1-0-3]

**Prerequisite:** At least third-year standing in any faculty.

**APBI 316 (3)** Equine Biology, Health and Welfare
Anatomy, physiology, reproduction, nutrition of the horse; common disease pathology, prevention and treatments; equine behaviour. [3-0]

**APBI 318 (3)** Applied Plant Breeding
Small-scale classical (i.e., non-biotechnological) plant breeding. Hands-on, application-oriented approach to techniques and procedures for managing seed inventories, designing and implementing a simple plant breeding program, and evaluating the impact of selection on breeding populations and desired outcomes.

**APBI 319 (3)** Aquaculture and the Environment
Interactions between aquaculture and the environment. Current issues, comparison of systems, species, production methods, environments, and socioeconomics.

**Prerequisite:** One of BIOL 230, APBI 260, APBI 265, CONS 330, ENVR 200, ENVR 300 and third year standing. Or permission of the instructor.

**APBI 322 (4)** Horticultural Techniques
Horticulture theory and methodology in an experiential learning format. Plant identification, seeding, propagation, canopy management, cultivation media, horticultural systems examined in the context of integrated crop management.

**APBI 324 (3)** Introduction to Seed Plant Taxonomy
Introduction to seed plant taxonomy emphasizing descriptive morphology and identification. Each student will be required to submit a plant collection. [2-3-0]

**Prerequisite:** BIOL 121.

**Equivalency:** BIOL 324.

**APBI 326 (4)** Introductory Plant Pathology
Study of the ecology of plant pathogenic organisms; principles of disease development and control. [3-2-0]

**Equivalency:** BIOL 316.

**APBI 327 (3)** Introduction to Entomology
A survey of the structure, classification and biology of insects; ecology and life-histories of insects; insect-plant relations. [2-3-0]

**Prerequisite:** BIOL 121.

**Equivalency:** BIOL 327.

**APBI 328 (4)** Weed Science
Importance, identification, dissemination and biology of weeds; preventive, cultural, biological and chemical methods of control. [3-2-0]

**Equivalency:** BIOL 317.

**APBI 342 (3)** Soil Biology
The diversity of soil organisms (bacteria, protozoa, fungi, animals, plants) in natural and managed ecosystems; roles in primary production, nutrient cycling, decomposition and reclamation; interactions between soil organisms; responses to environmental change. [2-3-0]

**Prerequisite:** BIOL 121.

**Equivalency:** FRST 310.

**APBI 351 (4)** Plant Physiology
Mechanisms and regulation of functional processes contributing to the assimilation, transport and utilization of water, mineral nutrients and carbon by plants. [3-3-0]

**Prerequisite:** BIOL 121 and either (a) CHEM 123 or (b) all of CHEM 111, CHEM 113. CHEM 233 is recommended.

**Equivalency:** BIOL 351, FRST 311.

**APBI 360 (3)** Agroecology II: Application and analysis
Animals and Plants as Components of Agricultural Ecosystems. A systems approach is used to investigate the functions and interactions of plants and animals in agricultural systems.

**Prerequisite:** One of APBI 260, APBI 265.

**APBI 361 (3)** Key Indicators of Agroecosystem Sustainability
A detailed exploration of biophysical, economic, and social ecosystem sustainability indicators for primary production.
subsystems. [1-0-3]

APBI 365 (6) Summer Practicum in Sustainable Agriculture and Food Systems
Based at the UBC Farm. Application required. Fees will be assessed to meet expenses.
Prerequisite: One of APBI 260, APBI 265 and third-year standing.

APBI 398 (3) Research Methods in Applied Biology
Research methods including research design, scientific critique, writing proposals and reports, and oral presentation.
Prerequisite: Third-year standing in the Applied Biology program and permission of the instructor.

APBI 401 (3) Soil Processes
Integration of soil physics, chemistry, and biology in understanding essential soil processes. [3-0-0]
Prerequisite: APBI 200.

APBI 402 (3) Sustainable Soil Management
Application of fundamental, unifying, soil science principles in sustainable ecosystem management. [1-0-3]
Prerequisite: APBI 200.

APBI 403 (3) Soil Sampling, Analyses and Data Interpretation
Field and laboratory analytical techniques in the chemical, biological and physical assessment of soils. Credit will be granted for only one of SOIL 503 or APBI 403. [1-3-0]
Prerequisite: APBI 200.

APBI 410 (3) Applied Animal Health and Physiology
Application of physiology and pathology principles to health and disease of domestic animals. [3-0-0]
Prerequisite: BIOL 201 and one of APBI 311, CAPS 301.

APBI 411 (4) Reproductive Physiology and Technology
A comparative overview of reproductive physiology and reproductive technologies in domesticated and laboratory animals. [3-2-0]
Prerequisite: BIOL 201. Third year standing or higher.

APBI 412 (3) Belowground Ecosystems
Concepts, methods, and applications of belowground ecology with emphasis on biotic interactions in soil; roles that aboveground and belowground communities play in regulating the structure and function of terrestrial ecosystems and their responses to global change. Credit will be granted for only one of FRST 512 or APBI 412. [3-0-0]
Prerequisite: Fourth year standing in a Bachelor of Science Program. Permission is required for registration.

APBI 413 (3) Stress and Coping in Animals
Understanding, assessing, and managing stress in farm, companion, captive wildlife, and research animals: sources of stress; behavioural, emotional, cognitive, and physiological responses; effects on growth, reproduction, health.
Prerequisite: Third-year standing or higher. APBI 315 and courses in animal physiology and animal behavior recommended.

APBI 414 (3) Animals and Global Issues
Research seminar integrating diverse information to address global animal issues including: animal-source foods and human health, environmental impact of livestock production, trade in exotic animals. [3-0-0]
Prerequisite: One of APBI 314, APBI 315.

APBI 415 (3) Applied Animal Behaviour
Application of principles and research methods of animal behaviour to practical problems in the care of farm, companion, wild and research animals, and in animal training, and human-wildlife conflict. [3-0-0]

APBI 416 (3) Animal Welfare and Conservation Biology
Prerequisite: Third-year standing or higher. APBI 315 and BIOL 416 or CONS 220/330 recommended.

APBI 417 (4) Production and Postharvest Physiology of Vegetable Crops
Morphology, growth and development, production, compostition, quality, and postharvest physiology of vegetable crops. [3-2-0]

APBI 418 (3) Intensive Fish Production
Management of fin fish throughout the life cycle; broodstock, egg, larvae, and juvenile. Control of environmental factors, including pathogens, for maximum productivity at all life stages. [3-2-0]
Prerequisite: Third-year standing or higher. One of APBI 311, BIOL 204 or BIOL 260. APBI 312 recommended.

APBI 419 (3) Fish Health
Management of fish health in aquaculture; common fish pathogens, epidemiology, prevention, and treatment of diseases.

Prerequisite: Third year standing or higher. One of APBI 311, BIOL 204 or BIOL 260. APBI 312 and APBI 418 strongly recommended.

APBI 426 (3) Plant-Microbe Interactions
Biology and physiology of selected plant-microbe relationships. Impacts of plant-microbe relationships on society. [3-2-0]
Prerequisite: BIOL 201.
Equivalency: BIOL 421.

APBI 427 (3) Insect Ecology
Behavioural, population, and community ecology of insects. Interaction between insects and plants and the application of the principals of insect ecology to biological control of insects and weeds. [3-0]
Prerequisite: Either (a) BIOL 205 or (b) all of BIOL 327, APBI 327.
Equivalency: BIOL 411.

APBI 428 (3) Integrated Pest Management
Development and implementation of multi-disciplinary pest management programs in agricultural crops. [3-2]
Prerequisite: BIOL 121.

APBI 440 (3) Plant Genomics
Concepts, principles, and recent discoveries in genome structure and comparative genomics in plants with a focus on economically important plants; applications of genomics approaches to questions in plant genetics, evolution, and ecology. [3-0-0]
Corequisite: BIOL 335.
Equivalency: BIOL 440.

APBI 442 (3) Wine Grape and Berry Biology
Grapevine genetics, morphology, and physiology and major biological features of other important berry crops for British Columbia such as blueberry, cranberry, and raspberry. Credit will be granted for only one of APBI 442 or PLNT 542.
Prerequisite: All of BIOL 112, BIOL 121 and one of BIOL 200, BIOL 201, APBI 210, BIOL 210.

APBI 444 (3) Agroforestry
An introduction to the application of knowledge and principles of agroecology and forest ecology to global agroforestry systems. The course includes a one-weekend field trip that requires a supplemental fee. [1-0-3]
Prerequisite: An undergraduate course in ecology or equivalent.
Equivalency: FRST 444.

APBI 460 (3) Agroecology III: Synthesis and evaluation
The relationship between biological diversity and sustainability in food producing agroecosystems; emphasis on ecological similarities between natural ecosystems and managed agroecosystems.
Prerequisite: APBI 360 or equivalent.

APBI 461 (3) Applied Agroecology
Analysis and solution of problems in agricultural production systems through the integration and application of agroecological knowledge and principles. [1-0-3]

APBI 465 (3) Capstone in Sustainable Agriculture and Food Systems
Integrates classroom and applied learning at the UBC Farm with design project. [1-3-0]
Prerequisite: APBI 365.

APBI 490 (3) Advanced Topics in Applied Biology
Analysis and interpretation of current issues in applied biology.
Prerequisite: 3rd year standing or higher.

APBI 495 (3) Principles of Wildlife Management in Forests and Agricultural Environments
Impacts of wildlife on crop productivity in temperate and tropical environments, the resiliency of wildlife populations to conventional control methodology, adoption of innovative methods to reduce crop damage, and the impact of introduced species on native fauna. [2-0-1]
Equivalency: CONS 495.

APBI 496 (3/6) c Applied Animal Biology Practicum
Application of principles and concepts of Applied Animal Biology to experiential learning in the fields of wild, companion, lab, and farm animal welfare and management.
Prerequisite: Third-year standing or higher. APBI 314 and/or APBI 315 are recommended.
APBI 497 (2-6) Directed Studies
Prerequisite: Approval of program advisor.

APBI 498 (3) Undergraduate Essay
Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Consultation with a program adviser is required.

APBI 499 (6) Undergraduate Thesis
Design and execution of an experimental/analytical research project leading to the preparation of a thesis. Prerequisite: Approval of a program adviser; consult before the end of classes in third year.

Faculty of Applied Science

APPP: Applied Science Professional Program Platform

APPP 501 (1.5) Project Management and Leadership
Leading complex multidisciplinary projects through management processes; project management frameworks, standards; core management processes of planning, scheduling, estimating, survey of communication, risk, and management issues; case studies in industry-relevant project management. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

APPP 502 (1.5) Sustainability and Leadership
Skills for leading change that influences triple-bottom-line; sustainability, change agency systems thinking; awareness and perspective for engagement and communication; adaptive leadership; change dynamics; cases studies in organizational and social change. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

APPP 503 (1.5) Organizational Leadership
Behaviour of people and groups and its application to management and leadership within professional organizations; motivation, group dynamics, and organizational structure; leadership styles and effectiveness; assessing organizational effectiveness. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

APPP 504 (3) Business Acumen for Technical Leaders
Opportunity to tackle real-world problems in high-performing teams and present targeted solutions for assessment. Managerial accounting; strategy and performance; market evaluation; operations management; negotiations and contract management; business-case building; valuation. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

APPP 505 (3) Analytics and Interpretation for Applied Sciences
Relevant measurable metrics of a project; data interpretation techniques; introduction to data visualization; overview of big data and predictive analytics; strategies related to metrics and data, ethical and privacy concerns. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

APPP 506 (1-6) Capstone Project
A capstone design project designed to give students experience in leading complex multidisciplinary projects relevant to their professional specialization. Collaboratively delivered with the Faculty of Commerce and Business Administration. This course is not eligible for Credit/D/Fail grading.

Faculty of Applied Science

APSC: Applied Science

APSC 100 (3) Introduction to Engineering I
An introduction to the engineering profession including: roles and responsibilities of the engineer, the engineering disciplines, sustainability, an introduction to the engineering design process, introduction and application of the relevant foundational scientific principles, prototyping, engineering graphics, technical communication, and engineering ethics. This course is not eligible for Credit/D/Fail grading. [2-2-0]
APSC 101 (3) Introduction to Engineering II
An introduction to the engineering profession including: the engineering design process, sustainability, prototype testing, introduction and application of the relevant foundational scientific principles, team functioning, engineering graphics, and technical communication. This course is not eligible for Credit/D/Fail grading. Prerequisite: APSC 100.

APSC 110 (6) Co-operative Work Placement
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

APSC 122 (0) Introduction to Engineering
Non-credit course designed to introduce students to Engineering. Information on the Faculty, the profession and the particular skills and type of work done by practising engineers in different disciplines. [1-0-0]

APSC 150 (5) Engineering Case Studies
Application of scientific principles and technical knowledge to practical problems. Introduction to the engineering design process and to engineering graphics. This course is not eligible for Credit/D/Fail grading. [3-4-0]

APSC 151 (3) Computer-Aided Engineering Graphics
Orthographic projection, technical sketching, development of the ability to visualize in three dimensions. Standards and conventions of engineering drawing, graphical presentation of engineering data. Micro-computer based graphics aids. Engineering geometry and the solution of space problems. This course is not eligible for Credit/D/Fail grading. [1-0-4]

APSC 160 (3) Introduction to Computation in Engineering Design
Analysis and simulation, laboratory data acquisition and processing, measurement interfaces, engineering tools, computer systems organization, programming languages. Credit will only be given for one of: APSC 160, CPSC 301, or EOSC 211. This course is not eligible for Credit/D/Fail grading. [2-2-1]

APSC 172 (3) Engineering Analysis I
Functions, limits, differentiation, applications of derivatives, integration, applications of definite integrals. This course is not eligible for Credit/D/Fail grading. [3-0-1]

APSC 173 (3) Engineering Analysis II
Integrals and transcendental functions, techniques of integration, applications of integration, polar coordinates, infinite sequences and series, vectors and the geometry of space, and partial derivatives. This course is not eligible for Credit/D/Fail grading. [3-0-1] Prerequisite: APSC 172.

APSC 176 (3) Engineering Communication
Purpose, audience, content, format, and tone are studied, as are team-based report writings and presentations. Community Service Learning projects are integrated into existing assignments. An LPI level 5 is required for registration in this course. This course is not eligible for Credit/D/Fail grading. [2-0-2]

APSC 178 (4) Electricity, Magnetism, and Waves
Coulomb’s law, electric field, Gauss’ law, electric potential, conductors, capacitance, electric currents, resistance, DC circuits, magnetic fields and forces, sources of magnetic fields, electromagnetic induction, mechanical waves, electromagnetic waves, light propagation, geometrical optics. This course is not eligible for Credit/D/Fail grading. [4-0-2] Prerequisite: APSC 172. Corequisite: APSC 173.

APSC 179 (3) Linear Algebra for Engineers
Systems of linear equations, Gaussian elimination, engineering application of linear algebra, matrix operations, special matrices, determinants, vector space, orthogonality, eigenvalues and eigenvectors, linear transformation. [3-0-0]

APSC 180 (3) Statics
Force vectors, Cartesian coordinate system, free body diagram, dot and cross products, forces equilibrium of particles, force and moment equilibrium of rigid bodies, analysis of trusses, frames and machines, friction, wedges, pulleys, and belts. Applications of linear algebra in statics. This course is not eligible for Credit/D/Fail grading. [3-0-2]

APSC 182 (3) Matter and Energy I
Thermometry, states of matter and phase change, ideal and real gases, 1st law of thermodynamics, 2nd law of thermodynamics, liquids, solutions. This course is not eligible for Credit/D/Fail grading. [2-2-2*]

APSC 183 (3) Matter and Energy II
Atomic structures and bonding, solid crystals, chemical equilibrium, reactions in gas phase and in aqueous solutions, acid-base and redox reactions, kinetics of chemical reactions, thermochemistry, electrochemistry. This course is not eligible for Credit/D/Fail grading. [2-2*-2*]

**APSC 201 (3) Technical Communication**
Written and oral communication in engineering. Report preparation, business correspondence, and oral presentation of technical material. Credit will be granted for only one of ELEC 281, CPEN 281, BMEG 201 or APSC 201. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.

**APSC 202 (2) Technical Communication Engineering Physics I**
Written and oral communication in business correspondence, engineering design methods, report preparation, and oral presentations of technical material. Restricted to students in second year of the Engineering Physics Program. This course is not eligible for Credit/D/Fail grading. [2-0-1]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: ENPH 259.

**APSC 203 (1) Technical Communication Engineering Physics II**
Continuation of written and oral communication in business correspondence, engineering design methods, report preparation, and oral presentations of technical material. Restricted to students in second year of the Engineering Physics Program. This course is not eligible for Credit/D/Fail grading. [1-0-0]
Prerequisite: APSC 202.
Corequisite: ENPH 253.

**APSC 210 (6) Co-operative Work Placement**
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

**APSC 211 (6) Co-operative Work Placement**
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

**APSC 212 (6) Co-operative Work Placement**
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

**APSC 261 (3) Technology and Society I**
The course deals with the influence of technology on the social, political, economic, and environmental aspects of society. The specific subject matter varies from year to year. Examples of subjects considered include, resources, energy, nuclear power, technology, the effects of technology on the family, education, agriculture, international policy and others. [3-0-0]

**APSC 262 (3) Technology and Society II**
The course deals with the influence of technology on the social, political, economic and environmental aspects of society. The subject matter varies from year to year and differs from APSC 261. It may be taken as a continuation of APSC 261 or taken independently. Examples of subjects considered include pollution, work place health hazards, social impact of computers, problem solving, green revolution, technology and the third world, engineering ethics and others. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**APSC 263 (3) Technology and Development**
Environmental, economic, political, and social aspects of appropriate technologies in the developing world. Appropriate technology and infrastructure, trade and finance, transportation, energy, water access, communication, health, and gender. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**APSC 278 (3) Engineering Materials**
Atomic bonding; crystal structures and imperfections; properties of metals, ceramics, polymers, wood, concrete and fibre composite materials; selection of materials; corrosion; mechanical testing and heat treatment. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**APSC 279 (1) Engineering Materials Laboratory**
Atomic bonding; crystal structures and imperfections; properties of metals, ceramics, polymers, wood, concrete and fibre
composite materials; selection of materials; corrosion; mechanical testing and heat treatment. This course is not eligible for Credit/D/Fail grading. [0-2*-0]
Prerequisite: APSC 278.
Corequisite: APSC 278 may be taken.

APSC 310 (6) Co-operative Work Placement
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

APSC 311 (6) Co-operative Work Placement
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

APSC 312 (6) Co-operative Work Placement
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

APSC 331 (3) Intermediate Engineering Design I
Intermediate level engineering design project involving material in the curriculum of the Integrated Engineering program. For students in the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading. [1-4-0]

APSC 332 (3) Intermediate Engineering Design II
Intermediate level engineering design project involving material in the curriculum of the Integrated Engineering program. For students in the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading. [1-4-0]
Prerequisite: APSC 331.

APSC 364 (3) Applied Sustainability: UBC as a Living Laboratory
The role and function of common infrastructures, and the impact of various technological solutions on people, the economy, and the environment. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Third-year standing.

APSC 366 (3) The Art of the Possible: An Introduction to Engineering for Non-Engineers
An introduction to engineering for the non-specialist. A case-studies approach includes examples from sustainability-related technology, consumer products, structures, and energy conversion. [3-0-0]

APSC 377 (3) Nuclear Weapons and Arms Control
The evolution and contemporary significance of nuclear weapons and arms control policy and technology from the perspective of the physical and life sciences and the social sciences and humanities. Prerequisite: Third-year standing in B.A. or B.Sc. programs, or second-year standing in B.A.Sc. program. Equivalency: POLI 377.

APSC 380 (3) Introduction to Microcomputers
An introductory course intended for potential users of microcomputers in real time or non-computational engineering applications. Topics include: perspective on applications and costs; basic microcomputer hardware; principles of microcomputer operation; introduction to microcomputer programming and software design tools; input-output devices including transducers, analog-to-digital converters, digital-to-analog converters; input-output methods and interface characteristics; selected case studies such as direct digital controllers and sensor-based systems. Limited enrolment. Restricted to engineering students not taking Electrical or Computer Engineering. This course is not eligible for Credit/D/Fail grading. [2-3*-2*]

APSC 402 (3) Living Language: Science and Society
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance. This course is not eligible for Credit/D/Fail grading. Prerequisite: Fourth-year standing or permission of the instructor. Equivalency: ASTU 402, FRST 402, LFS 402, LLED 402, PHAR 402..

APSC 410 (6) Co-operative Work Placement
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.
APSC 411 (6) Co-operative Work Placement
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education. This course is not eligible for Credit/D/Fail grading.

APSC 412 (6) Co-operative Work Placement
Supervised, technical work experience in an approved company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and Co-operative Education Programs. This course is not eligible for Credit/D/Fail grading.

APSC 440 (3) Management Fundamentals for Technology-Based Product Marketing and Development
Management topics are presented from the perspective of technology-based industrial practice; project management, marketing and marketing planning, product development and commercialization, introduction to quality management, teamwork and effective individual participation. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing in Engineering.

APSC 450 (2) Professional Engineering Practice
Legislation affecting the practice of engineering; ethical principles and responsibilities. Management of engineering enterprises; labour relations, safety and environmental legislation. Restricted to engineering undergraduate students in the final year of their program. This course is not eligible for Credit/D/Fail grading. [2-0-0]

APSC 461 (3) Global Engineering Leadership
Introduction to concepts, theory, and practice of engineering leadership, including characteristics; individual and cultural differences, service and management contexts; managing change, conflicts, and crises; real-world ethics and core values. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Completion of third year.

APSC 462 (3) Global Engineering Leadership Practicum
International service learning (ISL) placement in which concepts, theory, and practice of engineering leadership are applied by working with a community organization on appropriate technology projects. This course is not eligible for Credit/D/Fail grading. Prerequisite: APSC 461 and registration with the Go Global ISL program and successful completion of Go Global program requirements.

APSC 486 (6) New Venture Design
Teams comprising students in APSC 486 and COMM 486 create a business plan and a prototype or engineering solution of a novel product, process, or process component. This course is not eligible for Credit/D/Fail grading. [1-4-0; 1-4-0]

APSC 496 (1-9) d Interdisciplinary Engineering Design Project
Projects involving students from several departments. This course is not eligible for Credit/D/Fail grading.

APSC 498 (1-6) d Directed Studies
Requires approval of a Department Head or Program Director. This course is not eligible for Credit/D/Fail grading.

APSC 510 (4) Advanced Technology Internship
Work in a technological setting on commercial and managerial aspects of an industrial project. A required internship to be taken at the end of the first year of the M.Eng. (Advanced Technology Management) program. This course is not eligible for Credit/D/Fail grading.

APSC 511 (2) Advanced Technology Management Colloquium
Student reports on internship, guest speakers from industry, preparation of group projects, joint study of industrial reports. Required of students enrolled in the M.Eng. (Advanced Technology Management) program. This course is not eligible for Credit/D/Fail grading.

APSC 512 (3) Intellectual Property Management and Technology Commercialization
Nature of knowledge and intellectual property. Value creation through knowledge and competitive advantage of knowledge. Copyrights, patents, trademarks, and licenses. Negotiation of deals and contracts involving knowledge and technology transfer or commercialization. Market assessments and valuations. This course is not eligible for Credit/D/Fail grading.

APSC 520 (6) Co-op Work Term I
Supervised, technical paid work experience with a public or private organization for a minimum of 12 weeks full-time. Co-op assignment(s) required. Restricted to graduate degree students meeting requirement(s) of the Faculty of Applied Science and the Co-operative Education program. This course is not eligible for Credit/D/Fail grading.

APSC 521 (6) Co-op Work Term II
Supervised, technical paid work experience with a public or private organization for a minimum of 12 weeks full-time. Co-op assignment(s) required. Restricted to graduate degree students meeting requirement(s) of the Faculty of Applied Science and the Co-operative Education program. This course is not eligible for Credit/D/Fail grading.

APSC 522 (6) Co-op Work Term III
Supervised, technical paid work experience with a public or private organization for a minimum of 12 weeks full-time. Co-op assignment(s) required. Restricted to graduate degree students meeting requirement(s) of the Faculty of Applied Science and the Co-operative Education program. This course is not eligible for Credit/D/Fail grading.

APSC 540 (3) Business Decisions for Engineering Ventures
Issues and case studies in creating and running engineering ventures and projects, with a particular emphasis on strategic planning, engineering economics, finance and risk. This course is not eligible for Credit/D/Fail grading.

APSC 541 (3) Technology Entrepreneurship for Engineers
A broad introduction to the entrepreneurial process, for engineers who would like to form or grow a technology company, and those with a general interest in the field. Key factors of new venture creation are identified and evaluated. This course is not eligible for Credit/D/Fail grading.

APSC 597 (6) Project for M.Eng. Studies
This course is not eligible for Credit/D/Fail grading.

APSC 598 (1-6) d Topics in Engineering
This course is not eligible for Credit/D/Fail grading.

Classical, Near Eastern and Religious Studies, Faculty of Arts

ARBC: Arabic Studies

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

ARBC 101 (3) Introduction to the Grammar and Vocabulary of Classic Arabic

ARBC 102 (3) Introduction to the Grammar and Vocabulary of Classic Arabic II
Prerequisite: ARBC 101.

ARBC 201 (3) Classical Arabic (Intermediate) I
Increased reading ability as well as learning the further essentials of grammar.
Prerequisite: ARBC 102.

ARBC 202 (3) Classical Arabic (Intermediate) II
Increased reading ability as well as learning the further essentials of grammar. Continuation of ARBC 201.
Prerequisite: ARBC 201.

ARBC 420 (3-12) d Supervised Study in Classical Arabic
Religious and literary Arabic texts pertaining to the early and medieval Islamic world. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARBC 400.

School of Architecture and Landscape Architecture, Faculty of Applied Science

ARCH: Architecture

ARCH 403 (3) Themes in Architecture and Design
Introduction to a broad range of themes in architecture and design. Restricted to B.En.D. students.

ARCH 404 (3-9) d Topics in Architectural History I (Pre-1900)
History of architecture in the pre-1900 time period. Technological, political, social, and economic changes that have influenced architecture and related fields. This course is not eligible for Credit/D/Fail grading.
ARCH 405 (3-9) Topics in Architectural History II (1900-Present)
History of architecture in the post-1900 time period. Technological, political, social, and economic changes which have influenced architecture and related fields. This course is not eligible for Credit/D/Fail grading.

ARCH 407 (3) Research Methods
Motivations and techniques which underpin environmental design research.

ARCH 410 (3) Design Methods
Techniques for environmental design, including architecture.

ARCH 411 (3) Materials and Methods of Construction
An investigation of building materials and systems considering design objectives, environmental conditions, historical context, regulatory controls, and economic constraints. The major building systems of light wood frame, steel, and concrete and the technical and expressive opportunities inherent in each. Credit will be granted for only one of ARCH 411 or DES 232. Restricted to B.En.D. students. This course is not eligible for Credit/D/Fail grading.

ARCH 437 (3) Geometric Modeling
Advanced modeling, rendering and image processing applications; the construction of geometric models, their viewing transformations, light and material attributes; mapping and rendering are introduced. Credit will be granted for one of ARCH 437, ARCH 517 or DES 212. Restricted to B.En.D. students. This course is not eligible for Credit/D/Fail grading.

ARCH 500 (9) Architectural Design Studio I
A series of projects focusing on conceptual development, design synthesis, principles of typology, organization and representation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 502.

ARCH 501 (9) Architectural Design Studio II
This course is not eligible for Credit/D/Fail grading. Prerequisite: ARCH 500.

ARCH 502 (2) Introductory Workshop
Commences in August the two weeks prior to Labour Day. Enrolment mandatory for all incoming students. A non-refundable fee will charged to cover expenses. Credit will be granted for only one of ARCH 502 or LARC 511. This course is not eligible for Credit/D/Fail grading.

ARCH 504 (3-9) Topics in Architectural History I (Pre-1900)
History of architecture in the pre-1900 time period. Technological, political, social, and economic changes that have influenced architecture and related fields. This course is not eligible for Credit/D/Fail grading.

ARCH 505 (3-9) Topics in Architectural History II (1900-Present)
History of architecture in the post-1900 time period. Technological, political, social, and economic changes which have influenced architecture and related fields. This course is not eligible for Credit/D/Fail grading.

ARCH 511 (3) Architectural Technology I
Architectural technology, including materials and methods, construction types, and building system integration. Strong emphasis on enclosure performance with focus on smaller buildings and light wood framing construction. This course is not eligible for Credit/D/Fail grading.

ARCH 512 (3) Structures I
Quantitative and qualitative means for understanding of statics, materials and flow of force through a structure. This course is not eligible for Credit/D/Fail grading.

ARCH 513 (3) Environmental Systems and Controls I
Building form and fabric considerations to assure appropriate thermal, luminous, sonic, and atmospheric conditions within buildings. This course is not eligible for Credit/D/Fail grading.

ARCH 515 (3) Design Media I
Foundations of manual and digital skills and concepts employing a variety of subjects, techniques and software. Credit will be granted for only one of ARCH 515, DES 211 or ENDS 320. This course is not eligible for Credit/D/Fail grading.

ARCH 517 (3) Design Media II
Intermediate manual and digital skills and concepts employing a variety of subjects, techniques and software. Credit will be granted for only one of ARCH 517, ARCH 437 or DES 212. This course is not eligible for Credit/D/Fail grading. Prerequisite: ARCH 515.

ARCH 520 (9) Architectural Design Studio III
This course is not eligible for Credit/D/Fail grading. Prerequisite: ARCH 501.

ARCH 521 (9) Architectural Design Studio IV
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of ARCH 500, ARCH 501, ARCH 520, ARCH 511, ARCH 512, ARCH 513, ARCH 531.

ARCH 522 (3) Current Issues in Architecture
A seminar examining current issues in Architecture, based on reading assignments, papers and presentations. Enrolment is limited to facilitate discussion. This course is not eligible for Credit/D/Fail grading.

ARCH 523 (3) Contemporary Theories in Architecture
Theoretical propositions and their built manifestations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 500, ARCH 501.

ARCH 531 (3) Architectural Technology II
Analysis and design of advanced assemblies. Integration of multiple building systems within a wide range of construction types, and more complex enclosures in a variety of climatic conditions. Emphasis on technical performance, durability and sustainability. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 511.

ARCH 532 (3) Architectural Structures II
Complex multi-span and continuous systems: effective material configuration, approximate methods of analysis, selection of appropriate structural systems, earthquake configuration and high rises. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 512.

ARCH 533 (3) Environmental Systems and Controls II
Mechanical and electrical services of buildings and their integration with architectural form and fabric. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 513.

ARCH 538 (3-9) d Study of Architecture Abroad
More than one section may be taken concurrently. This course is not eligible for Credit/D/Fail grading.

ARCH 539 (9) Architectural Design Abroad
Design studio component of term-long study abroad offering. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 500, ARCH 501.
Corequisite: ARCH 538.

ARCH 540 (9) Architectural Design Studio V
This course is not eligible for Credit/D/Fail grading. Prerequisite: ARCH 521.

ARCH 541 (3) Professional Practice
Ethical, legal and business context of professional practice, including contracts, project management. This course is not eligible for Credit/D/Fail grading.

ARCH 543 (3) Seminar: Contemporary Practice
Topics across a range of practice related subject matter. This course is not eligible for Credit/D/Fail grading.

ARCH 544 (3/6) d Seminar in Architecture
An exploration of selected topics in architecture. Enrolment is limited to facilitate discussion. This course is not eligible for Credit/D/Fail grading.

ARCH 545 (3/6) d Directed Studies in Architecture
Directed research and exploration of selected topics in architecture. This course is not eligible for Credit/D/Fail grading.

ARCH 548 (3) Graduate Project Part I
Preparation of a graduation design project including literature review. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Completion of all second-year requirements.

ARCH 549 (9) Graduate Project Part II
Design component, completion, and defense of the graduation design project. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 548 and no more than 18 credits outstanding beyond ARCH 549.

ARCH 551 (3) Communicating Construction
Understanding the role, composition, organization, and conventions of the formal documentation necessary for communication of an architectural design to those undertaking the construction. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 511, ARCH 512.

ARCH 555 (3) Co-op Work Placement 1
Approved and supervised work experience for a minimum of 4 months. Technical report required. Restricted to students admitted to the Architecture Co-op Education Program. This course is not eligible for Credit/D/Fail grading.

ARCH 556 (3) Co-op Work Placement 2
Approved and supervised work experience for a minimum of 4 months. Technical report required. Restricted to students admitted to the Architecture Co-op Education Program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 555.

ARCH 561 (3) Seminar: History and Theory
Topics across a range of history/theory-based subject matter. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 504, ARCH 505, ARCH 523, ARCH 568.

ARCH 568 (3) Research Methods
Contemporary concerns and issues associated with research in architecture and landscape architecture. This course is not eligible for Credit/D/Fail grading.

ARCH 571 (3/6) d Seminar: Technology and Analysis
Topics across a range of building material and construction technology-based subject matter. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 511, ARCH 512, ARCH 531.

ARCH 572 (3) Research Seminar: Advanced Structure and Generative Methods
Structural principles and corresponding mathematical representation as three- and four-dimensional digital models using structural analysis software. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 512.

ARCH 573 (3-12) d Seminar: Environmental Studies
An investigation of specialized environmental topics concerning theory and the practice of architecture. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ARCH 513.

ARCH 574 (3) Green Building Contemporary Practice
Enhanced building environmental performance and the integration of green building principles, strategies and technologies. This course is not eligible for Credit/D/Fail grading.
Equivalent: HPB 501.

ARCH 575 (3) Regenerative Development
The relationship between human and natural systems in the context of regenerative design. Provides an understanding of how regenerative approaches differ from green design and how they can offer new insights and directions for design. This course is not eligible for Credit/D/Fail grading.
Equivalent: HPB 502.

ARCH 577 (3) Seminar: Design Media
Topics across a range of design media-based subject matter. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ARCH 515, ARCH 517.

ARCH 597 (3/6) d Special Topics
Individual or small group study of special topics. This course is not eligible for Credit/D/Fail grading.

ARCH 598 (12) Research Thesis
Restricted to M.A.S.A. candidates. This course is not eligible for Credit/D/Fail grading.

Anthropology, Faculty of Arts

ARCL: Anthropological Archaeology

ARCL 103 (3) Introduction to Archaeology
Survey of world archaeology, from the emergence of humankind to the beginning of state societies.

ARCL 140 (3) Bones: The Origins of Humanity
The origin and evolution of the human lineage and the emergence of human biological and cultural traits with emphasis on the fossil record before the Pleistocene. Credit will be granted for only one of ARCL 140 or ANTH 225.

ARCL 203 (3) Archaeological Methods
Introduces the methods and principles applied in anthropological archaeology and cultural-historical research.

ARCL 204 (3) Great Archaeological Discoveries
An examination of some momentous discoveries in archaeology that have shaped our knowledge of the ancient world and the history of humanity.

ARCL 228 (3) Forensic Anthropology
The application of methods from biological anthropology and archaeology to the identification, recovery, and analysis of skeletal remains from crime scenes, mass disasters, and unexplained deaths.

ARCL 231 (3) Ancient North America
Introductory survey of North American archaeology comparing the ancient cultures from all major regions of Canada and the US.

ARCL 232 (3) Ancient Latin America
The archaeology of ancient Mexico, Central and South America, highlighting recent discoveries about the emergence and growth of civilizations such as the Aztecs, Maya, Zapotec, Inca, Chimor and their ancestors.

ARCL 305 (3) Archaeological Interpretation
Current theoretical developments explored through the practice of archaeology. Examples drawn from a range of times and places focusing on emerging technologies, food production, colonial encounters and culture contact, materiality and symbolic systems, social inequality and complexity, and human-environmental interactions.
Prerequisite: ARCL 203.

ARCL 306 (6) Summer Field Training in Archaeology
Intensive training in excavation techniques and interpretation, including mapping procedures, recording, preliminary analysis, and reporting. Students will participate in an excavation for the Summer Session and will use this excavation as a basis for lectures, discussions and reports. Additional Field Trip Fees are charged for this course.
Prerequisite: ARCL 305.

ARCL 309 (3) The Archaeology of Collapse and Sustainability
An evaluation of the issues of sustainability and collapse of ecological and social systems through the archaeological study of the past.

ARCL 318 (3) Archaeology of Hunter-Gatherer-Forager-Societies
Early hunter-gatherer-forager societies, spanning the period from the emergence of the first tool-using hominins to the origins of agriculture.

ARCL 319 (3) The Emergence of Complex Societies in Eurasia and Africa
Archaeological evidence and theories for the origins and spread of settled village life, food production systems, and complex social and political organization: Early Neolithic period through to the appearance of the old world civilizations.

ARCL 322 (3) Archaeological Foundations of East and Southeast Asia
Survey of the archaeology of East and Southeast Asia, with an emphasis on the beginnings of the economic, social, political, and artistic traditions and systems of the great civilizations, and the conditions in which they arose. Theories of cultural development emphasizing Neolithic and state-level societies will be discussed.

ARCL 323 (3) Archaeological Foundations of Mesoamerica
The archaeology of Mexico and Central America with an emphasis on the emergence of economic, social, political, and religious organization. Seminar format discussing recent research and current discoveries.

ARCL 324 (3) Archaeological Foundations of South America
The archaeology of South America with an emphasis on the emergence of economic, social, political, and religious organization, and a primary focus on the Andean region. Seminar format with lectures discussing recent research and current discoveries.
Prerequisite: ARCL 232.

ARCL 325 (3/6) d Paleoanthropology
Origin and development of the hominins; the hominin fossil record, and theories relating to hominin evolution.
Prerequisite: ARCL 140.

ARCL 326 (3) Primatology
A comprehensive survey of primates, with emphasis on evolution, ecology, social organization, social behaviour, and field
studies.

**Prerequisite:** ARCL 140.

**ARCL 405 (3) Archaeological and Anthropological Mapping**
Current methods in mapping spatial information in archaeology and related subfields of anthropology.

**ARCL 406 (3/6) Analytical Techniques in Archaeology**
A survey of methods and techniques in the interpretation of archaeological data; practical experience in processing and analyzing archaeological materials by means of a research project. Students will prepare manuscripts, drawings and photographs for publication and will learn the basics of lithic and faunal analyses.

**Prerequisite:** ARCL 305.

**ARCL 410 (3/6) Archaeology of a Special Area in Africa, Eurasia, or Oceania**
Analysis of the archaeology of one of the listed areas, including a summary of the literature and examination of specific sites and analytical issues. The area covered will vary according to the instructor's expertise.

**Prerequisite:** One of ARCL 305, ARCL 318, ARCL 319, ARCL 322.

**ARCL 411 (3/6) Prehistory of a Special Area in the New World**
Analysis of the prehistory of a selected New World area, including a summary of the literature and discussion of relevant problems. The course will provide background for students in North, Central, and South American area studies. Typical offerings include the prehistory of Mesoamerica, the Southwest, North America and the Mayan areas.

**Prerequisite:** One of ARCL 305, ARCL 321.

**ARCL 419 (3) The Archaeology of Death**
A survey of methods, theory, and case-studies in mortuary archaeology.

**Prerequisite:** ARCL 203.

**ARCL 420 (3/6) First Nations Archaeology of British Columbia**
An advanced study of the prehistoric archaeology of coastal and interior Native Peoples. A critical analysis of the archaeological evidence and interpretations of prehistoric cultural developments from the earliest migrations up to historical contact.

**ARCL 424 (3/6) Practicing Archaeology and the Management of Cultural Resources**
Survey of the use of archaeology in the public context and interest, particularly the identification, evaluation, conservation, and management of archaeological resources. Laws and policies, principles, methods, and ethical concerns guiding current practices, public involvement, relationships with indigenous communities, and contemporary issues in cultural resources management.

**Prerequisite:** ARCL 203.

**ARCL 425 (3) Paleodiet**
The archaeological evidence for the change of human diets over time and the methods used to reconstruct past diets.

**ARCL 430 (3) Archaeological Survey Methods**
Analytical and practical skills in locating archaeological sites and data leading to spatial patterns and historical interpretation.

**Prerequisite:** ARCL 203.

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**School of Library, Archival & Information Studies, Faculty of Arts**

**ARST: Archival Studies**

**ARST 500 (3) Information Technology and Archives**
This course is not eligible for Credit/D/Fail grading.

**ARST 510 (3) Archival Diplomatics**
This course is not eligible for Credit/D/Fail grading.

**ARST 515 (3) Arrangement and Description of Archives**
This course is not eligible for Credit/D/Fail grading.

**ARST 516 (3) Management of Current Records**
This course is not eligible for Credit/D/Fail grading.

**ARST 517 (3) History of Record Keeping**
This course is not eligible for Credit/D/Fail grading.
ARST 520 (3) Selection and Acquisition of Archival Documents
   This course is not eligible for Credit/D/Fail grading.

ARST 530 (3) The History of the Canadian Administrative System
   This course is not eligible for Credit/D/Fail grading.

ARST 540 (3) Archival Public Services
   This course is not eligible for Credit/D/Fail grading.

ARST 545 (3) Advanced Arrangement and Description of Archival Documents
   This course is not eligible for Credit/D/Fail grading.

ARST 550 (3) Management of Audiovisual and Non-textual Archives
   This course is not eligible for Credit/D/Fail grading.

ARST 554 (3) Database Design
   This course is not eligible for Credit/D/Fail grading.

ARST 555 (3) The Preservation of Digital Records
   This course is not eligible for Credit/D/Fail grading.

ARST 556 (1-12) d Topics in Archival Automation
   This course is not eligible for Credit/D/Fail grading.

ARST 560 (3) Records and Information Governance
   This course is not eligible for Credit/D/Fail grading.

ARST 565 (3) Administering Records under Freedom of Information and Protection of Privacy Legislation
   This course is not eligible for Credit/D/Fail grading.

ARST 570 (3) Management of Information Organizations
   This course is not eligible for Credit/D/Fail grading. Equivalency: LIBR 504.

ARST 573 (3) Archival Systems and the Profession
   This course is not eligible for Credit/D/Fail grading.

ARST 575 (1-12) d Topics in the Management of Records
   This course is not eligible for Credit/D/Fail grading.

ARST 580 (3) Records, Archives, and the Law
   This course is not eligible for Credit/D/Fail grading.

ARST 587 (3) Preservation
   This course is not eligible for Credit/D/Fail grading. Equivalency: LIBR 587.

ARST 591 (3) Archival Research and Scholarship
   This course is not eligible for Credit/D/Fail grading.

ARST 592 (3-6) c Directed Research Project
   This course is not eligible for Credit/D/Fail grading. Prerequisite: ARST 590.

ARST 593 (3/12) d Seminar
   This course is not eligible for Credit/D/Fail grading.

ARST 594 (3-6) c Directed Study
   This course is not eligible for Credit/D/Fail grading.

ARST 595 (3) Internship
   This course is not eligible for Credit/D/Fail grading.

ARST 596 (3) Professional Experience
   Project-based experience undertaken with a faculty associate occupying a minimum of ten hours a week for 12 consecutive weeks or the equivalent time. Evaluation: Pass/Fail. This course is not eligible for Credit/D/Fail grading. Prerequisite: 24 credits in the program are required.

ARST 599 (6/12) d Thesis
   This course is not eligible for Credit/D/Fail grading.
Art History, Visual Art and Theory, Faculty of Arts

ARTH: Art History

Not every course is given every year. For details of current offerings, consult the departmental website at www.ahva.ubc.ca. Students wishing to take fourth-year seminars should normally have had a closely related third-year course and are advised to check with the instructor in this regard. Credit will be given to either the current ARTH listing or its former FINA equivalent.

ARTH 101 (3) Ways of Seeing: Introduction to Visual Studies
Drawing on examples from across history and around the world, this course deals with the role of the visual in society, culture, and everyday experience.

ARTH 102 (3) Crisis and Contradiction in Art and the Built Environment
Concepts and issues critical to the understanding of art and its histories in a global context.

ARTH 225 (3) Art in Europe to the Sixteenth Century
A selective survey of painting, sculpture, and architecture.

ARTH 226 (3) Art in an Era of Global Expansion
A selective survey of painting, sculpture, and architecture from the 16th century to the emergence of the modern era.

ARTH 227 (3) Art and the Visual Environment in the Modern and Post-modern Periods
A selective survey of visual art, architecture and other visual media since 1900.

ARTH 251 (3) Asian Arts: From Chinese Warriors to Bollywood Posters
A thematic examination of Asian arts, such as historic, religious, and secular painting and sculpture to contemporary visual culture.

ARTH 253 (3) Asian Architecture: Sacred and Urban Spaces
Select built forms in Asia, such as temples, tombs, palaces, cities and gardens, and their relations to cultural, social and political systems.

ARTH 261 (3) Pre-Hispanic Arts of Central and South America
The relevance of various arts to social institutions in ancient societies of Peru and Mesoamerica.

ARTH 262 (3) Indigenous Arts of North America
A survey of the artistic production by Indigenous peoples of North America from pre-contact times to the present.

ARTH 300 (3) Seminar on Methods and Approaches in Art History
Theories, problems, and literature in the study of art history. Required of all Major and Honours students in art history. This course is not eligible for Credit/D/Fail grading.

ARTH 310 (3) Art and the Christian Transformation of the Roman Empire
Visual culture and the rise of Christianity; social, political and religious contexts of art, including diverse viewing practices and cultural frameworks. Credit will be granted for only one of ARTH 310 or ARTH 330.

ARTH 311 (3) Art in the Early Medieval West
From pagan adornment to Christian devotion to service of Christian or Islamic rule (AD 500 - 1000). Credit will be granted for only one of ARTH 311 or ARTH 331.

ARTH 312 (3) Medieval Art in the Age of Monasticism
Art in Western Europe between 1000 and 1200; the role of monasteries as leading institutions and patrons of art and large scale architecture. Credit will be granted for only one of ARTH 312 or ARTH 332.

ARTH 313 (3) Art, Church, Society and their Margins in the Later Middle Ages
Diversification of the arts and architecture with the expansion of patronage in late medieval society. Credit will be granted for only one of ARTH 313 or ARTH 333.

ARTH 319 (3) The Archaeology of Ancient Iraq and Syria: Babylon and Beyond
An overview of the archaeology of the ancient Near East, with special emphasis on the civilizations of Mesopotamia, from the appearance of the first cities (c. 3400 BCE) to the end of the Persian period (c. 330 BCE).
Prerequisite: NEST 101 is highly recommended.
Equivalence: NEST 319.
ARTH 320 (3) Entangled Worlds: Spain and Colonial Latin America (1500-1700)
Role of visual art and culture within Catholic Spain and colonial Latin America is surveyed, with emphasis on transculturation from mudejar to mestizaje.

ARTH 321 (3) Public and Private Bodies: Italian Renaissance Art and Culture
Visual art and culture within the social, political, and religious contexts of the Papacy and the city-states ca. 1350-1550 (Siena, Florence, Venice, Mantua).

ARTH 322 (3) Early Modern Italian Art and Culture (ca. 1550-1700)
Focus primarily on Rome as the center of artistic, cultural, economic, and religious power in the seventeenth century.

ARTH 323 (3) Heaven and Earth: Renaissance Art and Culture in Northern Europe
Early Modern painting, sculpture, and the graphic arts from the great devotional triptychs, through the Reformation, to the emergence of a secular art (1400-1600).

ARTH 324 (3) Urban and Courtly Arts in Early Modern Northern Europe (1600-1700)
The role of visual art in 17th century court cultures, commercial urban centres, and emergent nation states.

ARTH 325 (3) Ancient Egypt: The Archaeology of the Land of the Pharaohs
The material remains of the ancient Egyptians from monumental tombs and temples to the artifacts of daily life; the development of Egyptian civilization from the rise of the first rulers to its incorporation into the Roman Empire.
Equivalency: NEST 304.

ARTH 329 (6) Greek and Roman Art
Emphasis on the architecture, sculpture, painting, and decorative arts of Greece and Rome.
Equivalency: CLST 330.

ARTH 338 (3) Visual Culture in the Age of Enlightenment and Revolution (1715-1830)
Art, architecture, and social space in Europe and America: redefining gender, identity and nation in the era of industrialization and political change.

ARTH 339 (3) 19th-Century Art and Social Space
Ideologies of gender, class, race, ethnicity, and economics in 19th-century European and American visual culture.

ARTH 340 (3) 20th Century Art and Culture: The Triumph and Demise of Modernism
A critical survey of western art and cultural production from the turn of the century to the development of Pop Art.

ARTH 341 (3) 20th Century Art and Culture: The Postmodern
A critical examination of international visual art and culture from the 1950s to the present; the role of art in consumerist society and the emergence of postmodernism.

ARTH 342 (3) Latin American Art: Modern and Contemporary
Analyses of specific works and texts will emphasize visual inventions and meaning in the light of recent theoretical debates.

ARTH 343 (3) Art and Photography in Canada to 1920
Art, artists, and art institutions from the establishment of the French and English colonies to the founding of the Group of Seven: issues of race, wilderness, and colonial expansion.

ARTH 344 (3) Art and Photography in Canada, 1920 to the Present
Art movements and art institutions from the landscape paintings of the Group of Seven to the photo-conceptualist practices of the Vancouver school.

ARTH 345 (3) History of Photography: Archive, Spectacle, Reality
History and theory of photography, from the competitive context of invention in the 1830s to contemporary uses in social media.

ARTH 346 (3) Architecture in Europe: Building the Fabric of the Modern State (1715-1837)
The role of architecture within the development of the modern state. A survey of broad cultural dynamics, particular building projects and design careers.

ARTH 347 (3) Architecture in Europe: Modern Paradigms of Design (1837-present)
An examination of new requirements imposed on architecture by the consolidation of a capitalist economy, industrialization, new technologies and scientific methods.

ARTH 348 (3) Architecture in North America: Colonial Projects and Disruptions (1605-1867)
The role of architecture in the imposition of European governance within North America; the modification of received conventions in relation to topographical, ethnic-religious and political factors.
ARTH 349 (3) Architecture in North America: Independent Design Idioms (1867-present)
The emergence of a distinctive architecture that superseded British and European agendas; the growth of private and public patronage and the establishment of modern design and practice.

ARTH 350 (3) Grounding the Islamic Image
Contextualizing the complex language of images in the Islamic world.

ARTH 351 (3/6) d Art and Architecture in the Islamic World
A thematic study of visual arts, architecture, and objects from the Islamic world.
Corequisite: RELG 341

ARTH 352 (3) Historic India: Images, Temples and the Construction of Indian Art History
North and South Indian art and architecture with an emphasis on Buddhism and Hinduism.

ARTH 353 (3) Nepal and Tibet: Art, Ritual and Performance
Art of the Himalayan region situated within social and religious practices, festivals, and performances.

ARTH 354 (3) Mughal India: Art, Architecture and the Spectacle of Empire
The complex relationship of Mughal imperial architecture and painting with those of the Hindu Rajput courts.

ARTH 355 (3) Modern and Contemporary India: Art in Colonial and Independent India
The development of a new Indian art during the colonial period and nationalist movement; the construction of India's contemporary visual culture.

ARTH 357 (3) Chinese Art and Architecture: Patronage and Collecting
The commission, production, preservation, and transmission of Chinese monuments and artworks focusing on the court and questions of cultural policies. This course is not eligible for Credit/D/Fail grading.

ARTH 358 (3) Chinese Art for the Afterlife
Close analyses of Chinese tomb objects and tombs as spatial constructs in their historical, ritual, and social context.

ARTH 360 (3) Chinese Painting: Word and Image
Analyses visual narratives and relationships between painting, calligraphy, and poetry in court and literati painting.

ARTH 361 (3) Chinese Modern and Contemporary Art
Chinese art and its global entanglements from Qing Encounters to the 21st century.

ARTH 362 (3) Art in Japan: Objects and Spaces
Changing relationship between art objects and the built environment in the Japanese archipelago, in its social and historical context.

ARTH 363 (3) Art in Japan: The Problem with Painting
Key debates in the history of painting and its institutionalization.

ARTH 368 (3) Art in Japan: Print Media
Historical and theoretical questions concerning the development of print media in Japan, from Edo period woodcuts to the advent of digital technologies.

ARTH 369 (3) Art in Japan: Modern Visual Culture
Self and community in the art and visual culture of modern Japan.

ARTH 370 (3) Arts of Mexico's Early Peoples
Pre-Aztec monumental and portable arts of the Olmec, Zapotec, Teotihuacan and Classic Veracruz peoples.

ARTH 371 (3) Arts of the Aztec period in Mexico
Symbolic meanings and political agendas of Aztec architecture, sculpture and manuscript illustration investigated using Spanish accounts.

ARTH 372 (3) Maya Public Ritual Arts
Architecture, sculpture, costume, and visual productions associated with Maya public ritual, including the ancient ball game and modern cofrad?a dances.

ARTH 373 (3) Maya Arts of Everyday Life
Social context and meaning of the Maya's elaborate architecture, sculpture, mural paintings, jewelry, ceramics, figurines, and textiles, ancient and modern, of residences from humble to palatial.

ARTH 376 (3) Arts of the Northwest Coast Peoples: The North
The histories, historiography and cultural diversity of the Northern Northwest Coast region; persistence and innovation in the arts in communities, and in cross-cultural and market spheres.

ARTH 377 (3) Arts of the Northwest Coast Peoples: The South
The histories, historiography and cultural diversity of the Southern Northwest Coast region; persistence and innovation in the arts in communities, and in cross-cultural and market spheres.

ARTH 380 (3) Art as Technology
Relationship between artistic practice and media, examined through a history of paradigm shifts in technology.

ARTH 381 (3) The Artist in the World
Critical approach to the figure of the artist in art, film and texts, from the Early Modern period to the present.

ARTH 382 (3) Is Art History Queer?
Issues in the history of art through the lens of queer theory.

ARTH 397 (3/6) d Special Topics

ARTH 410 (3) Seminar in African Art
Key debates in the art of Africa and the African diaspora. This course is not eligible for Credit/D/Fail grading.

ARTH 429 (3/6) d Studies in the Art and Archeology of Greece and Rome

ARTH 432 (3) Seminar in the Art of the Middle Ages
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 431, ARTH 433.

ARTH 435 (3) Seminar in Early Modern: Renaissance
This course is not eligible for Credit/D/Fail grading.

ARTH 436 (3) Seminar in Early Modern Art
This course is not eligible for Credit/D/Fail grading.

ARTH 437 (3) Seminar in Early Modern: 17th Century
This course is not eligible for Credit/D/Fail grading.

ARTH 439 (3) Seminar in 18th & 19th-Century Visual Culture
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 438.

ARTH 440 (3/6) d Seminar in Modern and Contemporary Art
This course is not eligible for Credit/D/Fail grading.

ARTH 442 (3) Seminar in Contemporary Latin American Art
This course is not eligible for Credit/D/Fail grading.

ARTH 443 (3) Seminar in Canadian Art
This course is not eligible for Credit/D/Fail grading.

ARTH 445 (3) Film and the City
The complex interrelations between film and the city; dominant urban theories, film technologies and viewing practices and the intersections between them. This course is not eligible for Credit/D/Fail grading.

ARTH 448 (3) Seminar in North American Architecture
This course is not eligible for Credit/D/Fail grading.

ARTH 450 (3) Seminar in Art in the Islamic World
Key debates in the field of art and architecture in the Islamic World.

ARTH 455 (3) Seminar in the Art of South Asia
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 457, ARTH 458.

ARTH 458 (3) Seminar in Chinese Art
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 451, ARTH 452.

ARTH 459 (3) Seminar in Chinese Art
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 451, ARTH 452.

ARTH 464 (3) Seminar in Japanese Art
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 453, ARTH 454.
ARTH 471 (3) Seminar in Pre-Hispanic Art
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 463, ARTH 465.

ARTH 476 (3) Seminar in North American Aboriginal Art
This course is not eligible for Credit/D/Fail grading. Equivalency: ARTH 469.

ARTH 479 (3) Performance Actions and Approaches
Advanced performance art practices and research methodologies. This course is not eligible for Credit/D/Fail grading. Equivalency: VISA 479.

ARTH 480 (3) Visual and Digital Media Theory
A thematic examination of key arguments in visual and digital media theory, focusing on developments in lens-based and digital media in relationship to twentieth-century and contemporary artistic practice.

ARTH 490 (3) Art History Internship
This course is not eligible for Credit/D/Fail grading. Prerequisite: ARTH 300 and departmental approval. Interested students may contact the department for details on how to proceed.

ARTH 499 (6) Honours Essay
This course is not eligible for Credit/D/Fail grading.

ARTH 531 (3/6) d Studies in Early Medieval Art
This course is not eligible for Credit/D/Fail grading.

ARTH 533 (3/6) d Studies in Medieval Art
This course is not eligible for Credit/D/Fail grading.

ARTH 535 (3/6) d Early Modern: Renaissance
This course is not eligible for Credit/D/Fail grading.

ARTH 537 (3/6) d Early Modern: 17th Century
This course is not eligible for Credit/D/Fail grading.

ARTH 539 (3/6) d Studies in 19th-Century Art
This course is not eligible for Credit/D/Fail grading.

ARTH 540 (3/6) d Studies in 20th Century Art
This course is not eligible for Credit/D/Fail grading.

ARTH 543 (3/6) d Studies in Canadian Art
This course is not eligible for Credit/D/Fail grading.

ARTH 548 (3/6) d Studies in Architecture
This course is not eligible for Credit/D/Fail grading.

ARTH 550 (3) Studies in Art in the Islamic World
This course is not eligible for Credit/D/Fail grading.

ARTH 551 (3/6) d Studies in Chinese Art
This course is not eligible for Credit/D/Fail grading.

ARTH 553 (3/6) d Studies in Japanese Art
This course is not eligible for Credit/D/Fail grading.

ARTH 555 (3/6) d Studies in South and Southeast Asian Art
This course is not eligible for Credit/D/Fail grading.

ARTH 561 (3/6) d Studies in the Indigenous Arts of the Americas
This course is not eligible for Credit/D/Fail grading.

ARTH 571 (6) The Methodology of Art History
Required of all art history graduate students. This course is not eligible for Credit/D/Fail grading.

ARTH 577 (3/6) c Directed Reading
This course is not eligible for Credit/D/Fail grading.

ARTH 599 (6) Master's Thesis
This course is not eligible for Credit/D/Fail grading.
ARTH 649 (0) Doctoral Dissertation

Arts One Program, Faculty of Arts

ARTS: Arts One Program

ARTS 001 (18) Arts One

This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

ASIA: Asian Studies

ASIA 100 (3) Introduction to Traditional Asia
A survey of the histories and cultures of Asia before 1600 and the coming of the Europeans. Emphasis will be given to parallel themes in the development of the civilizations of South, Southeast and East Asia. This course is not eligible for Credit/D/Fail grading.

ASIA 101 (3) Introduction to Modern Asia
A survey of the emergence of modern Asia. Aims at an understanding of how the various peoples of Asia have maintained distinctive cultural identities despite centuries of political, economic, social and cultural change. This course is not eligible for Credit/D/Fail grading.

ASIA 110 (3) Introduction to the Major Eastern Religions
Introduction to the major Asian religious traditions (Islam, Hinduism, Sikhism, Jainism, Buddhism, Confucianism, Daoism, Christianity, Shintoism, and Shamanism); employs theoretical models drawn from religious studies. This course is not eligible for Credit/D/Fail grading.
Equivalency: RELG 102.

ASIA 200 (3) Cultural Foundations of East Asia
A comparative survey of the beliefs, assumptions and values which have shaped the civilizations of East Asia in both traditional and modern times.

ASIA 204 (6) Introduction to Asian Religions
The religions of India, China, and Japan in their interactions and cultural contexts, including Hinduism, Buddhism, Jainism, Sikhism, Taoism, Confucianism, and Shinto.
Equivalency: RELG 204.

ASIA 208 (3) Cultural Foundations of South Asia
A survey of South Asian cultures, including language and literature, art, religion, polity and society, as they developed in the past and have been transformed in the modern period.

ASIA 209 (3) Cultural Foundations of Southeast Asia
A comparative survey of the different cultures found in the communities of Southeast Asia. Focus will be on language and literature, arts, religion, society and polity, ideologies and belief systems in the past as well as in modern times. This course is not eligible for Credit/D/Fail grading.

ASIA 211 (3) Sex, Sexual Ethics, and Asian Religions
Sex and sexual ethics in the scriptures, monastic rules, rituals, and narratives of Asian religions, such as Sikhism, Hinduism, Buddhism, and Confucianism.

ASIA 212 (3) Writing About Japan
Literary, historiographic, religious, and feminist approaches to Japanese myths, legal tracts, religious tales, fiction, and poetry.

ASIA 213 (3) Myth, Literature, and Film in North India
Indian literary and mythological texts, in genres from epic to lyric, as recast in contemporary Hindi film.

ASIA 222 (3) Encountering Asia
Introduction to the literary, religious, and philosophical traditions of at least two Asian cultures using foundational texts. Students will learn about these traditions by encountering them historically as well as through the lenses of their own diverse identities and...
contexts.

ASIA 223 (3) Writing Asia
This writing-intensive course is to be taken concurrently with ASIA 222. The seminar builds on the materials of ASIA 222. Students must have knowledge of or be enrolled in the study of one of the languages offered in Asian Studies.

ASIA 250 (3) Introduction to Buddhism
Origins, basic teachings, development of Theravada, Mahayana, and Tantric traditions, historical spread first through Asia and later the world, and Buddhism in contemporary societies.

ASIA 254 (3) Sex, Gender, and Sexuality in Japanese Literature and Film
The integral role that sex, gender, and sexuality play in literary and cinematic works from Japan. Literary works will be read in translation, movies will be subtitled.

ASIA 258 (3) Religion in South Asia
The major religious traditions of South Asia, including Hinduism, Islam, Sikhism, and Buddhism; the significance of religious thought and practice in premodern India, as well as the continuing impact of religion in today's globalized South Asia.

ASIA 270 (3/6) d China in World History
The history of China in a global context, from the earliest times to the most recent past; how China has changed the world and how engagement with the world has changed China. *Equivalency: HIST 270.*

ASIA 300 (3) Writing and Culture in East Asia
Practical, aesthetic, historical, technological and political issues pertaining to the use of Chinese characters - hanzi (Chinese), kanji (Japanese), or hanccha (Korean) - throughout the region.

ASIA 301 (3) Buddhism in the Modern Era
Buddhism from the nineteenth century to present day with special emphasis on its history and character in local settings, including specific traditions such as Tibetan Nyingma and Japanese Zen, as well as the development of a modern and global "Buddhism."

ASIA 302 (3) Theravada Buddhism
History, story, and culture of the major form of Buddhism primarily focused on the regions of Sri Lanka, and mainland Southeast Asia, including southern Vietnam, parts of southern China, spread to Nepal, and modern global diffusion.

ASIA 303 (3) Mahayana Buddhism
Historical and philosophical development of Mahayana Buddhism.

ASIA 304 (3) Survey of South and Southeast Asian Performing Arts
An historical perspective of the performing arts of South and Southeast Asia, highlighting the role of music, dance, and the dramatic arts in the lives of actors and audiences. Option to complete a practicum performance.

ASIA 305 (3) Asian Horror Cinema: National Nightmares and Specters of Trauma
Engaging with the ideologies, industrial histories, socio-cultural contexts, and aesthetics of horror films - and the genre itself - from various Asian cinemas.

ASIA 306 (3) Esoteric Buddhism
Overview of Buddhism's rich and complex esoteric traditions in the Himalayan region and South, Southeast, and East Asia, with particular emphasis on texts, commentaries, and practices from a variety of traditions, locales and time periods.

ASIA 307 (3) Korean Language and Writing in Culture and Society
An examination of Korean language and writing using approaches from sociolinguistics, the sociology of language, and linguistic anthropology.

ASIA 308 (3) Myth, Ritual and Epic in Ancient India
Myths of creation Gods and goddesses of the Vedic pantheon. Connections with myths in other parts of the world, particularly in the Indo-European tradition. Literary representations of the myths.

ASIA 309 (3) South Asian Beyond South Asia
A history of South Asian peoples and communities that emigrated overseas, including Indo-Canadians.

ASIA 310 (3/6) d Studies in the History of a Major Asian Civilization
Study of an Asian culture area different from those covered in existing courses. Not given every year. Consult Department for details. May be taken multiple times on different subjects for credit.
ASIA 311 (3) Tibetan Buddhism
Religious terrain of the Tibetan cultural realm, looking at the history and development of Tibetan Buddhism and key ideas of the four main Tibetan Buddhist traditions.

ASIA 312 (3) Buddhism in Korea
Historical, cultural and philosophical development of Korean Buddhism.

ASIA 313 (3) Tibetan and Himalayan Culture and Society
History and culture of the Himalayan regions, including India, China, Tibet, Nepal, and Bhutan.

ASIA 314 (3) Premodern Japan
Japanese history (political, economic, social and cultural) to 1600.

ASIA 315 (3) Japan from Feudal to Modern State
Japanese history from 1600 to the Meiji Restoration. Political, economic, social and cultural forces which were involved in transforming Japan.

ASIA 316 (3) Race and Ethnicity in Japanese Literature and Film
Examines relations between majority and minority groups in Japanese society and changing definitions of "Japan" through literature and film from Japan.

ASIA 317 (3) The Rise of Korean Civilization
The evolution of a distinctive Korean civilization within the East Asian cultural sphere. Primary focus on cultural, social and political development from the earliest times to the sixteenth century.

ASIA 318 (3) Premodern India
A survey of the history and culture of India from the earliest historic period to 1200 and the coming of Islam, with emphasis on the evolution of classical Hindu civilization.

ASIA 319 (3) History of Indonesian Civilization
Survey of the archipelago from the 10th century to the present. Social organization, major religions, economic and political developments from the pre-modern period, through Dutch colonial rule to independence.

ASIA 320 (3) History of Early China
History of China from the earliest times to the disintegration of the Tang empire. Students will acquire the analytical skills and tools to understand the origins and foundations of Chinese society.
Equivalency: HIST 378.

ASIA 323 (3) History of Cantonese Worlds
The history, culture, languages, and identities of the multi-faceted Cantonese worlds, in the context of Chinese history and the Cantonese diaspora.
Equivalency: HIST 377.

ASIA 324 (3) Literature of Hong Kong
A survey of the literature of Hong Kong, from classical times to the present. Important periods in literary history (imperial, colonial, post-colonial), major authors (locals, visitors, and writers elsewhere), and important genres, including poetry, essays, and fiction.

ASIA 325 (3) Hong Kong Cinema
A survey of the cinema of Hong Kong from the post-war period to the present. The influence of Hong Kong on global cinema, and the forces (artists, studios, audiences, etc.) that have given rise to filmmaking styles and genres perceived as "distinctively Hong Kong."

ASIA 326 (3) Critical Approaches to Manga and Anime
A critical introduction to Japanese manga and anime in the 20th and 21st centuries.

ASIA 327 (3) Korean Popular Music in Context
History, contexts, and the genres of Korean popular music. Students will analyze specific artists and songs using a range of approaches. While an understanding of basic concepts of music will be helpful, no previous exposure to ethnomusicology or music performance is required.

ASIA 328 (3) Medieval India
The history, culture, and social and economic organization of South Asia from the decline of the classical Hindu empires through the Sultanate period.
ASIA 329 (3) Gender in Southeast Asia
A critical examination of what it means to be a woman or a man within the social and cultural context of Southeast Asia. What “masculinity” and “femininity” signify in Indonesia's society; how these concepts are reaffirmed or challenged.

ASIA 330 (3) Islam in South Asia
Islam as a transnational phenomenon with specific reference to its South Asian forms.

ASIA 331 (3) Islam in Indonesia
Islam as a transnational phenomenon with specific reference to its Indonesian forms.

ASIA 332 (3) Confucianism in China and Beyond: Reinventions of Tradition
Key ideas and trends in Confucian thought and practice from its origins to modern times through primary sources in translation and secondary scholarship.

ASIA 333 (3) Contemporary South Asian Gender and Sexuality Studies
Main theories and key concepts with a particular focus on the changing status of women, and gender and sexual minorities.

ASIA 334 (3) Indonesian Cinema
Representations of social and political relations, cultural traditions and regional differences, marriage, family and kinship ties, and gender politics in Indonesia as shown through Indonesian cinema.

ASIA 337 (3) The Korean People in Modern Times (1600 to the present)
The transformation of Korea from a Confucian state into an industrial nation. The rise of nationalism and modern ideologies in Korea. Cultural, social and economic changes Korea has undergone as it has entered the modern world.

ASIA 338 (3) Modern India: From Conquest to Raj
The history of India from the coming of the Europeans to the rise of the nationalist movement with emphasis on the social and economic impact of British imperialism.

ASIA 339 (3) The Construction of South Asian Communities in the Diaspora
An examination of contemporary South Asian communities in the diaspora. Topics of particular importance are family life, religious life, notions of space, communal memory, literary and visual representation.

ASIA 340 (3) History of Later Imperial China
History of China from the end of Tang to the eve of its modern transformation. Students will acquire the analytical skills and tools to understand the political, socio-economic, and cultural changes in imperial China. 
Equivalency: HIST 379.

ASIA 341 (3) Classical Chinese Literature in Translation
Poetry, historical and philosophic prose writings and the earliest genres of fiction in classical Chinese (ca. 1100 BC û ca. 750 AD).

ASIA 342 (3) Chinese Literature in Translation: The Vernacular Tradition
Readings in drama and fiction, 800 to 1800 AD. The emergence of vernacular genres as distinct from and sometimes opposed to the existing classical genres.

ASIA 343 (3) Film in South Asia
Social and cultural history of South Asian film.

ASIA 344 (3/9) d Topics in Japanese Cultural History I: Aristocrats and Warriors
Focuses each year on a specific topic related to the courtly or warrior culture of Japan.

ASIA 345 (3) Chinese Film Classics
Introduction to and analysis of artistically significant films made in mainland China during the first half century of Chinese film history. This course is not eligible for Credit/D/Fail grading.

ASIA 346 (3-9) d Topics in Japanese Cultural History II: The Early Modern Age
Focuses each year on a specific topic related to the culture of early modern Japan.

ASIA 347 (3) Traditional Korean Literature in Translation
An introduction to Korean literature from ancient times to 1900.

ASIA 348 (3) Great Literary Works of Classical India in Translation
Major Sanskrit and Prakrit literary genres as developed in the Brahmanical, Buddhist and Jaina traditions, including folktales of riddle, intrigue, etc. Ramayana, Mahabharata. Polished poems of the urbane. Plays. Learned novels and long poems.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ASIA 349</td>
<td>Southeast Asian Literature in Translation</td>
<td>Literary works from the Malay/Indonesian-speaking world (Indonesia, Malaysia, Singapore) and some from other regions (mainland Southeast Asia, the Philippines). All readings in English translation.</td>
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<tr>
<td>ASIA 350</td>
<td>Asian Literature in Translation: A Comparative Approach</td>
<td>A comparative approach to the literatures of East, South and Southeast Asia focusing on a specific theme.</td>
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<tr>
<td>ASIA 351</td>
<td>Modern Chinese Fiction in Translation</td>
<td>Reading of selected novels and stories written between 1750 and the present.</td>
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<tr>
<td>ASIA 352</td>
<td>Topics in Traditional Chinese Vernacular Literature</td>
<td>Traditional Chinese culture as seen through reading and discussion of exemplary literary works in the vernacular language.</td>
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<tr>
<td>ASIA 353</td>
<td>Introduction to Hindi Film</td>
<td>History, aesthetics, politics, and social roles of Bollywood films. Seminar discussions in English; Hindi films with English subtitles.</td>
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<tr>
<td>ASIA 354</td>
<td>Introduction to Japanese Cinema</td>
<td>Students will be introduced to the work of the major directors (e.g., Ozu, Mizoguchi, Kurosawa, Itami, Oshima, Shinoda). Ideological uses of literary texts and period pieces (e.g., Ugetsu, Life of Oharu, Double Suicide). Impact of depiction of Japanese in American film.</td>
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<tr>
<td>ASIA 355</td>
<td>History of Chinese Cinema</td>
<td>Introduction to the work of major directors.</td>
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<td>ASIA 356</td>
<td>Korean Cinema</td>
<td>Introduction to the work of the major film makers.</td>
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<tr>
<td>ASIA 357</td>
<td>Modern Korean Literature in Translation</td>
<td>Selected fiction and poetry written between 1917 and the present.</td>
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<tr>
<td>ASIA 358</td>
<td>Literature of Medieval India in Translation</td>
<td>Devotional, mystic, and erotic poetry of medieval Hinduism, Islam, and Sikhism.</td>
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<tr>
<td>ASIA 359</td>
<td>Gender Relations in Southeast Asian Literature and Cinema</td>
<td>Gender relations as portrayed in Southeast Asian films and writings in English translation by women and men from the Malay/Indonesian-speaking world, mainland Southeast Asia, and the Philippines.</td>
</tr>
<tr>
<td>ASIA 360</td>
<td>A Specific Asian Literature in Translation</td>
<td>Introduction to the literature of a linguistic area of Asia not covered in existing courses. Not given every year. Consult the Department for details. May be taken multiple times on different subjects for credit.</td>
</tr>
<tr>
<td>ASIA 363</td>
<td>Fiction and Film from Modern Taiwan</td>
<td>A reading-intensive survey of literary and cinematic culture in Taiwan since the early 20th century: colonialism, the national divide, nativism, trauma, cosmopolitanism, and utopian imaginings. In English.</td>
</tr>
<tr>
<td>ASIA 364</td>
<td>Modern Japanese Literature in Translation</td>
<td>An introduction to the literature and cultural history of modern Japan, with readings drawn from various literary genres, from 1868 to the present.</td>
</tr>
<tr>
<td>ASIA 365</td>
<td>Punjabi Cinema</td>
<td>Punjabi culture, history, and social values through films. The class includes film viewings and seminar discussions. Films will be screened with English subtitles.</td>
</tr>
<tr>
<td>ASIA 366</td>
<td>Edo-Period Theatre</td>
<td>Edo-period puppet and kabuki theaters, with additional attention to the latter's representation in woodblock prints and the construction of gender roles in theatre.</td>
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<tr>
<td>ASIA 367</td>
<td>Contemporary Korean Culture</td>
<td>An introduction to the literature, drama, music, and art of Korea today. Particular attention will be paid to the continuing influence of traditional themes and forms.</td>
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</tbody>
</table>
ASIA 368 (3) Modern Literatures of South Asia in Translation
Fiction, drama, and poetry of modern India, Pakistan, Bangladesh, and Sri Lanka, including works in English translation and originally written in English.

ASIA 369 (3) Asian Folklore
A survey of oral and expressive traditions in Asia, including jokes, superstitions, fairy tales, myths, music, and foodways; practical training in collecting and archiving folklore.

ASIA 370 (3) The Sanskrit Cosmopolis: India and the World, 200-1500 CE
Languages, religions, art forms, and political structures of Asian societies shaped by creative encounters with Sanskrit.

ASIA 371 (3) Foundations of Chinese Thought
Chinese thought from its beginnings until the Han dynasty (206 BCE to 220 CE) in its historical and cultural contexts. Includes, among others: Confucius; Mo Zi; the Legalists/Authoritarians; Zhuang Zi; the Lao Zi book.
Equivalency: PHIL 371.

ASIA 372 (3) Development of Traditional Chinese Thought
Chinese thought from the Han dynasty (206 BCE to 220 CE) to Wang Yangming (1472-1529) in its historical and cultural contexts.

ASIA 373 (3) History of Hong Kong
History, culture, and identities of Hong Kong from the early 1800s to the present.
Equivalency: HIST 373.

ASIA 374 (3) Imagining Punjab
The cultural and linguistic region of Punjab as it has been imagined in different times and places, in South Asia and beyond, in literature, scholarship, film, and popular culture.

ASIA 375 (3) Global Chinese Cinemas
A survey of Chinese cinemas in global perspective, covering films, filmmakers, producers, audiences, markets, industries, and critical discourse since the early twentieth century. Covers both cinematic culture and filmmaking technique.

ASIA 376 (3) The Sikhs: Formations, Contexts, and Historical Development
Introduction to the historical development of Sikh traditions in India and Diaspora, from the 15th century to the present, with attention to broader historical contexts.

ASIA 377 (3) History of Korean Thought
An examination of Korean religious, philosophical, and scientific thought from the earliest written records to the present day, with particular focus on the interaction of Shamanism, Buddhism, Confucianism, and, in the present century, Christianity.

ASIA 378 (3) Philosophical Wisdom of Early India
Epistemological and ontological thought from the Vedic period to the period of the rise of philosophical schools or systems Philosophy in the Mahabharata, Gita; early Buddhist and Jain views on knowledge and reality; views on language.
Equivalency: PHIL 378.

ASIA 379 (6) The Sikhs: History, Religion and Society
A historical study of the social and cultural forces that helped shape Sikh religious beliefs and ritual practices over the past four centuries. In dealing with the evolution of Sikh identity, due attention will be given to Sikh ideals, social organization, religious institutions and sacred literature.
Equivalency: HIST 389.

ASIA 380 (6) The Making of Modern China: Nationalism, War, Revolution
The history of China from 1800 to the present including the decline of the Qing empire, the rise of modern nationalism, foreign invasion, and China's multiple revolutions.
Equivalency: HIST 380.

ASIA 381 (3) Daoist (Taoist) Religion and Its Philosophical Background
A study of the Daoist religious traditions from their beginnings in the second century CE in their cultural, intellectual and social contexts.
Equivalency: RELG 365.

ASIA 382 (3) Buddhism in China
History, thought, and practices of Chinese Buddhism from its beginnings until the twentieth century.
Equivalency: RELG 366.
ASIA 383 (3) Common Religious Traditions in China
A study of the religious practices and beliefs shared by the great majority of people in traditional Chinese culture, including ancestor worship, seasonal festivals, offerings to deities, exorcism of harmful forces.

ASIA 384 (3) The Zhuangzi (Chuang-Tzu)
Introduction to a foundational text of East Asian thought. Both the primary text and its reception in traditional and modern contexts will be examined.

ASIA 385 (3) Chan/Zen Buddhism: Doctrine and Practice
The history, doctrines, and practices of Chan Buddhism, particularly the profound influence of Chan Buddhism on various aspects of East Asian culture.

ASIA 386 (3) Chinese Grammar and Usage I
In-depth examination of modern Chinese grammar and its usage including word formation, syntactic constructions, discourse cohesions, semantics, and stylistic considerations.
Prerequisite: All of CHIN 207, CHIN 337, CHIN 208, CHIN 338, CHIN 217, CHIN 347, CHIN 218, CHIN 348 or higher level of Chinese language proficiency.

ASIA 387 (3) Japanese Religions
An introduction to traditional Japanese religions including Shinto, Buddhism, Shugendo, Confucianism, new religions and folklore, and their roles in Japanese history, culture and society.

ASIA 388 (3) Buddhist, Brahmanical and Jain Philosophers in Interaction
Debates on issues of epistemology, language and ontology among the philosophical schools or systems of classical India Nagarjuna, Bhatrachari, Uma-svati, Sankara and others.
Equivalency: PHIL 388.

ASIA 390 (3) History of the Indian Ocean World
Societies and empires shaped by voyages of exploration, religious pilgrimages, trading diasporas and forced migration in the world of the Indian Ocean.

ASIA 391 (3) An Introduction to the Indo-Persian Cosmopolis/Knowledge Systems
Cultural interactions between Delhi and the wider Dar al Islam with indigenous groups and local culture from the 13th to the 19th centuries.

ASIA 392 (3) Classical Persian Literature in English Translation
Works of classical Persian literature dating from the tenth to the seventeenth century (in English translation).

ASIA 393 (3) History of Iran from the Sasanians to the Safavids
Iranian history from the fall of the Sasanian empire and the Arab conquest of Iran to the rise of Iranian dynasties in the east, the reign of Turkic and Turko-Mongolian rulers, and the formation of a Shi'ite Iran under the Safavids.

ASIA 394 (3) Post-Revolutionary Iranian Cinema
Gender politics, family relationships, and women's social, economic, and political roles in post-revolutionary Iran as shown through Iranian cinema.

ASIA 396 (3) Chinese Grammar and Usage II
In-depth examination of modern Chinese grammar and its usage including word formation, syntactic constructions, discourse cohesions, semantics, and stylistic considerations. Continuation of ASIA 386.
Prerequisite: ASIA 386 or higher level of Chinese language proficiency.

ASIA 397 (3) The Idea of India
History of cultural ideas that led to India's transformation from a traditional, colonial society tied to the British empire to a postcolonial, pluralistic, development oriented parliamentary democracy.

ASIA 398 (3) Narrative Literature in Premodern India
Stories of gods, goddesses and religious heroes from the Ramayana, Mahabharata, Puranas, Avadanas and in classical poetry and drama.

ASIA 400 (3) Chinese Characters: Script, Languages, and Civilizations
Advanced study of the structure of the Chinese characters in their graphic, phonetic, and semantic aspects.
Prerequisite: ASIA 300 and one of CHIN 207, CHIN 208, CHIN 337, CHIN 338, CHIN 217, CHIN 218, CHIN 347, CHIN 348, JAPN 213, JAPN 251, JAPN 323, JAPN 361, KORN 300, KORN 301, KORN 302.

ASIA 402 (3) Language, Writing, and Linguistic Thought in the History of the Sinographic Cosmopolis
History of language, writing and linguistic thought in China, Japan, Korea and Vietnam from a comparative perspective and focusing on the dissolution of this translocal cultural formation with the onset of modernity. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Restricted to fourth-year students. At least 12 credits of any level of CHIN, JAPN, or KORN or placement approval. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 405 (3) The Interaction of Science, Religion, and Philosophy in East Asia
The influence of Confucianism, Buddhism, Daoism, and Christianity on the way peoples of East Asia understood and manipulated the natural world, focussing on the natural sciences.

ASIA 407 (3) North Korea in Historical Context
Analytical overview of North Korea's politics, society, and economy. Prerequisite: Restricted to fourth-year students. 9 credits of 300-level ASIA coursework recommended.

ASIA 408 (3) Religion, Society, and Secularism in Modern India
The postcolonial nation-state and the challenge of a multi-religious society. Religious and secular discourse in colonial India, the partition, the modern constitution, secularism, Hindu and Muslim mobilization, and religious radicalism and communal violence. Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 410 (3) International Relations in Premodern East Asia
International relations, particularly between Korea and Japan in the premodern East Asian context, focusing on migration, trade, diplomacy, war, collective memory, mutual perceptions, and the context of the Sinocentric international order.

ASIA 411 (3) Chinese Political Thought and Institutions
Chinese theories and practices of government and administration from earliest times to 1949. This course is not eligible for Credit/D/Fail grading.

ASIA 414 (3) Architecture and Urbanism in Islamic South Asia
Historical factors shaping Indian architecture from the 13th to the 19th centuries.

ASIA 418 (3) Social History of India
Fundamental institutions including family, caste and religious organizations, with emphasis on the early modern and British periods.

ASIA 427 (3) Topics in Korean Popular Culture (Hallyu)
A survey of one of the primary areas of Korean popular culture, such as television dramas, film, K-Pop music, graphic novels and webtoons, or Hanshik cuisine. Prerequisite: One of ASIA 327, ASIA 347, ASIA 357, ASIA 447, ASIA 452, ASIA 457. Or placement approval. Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 428 (3) Mughal India
History of the politics, economy, society, and culture of South Asia from the Great Mughals to the British conquest.

ASIA 430 (3) International Relations in Modern East Asia: Korea and Japan
Trade, diplomacy, war, imperialism, militarism, colonialism, collective memory, mutual perceptions Korean-Japanese relations are examined as an exemplary case for exploring the dimensions of international conflict and partnership.

ASIA 433 (3) The Cinematic Lives of Muslims in South Asia
Depictions of Muslims in South Asian cinema, with a particular focus on the Hindi film industry. Prerequisite: Third-year standing.

ASIA 434 (6) History of Southeast Asia since 1800
Equivalency: HIST 383.

ASIA 438 (3) Twentieth Century South Asia

ASIA 440 (3) Cultural History of Imperial China
An in-depth examination of the construction, transmission, and transformation of Chinese culture(s) prior to 1800. Completion of at least 9 credits of 300- or 400-level ASIA recommended prior to registration. Credit will be granted for only one of ASIA 440 or HIST 479.

ASIA 441 (3/6) d Masterworks of Chinese Fiction and Drama in Translation
Reading of a classic novel or play, with attention to intellectual, social, and political subtexts as well as aesthetic dimensions and problems of interpretation.
ASIA 442 (3) Lives of Chinese Books
Concepts and methods for understanding the lives of books across time, through an examination of both the material forms of a text and its cultural reception. Focus on one major work from pre-modern China.

ASIA 444 (3-9) d Topics in Modern Japanese Fiction and Cultural History
Focuses on a limited time period or particular aspect of modern Japanese literature.

ASIA 447 (3) Korean Women's Literature
Women's voices and issues in the Korean literary tradition, from earliest times to the new millennium, in translation. 
Prerequisite: One of ASIA 347, ASIA 357. Permission of instructor is also acceptable.

ASIA 448 (3) Narrative and Performance in South Asia
Key theoretical issues in the production and enactment of folk narratives in traditional and modern South Asian cultures. Intended for advanced undergraduates in Asian folklore studies. Credit will be granted for only one of ASIA 448 or ASIA 547.
Prerequisite: ASIA 369.

ASIA 450 (3-12) d Special Topics in Buddhist Studies
For upcoming offerings, including course descriptions, please see section information in the UBC course schedule at https://courses.students.ubc.ca/cs/main.

ASIA 451 (3) Modern Chinese Authors in Translation
Study of one influential modern Chinese author, such as Lu Xun, Shen Congwen, Eileen Chang, Yu Hua, Mo Yan, or Wang Anyi.
Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 452 (3) Literature of the Korean Diaspora
A survey of literature, in translation, from the Korean diaspora, focusing on writing by ethnic Koreans in North America, Europe, and Japan.
Prerequisite: One of ASIA 347, ASIA 357, ASIA 447, ASIA 457.

ASIA 453 (3) Japanese Travel Literature
Japanese travel literature (myths, legends, poetry, tales, diaries, illustrated guides, satiric sermons, haiku, comic fiction, colonial reporting, and ethnography) from the 8th century to present.
Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 454 (3) Japanese Poetry in Translation
An introduction to Japanese poetry from its origins in song and myth, to its development from a courtly art (waka) to a popular pastime (haiku). Influences on prose, autobiography, and theatre will also be considered.

ASIA 455 (3) Adaptations of Japanese Classics
Introduction to literary, stage, and film adaptations of Japanese classics and legends and the ways in which these "new" works appropriate the past to comment on the present.

ASIA 456 (3) History and Culture of Taiwan
The major social, economic, political, and cultural changes in Taiwan since the seventeenth century; the post-World War II process of democratization and Taiwan's place in the contemporary world.

ASIA 457 (3) The Modern Korean Novel
Survey of major single-volume novels, ranging from Yi Kwang-su's Heartlessness to Ch'oe Yun's There a Petal Silently Falls, in translation.
Prerequisite: ASIA 357 or permission of instructor.

ASIA 460 (3) Modern Asian Women in Narrative
Experience of women in the context of a particular Asian culture, as seen through literature, popular culture, film and folklore. Narrative as a medium for the representation and constitution of gender.

ASIA 464 (3) Japanese Women's Self-Writing
Selected aspects of the more than 1000 years of self-writing (diary, autobiography, personal fiction). Theory and criticism about the use of writing as a medium of self-expression.

ASIA 466 (3) The History of Christianity in Asia
A survey of Christian proselytizing drives in South, Southeast, and East Asia, focusing on the period since 1500 and the
reasons for successes (the Philippines and Korea, for example) and failures (Japan). Credit will be granted for only one of ASIA 466 or 566.

ASIA 466 (3) Approaches to the Study of Asian Religions
The Western genealogy and problematics of religion, issues in its application to non-Western cultures and traditions, and the practical study of Asian religions, in Asia and its diasporas. 

Prerequisite: One of ASIA 376, ASIA 381, ASIA 382, ASIA 383, ASIA 387. Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 470 (3) Comparative Conceptions of the Self
Ways in which the "self" has been portrayed in eastern and western religious traditions. Thinkers to be considered include Aristotle, Mencius, Freud, Xunzi (Hs?n-tzu), Nietzsche, and Zhuangzi (Chuang-tzu).

ASIA 475 (3) Documenting Punjabi Canada
Exploration of the history of the Punjabi Canadian community through traditional text-based methods and oral history collection (in English or Punjabi).

ASIA 476 (3-9) d Topics in Sikh and South Asian Studies
Seminar class designed to explore current scholarly debates in South Asian and Sikh Studies. May be repeated for credit with permission of instructor. Credit will be granted for only one of ASIA 476 or ASIA 576.

Prerequisite: Restricted to students with 2nd year standing or above.

ASIA 477 (3) New Religious Movements of East Asia
Examines the rise of new religious movements in China, Japan, and Korea over the last two centuries, from the Taiping, Tonghak, and Tenri-kyo to the Unification Church, SGI International, and Falun Gong. Credit will be granted for only one of ASIA 477 or ASIA 577.

Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 478 (3) The Religious Image in Asia
The religious image and related material culture within Buddhism, Islam, Jainism, Hinduism, Christianity, and Sikhism with special attention to methodological concerns. Credit will be granted for only one of ASIA 478 or ASIA 578.

Prerequisite: Restricted to students with 2nd year standing or above.

ASIA 484 (3) The History of the Choson Dynasty
Political, social, and cultural history of Korea's Choson Dynasty, focusing on how it lasted from 1392 to 1910 and why it collapsed so quickly at the beginning of the twentieth century. Credit will be granted for only one of ASIA 484 or ASIA 587.

ASIA 485 (3) Inventing Asian Religions in the West/East Encounter
An examination of how western imperial expansion transformed the descriptions and practices of Asian traditions through systems of classification, missionaries, discovery of languages, modernity, and fragmentation.

ASIA 488 (3) Religion, Society and State in Modern India
History of secular and religious discourse in post-independent India. Partition, state policy of secularism, religious mobilization among Hindus and Muslims, communal violence and religious radicalism.

ASIA 490 (3) Asian Classics - Fourth Year Seminar
Focus changes from year to year. Prerequisite: Permission of Instructor and fourth-year standing.

ASIA 495 (3) Folk Cultures in the Asian Diaspora
The mediation of folklore (e.g. slang, songs, games, dance, foodways) in the everyday lives of immigrant and transnational Asian communities. Emphasis on Asian-Canadian folklore in Greater Vancouver through digital documentary media production and archival folklore research.

Prerequisite: Restricted to 4th year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 498 (3) Asia in Museums/the Museum in Asia
Museological representations of Asia and Asian forms of museological representation in colonial and post-colonial contexts. Credit will be granted for only one of ASIA 498 or ASIA 598.

Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 499 (3) Honours Thesis
Restricted to fourth-year students admitted to the Honours Program in Asian Studies.
Prerequisite: Restricted to fourth-year students. Prior to registration, a minimum of 9 credits of 300-level ASIA coursework recommended.

ASIA 501 (3/6) d Research Methods and Source Materials in Classical Chinese Studies
This course is not eligible for Credit/D/Fail grading.

ASIA 502 (3/6) d Modern Chinese Fiction and Western Criticism
Same as Comparative Literature 506A. This course is not eligible for Credit/D/Fail grading.

ASIA 503 (3/6) d Problems in the History of the Chinese Language
This course is not eligible for Credit/D/Fail grading.

ASIA 504 (3-18) d Texts in Ancient Chinese Scripts
This course is not eligible for Credit/D/Fail grading.

ASIA 506 (3) Topics in Chinese Linguistics and Sociolinguistics
This course is not eligible for Credit/D/Fail grading. Prerequisite: CHIN 413.

ASIA 507 (3) Topics in Chinese Applied Linguistics
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASIA 506.

ASIA 508 (3-18) d Topics in Pre-modern Chinese History and Institutions
This course is not eligible for Credit/D/Fail grading.

ASIA 509 (3-18) d Aspects of Chinese Popular Thought and Religion
This course is not eligible for Credit/D/Fail grading.

ASIA 510 (3/6) d Monastic Biography and Hagiography in East Asian Buddhism
This course is not eligible for Credit/D/Fail grading.

ASIA 511 (3-18) d Readings in Chinese Religious Texts
Selected readings from primary texts in Confucianism, Taoism and Buddhism, and popular religion. This course is not eligible for Credit/D/Fail grading.

ASIA 512 (3-18) d Advanced Readings in Classical Chinese
This course is not eligible for Credit/D/Fail grading.

ASIA 513 (3/6) d Topics in Classical Chinese Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 514 (3-18) d Topics in Modern Chinese Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 515 (3-18) d Topics in Early Vernacular Modern Chinese Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 521 (3/6) d Research Methods and Source Materials in Japanese Studies
This course is not eligible for Credit/D/Fail grading.

ASIA 522 (3/6) d Readings in kambun kundoku
This course is not eligible for Credit/D/Fail grading. Prerequisite: JAPN 312.

ASIA 523 (3-18) d Topics in the History and Structure of the Japanese Language
This course is not eligible for Credit/D/Fail grading.

ASIA 524 (3) Japanese for Specialists of China and Korea
Reading seminar in Japanese scholarly material dealing with China and/or Korea for graduate students who have a reading knowledge of Chinese and/or Korean and some knowledge of Japanese. This course is not eligible for Credit/D/Fail grading.

ASIA 525 (3-18) d Topics in the Social History of Japanese Religions
This course is not eligible for Credit/D/Fail grading.

ASIA 528 (3-18) d Problems of Japanese Intellectual History
This course is not eligible for Credit/D/Fail grading.

ASIA 532 (3-18) d Topics in Traditional Japanese Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 533 (3-18) d Topics in Modern Japanese Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 541 (3-18) d Research Methods and Source Materials in South Asian Studies
This course is not eligible for Credit/D/Fail grading.

ASIA 543 (3-18) d Topics in the History and Structure of Indian Languages
This course is not eligible for Credit/D/Fail grading.

ASIA 546 (3-18) d Topics in South Asian Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 547 (3) Narrative Theory and South Asian Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 550 (3-18) d Topics in Early South Asian Civilizations
This course is not eligible for Credit/D/Fail grading.

ASIA 561 (3-18) d Problems of Modernization in Eastern and Southern Asia
This course is not eligible for Credit/D/Fail grading.

ASIA 562 (3) Buddhism, Modernity, and the Nation-State in Asia
This course is not eligible for Credit/D/Fail grading.

ASIA 566 (3) History of Christianity in Asia
This course is not eligible for Credit/D/Fail grading.

ASIA 570 (3/6) d Approaches to Asian Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 576 (3-9) d Topics In Sikh and South Asian Studies
This course is not eligible for Credit/D/Fail grading.

ASIA 577 (3) New Religious Movements Of East Asia
Credit will be granted for only one of ASIA 477 or ASIA 577. This course is not eligible for Credit/D/Fail grading.

ASIA 578 (3) The Religious Image in Asia - Graduate Seminar
Credit will be granted for only one of ASIA 478 or ASIA 578. This course is not eligible for Credit/D/Fail grading.

ASIA 580 (3/6) c Directed Readings
This course is not eligible for Credit/D/Fail grading.

ASIA 581 (3-18) d Research Methods and Source Materials in Korean Studies
This course is not eligible for Credit/D/Fail grading.

ASIA 582 (3/6) d History and Structure of the Korean Language
This course is not eligible for Credit/D/Fail grading. Prerequisite: LING 300.

ASIA 583 (3-12) d Topics in Modern Korean Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 584 (3-12) d Topics in Traditional Korean Literature
This course is not eligible for Credit/D/Fail grading.

ASIA 587 (3) The Choson Dynasty
Credit will be granted for only one of ASIA 587 or ASIA 484. This course is not eligible for Credit/D/Fail grading. Prerequisite: ASIA 506.

ASIA 590 (3-12) d Theories & Methods "Thinking with the Body" Embodied Cognition and the Study of Culture
Focus changes from year to year, please check the Department website for current course syllabi. This course is not eligible for Credit/D/Fail grading.

ASIA 591 (3) Critical Issues in Asian Studies
Proseminar introducing major methodological and conceptual themes in the contemporary study of Asia, modern and pre-modern. Required of all Asian Studies PhD students, normally in their first year. This course is not eligible for Credit/D/Fail grading.

ASIA 592 (3) The Profession of Asian Studies
Introduction to essential skills for academic and professional work in Asian Studies. Outlines career trajectories in the PhD and
beyond, including grant applications, cv-writing, and job searches. Required of Asian Studies PhD students, normally in their first year.

This course is not eligible for Credit/D/Fail grading.

ASIA 598 (3) Asia in Museums/the Museum in Asia
Credit will be granted for only one of ASIA 498 or ASIA 598. This course is not eligible for Credit/D/Fail grading.

ASIA 599 (6/12) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

ASIA 699 (0) Doctoral Dissertation
In Chinese, Japanese, or South Asian Studies only.

Faculty of Science

ASIC: Arts and Science Interdisciplinary Courses

ASIC 200 (3) Global Issues in the Arts and Sciences
Selected global issues explored through the methodologies and perspectives of both the physical and life sciences and the humanities and social sciences. [3-0-0]
Prerequisite: Second year standing in the Faculty of Arts or Faculty of Science.

ASIC 220 (3) Introduction to Sustainability
Sustainability examined from scientific, economic, and societal perspectives. [3-0-0]
Prerequisite: Second-year standing.

Asian Studies, Faculty of Arts

ASLA: Asian Languages

ASLA 300 (6) Studies in an Asian Language (Basic Course)
Introduction to the fundamentals of an Asian language not normally taught in the Department. Not given every year. Consult the Department for details.

ASLA 400 (6) Studies in an Asian Language (Intermediate Course)
Prerequisite: ASLA 300. Permission of the instructor is also acceptable.

Physics and Astronomy, Faculty of Science

ASTR: Astronomy

See also Physics.

ASTR 101 (3) Introduction to the Solar System
General principles of the celestial sphere, laws of motion and light, optics, and telescopes; current knowledge of the Sun and Solar System. [3-2*-0]
Prerequisite: One of PHYS 11, PHYS 12, PHYS 100. plus Principles of Mathematics 12.

ASTR 102 (3) Introduction to Stars and Galaxies
Modern stellar and extragalactic astronomy. Stars and stellar evolution from protostars to black holes; galaxies and quasars; cosmology. ASTR 200/205 rather than ASTR 102 are recommended for students who intend to pursue studies in Astronomy. [3-2*-0]
Prerequisite: One of PHYS 11, PHYS 12, PHYS 100. plus Principles of Mathematics 12.

ASTR 200 (3) Frontiers of Astrophysics
Stellar masses and evolution. White dwarfs, neutron stars, and black holes. Extrasolar planet formation and detection. Dark matter in the Milky Way and other galaxies. Cosmological observations and principles. [3-0-0]
**Prerequisite:** Either (a) one of PHYS 101, PHYS 107, PHYS 117, PHYS 157, PHYS 153 and one of MATH 101, MATH 103, MATH 105, MATH 121; or (b) SCIE 001.

**ASTR 205 (3) Stars and Stellar Populations**
- Measurement of positions, motions, and distances in astronomy. Temperature, masses, and spectra of stars.
- Hertzsprung-Russell diagram. Quantitative stellar structure and evolution. Chemical composition of stars in different Galactic populations. Globular and open star clusters. [3-0-0]
**Prerequisite:** ASTR 200 and one of PHYS 210, EOSC 211, CPSC 302, CPSC 303.

**ASTR 300 (3) Galaxies**
- Structure and kinematics of our galaxy. Spiral arms and dynamics of stars in spiral and elliptical galaxies. Galactic formation, evolution, dynamics, and groups. Active galaxies and quasars. This course is not eligible for Credit/D/Fail grading. [3-0-0]
**Prerequisite:** ASTR 205 and one of PHYS 210, EOSC 211, CPSC 302, CPSC 303.
**Corequisite:** One of MATH 217, MATH 227, MATH 317.

**ASTR 310 (3) Exploring the Universe: The Solar System**
- A survey of recent discoveries about the planets and other objects in the solar system, without the use of advanced mathematics. The Sun, the existence of planetary systems around other stars, and the search for life. Not open to first year students and not for credit in the Faculties of Science and Applied Science. [3-0-1*]

**ASTR 311 (3) Exploring the Universe: Stars and Galaxies**
- A survey of recent discoveries in modern astronomy without the use of advanced mathematics. Stars, pulsars, black holes, galaxies, quasars and the origin and evolution of the Universe. Not open to first year students and not for credit in the Faculties of Science and Applied Science. [3-0-1*]

**ASTR 333 (3) Exoplanets and Astrobiology**
- Observations and basic characteristics of extrasolar planets, including their formation, evolution, and potential for supporting life. [3-0-0]
**Prerequisite:** One of PHYS 101, PHYS 102, PHYS 107, PHYS 108, PHYS 117, PHYS 118, PHYS 153, PHYS 157, PHYS 158, SCIE 001 and one of MATH 200, STAT 200, STAT 203, STAT 241, BIOL 300, COMM 291, ECON 325, EPSE 482, EPSE 483, FRST 231, GEOG 374, KIN 371, POLI 380, PSYC 218, PSYC 366, SOCI 328.

**ASTR 349 (3) Directed Research Project in Astronomy**
- A research project, undertaken under the direction of a faculty member, culminating in a written report. Requires approval of the course instructor and program advisor in the Department of Physics and Astronomy. [1*-6-0]

**ASTR 403 (3) Cosmology**
- Introduction to the study of the Universe as a whole. Foundations of the Hot Big Bang model, the early Universe, nucleosynthesis, the cosmic microwave background, large-scale structure, galaxy formation and quasars. Credit will be granted for only one of ASTR 403 or PHYS 571. [3-0-0]
**Prerequisite:** One of PHYS 200, PHYS 250. ASTR 300 is recommended.

**ASTR 404 (3) Astronomical and Astrophysical Measurements**
- Astronomical instrumentation and techniques for ground and space-based observations. Theory of measurement, imaging, interferometry and spectroscopy of electromagnetic radiation at optical, radio, infrared, and X-ray wavelengths. Astronomical data analysis. [3-0-0]
**Prerequisite:** All of PHYS 210, PHYS 408 and one of PHYS 312, MATH 316.

**ASTR 405 (3) Astronomical Laboratory**
- Experiments in the use of astronomical instrumentation and data analysis. Use of the 40-cm reflector, spectrograph and electronic detectors. Photometric and spectroscopic analysis of digital data. [0-0-3]
**Prerequisite:** ASTR 404.

**ASTR 406 (3) High-Energy Astrophysics**
**Prerequisite:** All of PHYS 203, PHYS 301, MATH 215 and ASTR 300.

**ASTR 407 (3) Planetary Science**
- Structure of planetary systems, planetary interiors, planet formation, planetary atmospheres, meteoritics, impact cratering. [3-0-0]
**Prerequisite:** One of PHYS 210, EOSC 211 and one of MATH 217, MATH 227, MATH 317 and one of MATH 316, PHYS 312 and one of ASTR 200, EOSC 212.
**Corequisite:** One of PHYS 206, PHYS 216, PHYS 306, EOSC 352.
ASTR 449 (6) Honours Thesis in Astronomy
A research project in astronomy, undertaken under the direction of a faculty member, culminating in a thesis. [1*-6-0]

ASTR 500 (3) Principles of Modern Astronomy
An introduction to the physical processes occurring in the stars, the interstellar medium, and in our own and other galaxies (fourth-year Honours students in the Physics and Astronomy Department may elect this course with special permission of the Department Head). This course is not eligible for Credit/D/Fail grading.

ASTR 502 (3) Astronomical Dynamics
This course is not eligible for Credit/D/Fail grading.

ASTR 505 (2-6) c Galactic Astronomy
The study of the structure, content and evolution of our own and other galaxies, including the study of the physical processes occurring in the interstellar medium and galactic nuclei. This course is not eligible for Credit/D/Fail grading.

ASTR 506 (2/3) d High-Energy Astrophysics
This course is not eligible for Credit/D/Fail grading.

ASTR 507 (2/3) d Planetary Sciences
This course is not eligible for Credit/D/Fail grading.

ASTR 508 (3) Stellar Astronomy
This course is not eligible for Credit/D/Fail grading.

ASTR 509 (3) Astronomical Statistics
This course is not eligible for Credit/D/Fail grading.

ASTR 514 (3) Observational Astronomy
This course is not eligible for Credit/D/Fail grading.

ASTR 520 (3) Astronomy/Astrophysics Research Seminar
This course is not eligible for Credit/D/Fail grading.

ASTR 530 (2-6) c Directed Studies in Astronomy
This course is not eligible for Credit/D/Fail grading.

ASTR 536 (2-6) c Studies of the Interstellar Medium
This course is not eligible for Credit/D/Fail grading.

ASTR 549 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

ASTR 649 (0) Doctoral Dissertation

Faculty of Arts

ASTU: Arts Studies

ASTU 100 (6) 1st Year CAP Seminar
CAP seminar focused on writing and reading, including both literature and introduction to academic scholarship. Topics vary each year. Credits count toward both the Faculty of Arts Writing and Research Requirement and the Literature Requirement. Restricted to students in the Coordinated Arts Program. This course is not eligible for Credit/D/Fail grading.

ASTU 101 (3) Writing for Research in the Social Sciences and the Humanities
Analysis of and practice in academic writing and reading in the social sciences and the humanities. Restricted to students in the Coordinated Arts Program. This course is not eligible for Credit/D/Fail grading.

ASTU 160 (3) International Perspectives on Writing in the Social Sciences and Humanities
Analysis of and practice in writing and reading for research in the social sciences and humanities; national and international aspects of scholarship and of writing cultures. Fulfills the first component of the Arts' Writing and Research Requirement. Restricted to students in the Sciences Po - UBC Dual Degree Program. This course is not eligible for Credit/D/Fail grading. Corequisite: ASTU 204.

ASTU 201 (3) Canada, Japan and the Pacific: Cultural Studies
An interdisciplinary introduction to the cultures of Canada and Japan, and the interrelations between them. Specific topics vary from year to year but will include themes such as constructing the past; nationalism; self-perceptions; cross-cultural perceptions; multiculturalism in Canada and Japan; images in architecture, film and literature; mythologies.

ASTU 202 (3) Canada, Japan and the Pacific: Political, Economic and Geographical Perspectives
An interdisciplinary introduction to political, economic and geographical interactions between Japan and Canada, the links between these countries and other Pacific Rim nations, and the historical origins of these connections. Specific topics will vary from year to year, but will include themes such as economic integration in the Pacific region; the role of resource economies such as Canada's; security relations in the Pacific; the role of Japanese investment in the Asia-Pacific region.

Equivalency: GEOG 281.

ASTU 204 (1-6) d Topics in Interdisciplinary Arts Studies
Selected interdisciplinary topics in Arts studies. For upcoming offerings including course descriptions and possible enrolment restrictions, please see section information in the UBC course schedule.

ASTU 210 (3) Global Citizenship, Part 1: Introduction
Themes of global citizenship, sustainability, and civil society, and barriers and bridges to global thinking.


ASTU 211 (3) Global Citizenship, Part 2: Community Service Learning and Capstone Conference

Prerequisite: One of ASTU 210, EDUC 210.

Equivalency: EDUC 211.

ASTU 260 (3) Knowledge Dissemination: Communicating Research to Public Audiences
Research, theory, and practice in the communication of expert knowledge to non-specialist audiences; popular media and dissemination. Restricted to students in the Sciences Po - UBC Dual Degree. This course is not eligible for Credit/D/Fail grading.

Corequisite: ASTU 400.

ASTU 310 (3) Co-operative Work Placement I
Approved and supervised work experience with a public or private organization for a minimum of 13 weeks full-time. Orientation workshops. Final work term report required. Restricted to students in the Arts Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

Prerequisite: 6 credits first-year English or Arts I; 6 credits of science; 6 credits of literature; satisfaction of Faculty language requirement.

ASTU 311 (3) Co-operative Work Placement II
Approved and supervised work experience with a public or private organization for a minimum of 13 weeks full-time. Final work term report required. This course is not eligible for Credit/D/Fail grading.

Prerequisite: ASTU 310.

ASTU 360 (3) Community-Based Research and Knowledge Creation
Principles and practice of conducting research in community partnership. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Third-year standing.

ASTU 400 (3-6) d Interdisciplinary Studies in Arts
For upper-division students in the Faculty of Arts. Topics announced annually.

ASTU 401 (1-6) d Special Topics in Arts Studies
Selected topics offered by a distinguished visitor to the campus. For upcoming offerings including course descriptions and possible enrolment restrictions, please see section information in the UBC course schedule.

ASTU 402 (3) Living Language: Science and Society
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance.

Prerequisite: Fourth-year standing or permission of the instructor.


ASTU 410 (3) Co-operative Work Placement III
Approved and supervised work experience with a public or private organization for a minimum of 13 weeks full-time. Final work term report. This course is not eligible for Credit/D/Fail grading.

Prerequisite: ASTU 311.

ASTU 411 (3) Co-operative Work Placement IV
Optional extra work placement. Approved and supervised work experience with a public or private organization for a minimum of
13 weeks full-time. Final work term report. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: ASTU 410.

ASTU 412 (3-6) c Co-operative Work Placement V
Optional extra work placement. Approved and supervised work experience with a public or private organization for a minimum of 13 weeks full-time. Final work term report. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ASTU 411.

ASTU 501 (3) Co-operative Work Placement I
Approved and supervised paid work experience with a public or private organization for a minimum of 13 weeks full-time. Final written report required. Restricted to Master's degree students in departments with approved co-op programs. This course is not eligible for Credit/D/Fail grading.

ASTU 502 (3) Co-operative Work Placement 2
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASTU 501.

ASTU 503 (3) Co-operative Work Placement 3
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASTU 502.

ASTU 610 (3) Co-operative Education Work Placement 1
Approved and supervised paid work experience with a public or private organization for a minimum of 13 weeks full-time. Orientation, workshops, and co-op assignments required. Restricted to Ph.D. degree students in departments with Ph.D. approved co-op programs. This course is not eligible for Credit/D/Fail grading.

ASTU 611 (3) Co-operative Education Work Placement 2
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASTU 610.

ASTU 612 (3) Co-operative Education Work Placement 3
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASTU 611.

ASTU 613 (3) Co-operative Education Work Placement 4
This course is not eligible for Credit/D/Fail grading. Prerequisite: ASTU 612.

Earth, Ocean and Atmospheric Sciences, Faculty of Science

ATSC: Atmospheric Science

ATSC 113 (3) Applied Meteorology
Atmospheric-science principles elucidated by case studies applied to snow sports, sailing, surfing, soaring, and flying. [3-0-0]

ATSC 201 (3) Meteorology of Storms
Characteristics and physical processes of thunderstorms, tornadoes, lightning, hail, hurricanes, blizzards, cyclones and other storms. [3-0-0]
Prerequisite: Completion of first-year science.

ATSC 212 (1) Earth and Atmospheric Science Introductory Computing Laboratory
Computing tools, including Unix/Linux, Web page creation, programming languages used for numerical calculation, database programs. [0-2]
Prerequisite: CPSC 110.

ATSC 301 (3) Atmospheric Radiation and Remote Sensing
Energy transfer at infrared, visible, and microwave wavelengths. Analysis of satellite measurements of the atmosphere and surface. [3-0-0]
Prerequisite: One of PHYS 102, PHYS 108, PHYS 118, PHYS 158 and familiarity with a programming language.

ATSC 303 (3) Methods in Atmospheric Science
An introduction to instrumentation used in monitoring the state of the atmosphere; a brief survey of methods of analysis of meteorological data. [2-2-0]
Prerequisite: EOSC 211 and one of ATSC 201, GEOB 200.

ATSC 398 (3) Co-operative Work Placement I
Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in the Winter Session (Term 2) in third year. Technical report required. Restricted to students admitted to
Co-operative Education Program in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ATSC 201, GEOB 300.

ATSC 399 (3) Co-operative Work Placement II
Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in the Summer Session (Terms 1 and 2) following third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ATSC 398.

ATSC 404 (3) Dynamic Meteorology
Dynamic principles governing atmospheric motions on a rotating planet. Simplified mathematical models of atmospheric flow based on scale analysis. Application to synoptic-scale and general circulation of the troposphere. [3-0-0]
Prerequisite: One of PHYS 312, MATH 316 and one of EOSC 250, MATH 217, MATH 317.

ATSC 405 (3) Cloud Physics and Chemistry
Prerequisite: MATH 215. Familiarity with a programming language is required.
Corequisite: One of PHYS 203, CHEM 201, CHEM 304.

ATSC 406 (3) Operational Meteorology
Introduction to meteorological prediction, meteorological data analysis, prognosis of weather systems, motion and development, satellite imagery, Doppler radar, numerical weather prediction, synoptic and mesoscale forecasting, applied laboratory exercises. [2-2-0]
Prerequisite: ATSC 201.

ATSC 409 (3) Numerical Techniques for Ocean, Atmosphere and Earth Scientists
Web-based introduction to the practical numerical solution of ordinary and partial differential equations including considerations of stability and accuracy. Credit will be granted for only one of ATSC 409 or ATSC 506/EOSC 511. [0-0-3]
Prerequisite: One of MATH 215, MATH 255, MATH 256, MATH 265. Familiarity with a programming language is required.

ATSC 448 (3/6) Directed Studies
Investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of the undergraduate advisor and of the supervising faculty member is required before registration.

ATSC 449 (6) Honours Project
Honours students must submit a graduating report based on a project undertaken with the approval of the Associate Chair of the Atmospheric Science Program.

ATSC 490 (3) Student Directed Seminars in Atmospheric Science
Self-directed, collaborative studies in atmospheric science, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the Handbook for Student Directed Seminars (www.vpacademic.ubc.ca/sds/sds_handbook.pdf). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Prerequisite: Third-year standing.

ATSC 498 (3) Co-operative Work Placement III
Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in the Summer Session (Terms 1 and 2) after fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ATSC 399 and one of ATSC 303, GEOB 304.

ATSC 499 (3) Co-operative Work Placement IV
Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in Winter Session (Term 1) of the fifth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ATSC 498.

ATSC 500 (3) Boundary-Layer Meteorology
Theoretical and empirical analysis of the atmospheric boundary layer with particular emphasis on energy and mass exchanges near the Earth's surface. This course is not eligible for Credit/D/Fail grading.
ATSC 506 (3) Numerical Techniques for Ocean, Atmosphere and Earth Scientists
Credit will be granted for only one of ATSC 409 or ATSC 506/EOSC 511. This course is not eligible for Credit/D/Fail grading. Equivalency: EOSC 511.

ATSC 507 (3) Numerical Weather Prediction
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of a fluid-dynamics course, a numerical-methods course, as well as computer-programming skills.

ATSC 548 (3-6) d Master's Graduation Essay
This course is not eligible for Credit/D/Fail grading.

ATSC 595 (2-6) d Directed Studies
This course is not eligible for Credit/D/Fail grading.

ATSC 597 (3) d Co-operative Work Placement I
Restricted to students admitted to the M.Sc. Co-operative Education Option in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.

ATSC 598 (3) d Co-operative Work Placement II
Restricted to students admitted to the M.Sc. Co-operative Education Option in Atmospheric Science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ATSC 597.

ATSC 599 (12-15) d Master's Thesis
This course is not eligible for Credit/D/Fail grading.

ATSC 699 (0) Doctoral Dissertation

School of Audiology and Speech Sciences, Faculty of Medicine

AUDI: Audiology and Speech Sciences

All 600-level seminars are Ph.D. level courses and may not be offered on a regular basis. All may be taken more than once for credit.

AUDI 400 (3) Introduction to Speech-Language Pathology and Audiology
Frameworks from linguistics, psychology, and speech and hearing sciences as applied to communication disorders, clinical populations and practices. [3-0]
Prerequisite: One of LING 100, PSYC 100.

AUDI 402 (3) Neuroanatomy for Audiology and Speech-Language Pathology
[3-0]
Prerequisite: As indicated on the website at www.audiospeech.ubc.ca or by permission of the instructor.

AUDI 403 (1.5) Introduction to Neurolinguistics

AUDI 513 (1/2) Acoustic and Articulatory Phonetics
This course is not eligible for Credit/D/Fail grading.

AUDI 514 (2/3) c Hearing Science I
This course is not eligible for Credit/D/Fail grading.

AUDI 515 (3) c Hearing Science II
This course is not eligible for Credit/D/Fail grading.

AUDI 516 (1-3) d Discourse Analysis
May be taken more than once for credit. This course is not eligible for Credit/D/Fail grading.

AUDI 518 (3) Fundamentals of Audiology
This course is not eligible for Credit/D/Fail grading.

AUDI 520 (2/3) d Phonological Development, Assessment and Intervention
This course is not eligible for Credit/D/Fail grading.
AUDI 522 (3) Communication Development and Disorders
   This course is not eligible for Credit/D/Fail grading.

AUDI 524 (2) Disorders of Speech Production
   This course is not eligible for Credit/D/Fail grading.

AUDI 526 (3) Acquired Language Disorders
   This course is not eligible for Credit/D/Fail grading. [2-2]
   Prerequisite: AUDI 402.

AUDI 527 (1) Introduction to Dysphagia
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

AUDI 528 (3) Aural Rehabilitation I
   This course is not eligible for Credit/D/Fail grading.

AUDI 529 (2) Aural Rehabilitation II
   This course is not eligible for Credit/D/Fail grading.

AUDI 530 (1-3) d Research Methods
   May be taken more than once for credit. This course is not eligible for Credit/D/Fail grading.

AUDI 540 (1) Approaches to Audiology and Speech-Language Pathology for People of First Nations, M?tis or Inuit Heritage
   This course is not eligible for Credit/D/Fail grading.

AUDI 545 (0) Issues in Clinical Practice
   Ethics, service delivery systems, practice considerations specific to the work place.

AUDI 546 (1-9) d Advanced Communication Sciences and Disorders
   May be taken for credit more than once. This course is not eligible for Credit/D/Fail grading.

AUDI 547 (1-9) c Directed Reading in Audiology and Speech Sciences
   May be taken more than once. This course is not eligible for Credit/D/Fail grading.

AUDI 548 (3) Research Paper
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

AUDI 549 (6) M.Sc. Thesis
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

AUDI 550 (0.5-6) d Advanced Topics in Audiology
   May be taken more than once for credit. This course is not eligible for Credit/D/Fail grading.

AUDI 551 (1) Hearing and Noise
   This course is not eligible for Credit/D/Fail grading.

AUDI 552 (3) Diagnostic Audiology I
   This course is not eligible for Credit/D/Fail grading.

AUDI 553 (3) Diagnostic Audiology II
   This course is not eligible for Credit/D/Fail grading.

AUDI 555 (1) Issues in Professional Practice
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

AUDI 556 (3) Amplification I
   This course is not eligible for Credit/D/Fail grading.

AUDI 557 (3) Amplification II
   This course is not eligible for Credit/D/Fail grading.

AUDI 558 (3) Physiological Measurement of Auditory Function
   This course is not eligible for Credit/D/Fail grading.

AUDI 559 (1) Practicum in Speech-Language Pathology for Audiology Majors
   This course is not eligible for Credit/D/Fail grading.

AUDI 562 (3) Pediatric Audiology
   This course is not eligible for Credit/D/Fail grading.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDI 563</td>
<td>Cochlear Implants: Audiological Assessment and Management Issues</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 565</td>
<td>Audiology Practicum I</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 566</td>
<td>Audiology Practicum II</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 567</td>
<td>Audiology Practicum III</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 568</td>
<td>Audiology Practicum IV</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 569</td>
<td>Hearing and Aging</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 570</td>
<td>Case Studies in Phonological Intervention and Aural (Re)habilitation</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 571</td>
<td>Developmental Language Disorders</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 572</td>
<td>Cognitive Processing and Acquired Language Disorders</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 575</td>
<td>Language Development and Disorders in the School Years</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 576</td>
<td>Topics in Fluency Disorders</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 577</td>
<td>Advanced Studies in Acquired Speech and Swallowing Disorders</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 579</td>
<td>Practicum in Audiology for Speech-Language Pathology Majors</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 580</td>
<td>Speech Perception and Hearing Ability</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 581</td>
<td>Perceptual, Cognitive, and Social-affective Issues in Communication Development, Assessment and Intervention</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 583</td>
<td>Advanced Speech Science</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 585</td>
<td>Language Development Across the Lifespan</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>AUDI 586</td>
<td>Acquired Language Disorders II</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 590</td>
<td>Speech-Language Pathology Practicum I</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 591</td>
<td>Speech-Language Pathology Practicum II</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 593</td>
<td>Speech-Language Pathology Practicum III</td>
<td>This course is not eligible for Credit/D/Fail grading. Corequisite: All of AUDI 577, AUDI 586.</td>
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<tr>
<td>AUDI 594</td>
<td>Speech-Language Pathology Practicum IV</td>
<td>This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>AUDI 649</td>
<td>Doctoral Dissertation</td>
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</tbody>
</table>
This course is not eligible for Credit/D/Fail grading.

**AUDI 660 (1-9) d Seminar in Hearing Science**
This course is not eligible for Credit/D/Fail grading.

**AUDI 670 (1-9) d Seminar in Developmental Phonetics and Phonology**
Examination of current research, roles of theories in understanding the relationship between speech sound production and comprehension/perception. This course is not eligible for Credit/D/Fail grading.
Prerequisite: AUDI 580.

**AUDI 672 (1-9) d Seminar in Linguistic Aphasiology**
Examination of current research, roles of linguistic theories in understanding language disturbance in aphasia; development of single-case studies. This course is not eligible for Credit/D/Fail grading.
Prerequisite: AUDI 572.

**AUDI 675 (1-9) d Seminar in Developmental Language Disorders**
This course is not eligible for Credit/D/Fail grading.

**AUDI 685 (1-9) d Seminar in Language Development**
This course is not eligible for Credit/D/Fail grading.

**AUDI 690 (1-9) d Seminar in Speech Science**
This course is not eligible for Credit/D/Fail grading.

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**Commerce, Faculty of Commerce & Business Administration**

**BA: Business Administration: Core**

**BA 500 (6-20) d MBA Core**
This course is not eligible for Credit/D/Fail grading.

**BA 501 (5) Professional Residency I Leadership and Competitive Strategy**
This course is not eligible for Credit/D/Fail grading.

**BA 502 (5) Professional Residency II Business Development and Negotiations**
This course is not eligible for Credit/D/Fail grading.

**BA 503 (5) Professional Residency III Ethics, Sustainability and Managing Change**
This course is not eligible for Credit/D/Fail grading.

**BA 504 (3-4) d Business Strategy Integration: Foundation**
This course is not eligible for Credit/D/Fail grading.

**BA 505 (7.5) Integrated Foundation**
This course is not eligible for Credit/D/Fail grading.

**BA 506 (2) MBA Integrated Project**
This course is not eligible for Credit/D/Fail grading.

**BA 507 (3) Business Strategy Integration: Global**
This course is not eligible for Credit/D/Fail grading.

**BA 508 (1) Business Strategy Integration: Capstone**
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**BA 509 (6) Analytics Consulting Internship**
Experiential learning through analytics projects with industry partners. Restricted to students in the Master of Business Analytics program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**BA 510 (1.5) Internship/Project**
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**BA 511 (1.5) Community Business Project**
Registration restricted to students in the M.M. Program. This course is not eligible for Credit/D/Fail grading.

**BA 512 (1.5) Business Strategy Integration: Experiential Learning**
This course is not eligible for Credit/D/Fail grading.

BA 513 (1.5) Business Economics
This course is not eligible for Credit/D/Fail grading.

BA 520 (1.5) Career Development
This course is not eligible for Credit/D/Fail grading.

BA 530 (1.5-18) d Study Abroad and Exchange
Restricted to students in one of the following programs: M.B.A., J.D./M.B.A., M.Sc.B., Ph.D. with B.A.D.M. specialization, or M.M. with either ECMS or ECMJ. M.M. ECMS or ECMJ students are limited to a maximum of 12 credits in this course. This course is not eligible for Credit/D/Fail grading.

BA 531 (1.5-6) d GNAM: Global Network Course
Online courses offered by schools within the Global Network for Advanced Management (GNAM). Students across the network collaborate virtually on team projects. Credit values for each course vary. Students may take more than one course during their MBA program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

BA 532 (1.5-6) d GNAM: Global Network Week
Intensive on-campus study at schools within the Global Network for Advanced Management (GNAM). Face-to-face course activities and lectures, cross-cultural teams, and final presentations on projects. Students can take more than one Global Network Week during their MBA program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

BA 535 (0) Dual Degree Year 2 at Yale

BA 540 (0.8) Managerial Economics
This course is not eligible for Credit/D/Fail grading.

BA 541 (0.7) Consulting and Strategic Management
This course is not eligible for Credit/D/Fail grading.

BA 550 (1.5) Business Immersion
This course is restricted to students in the MM Program. This course is not eligible for Credit/D/Fail grading.

BA 551 (1.5) Business Capstone
Pass/Fail. Registration restricted to students in the M.M. Program. This course is not eligible for Credit/D/Fail grading.

BA 560 (1.5) Ethics and Sustainability
This course is not eligible for Credit/D/Fail grading.

BA 561 (1.5) Global Issues and Macroeconomics
This course is not eligible for Credit/D/Fail grading.

BA 562 (1.5) Creativity
This course is not eligible for Credit/D/Fail grading.

BA 563 (1.5) Decision Making for Managers
This course is not eligible for Credit/D/Fail grading.

BA 564 (1.5) Leadership Development
This course is not eligible for Credit/D/Fail grading.

BA 580 (0.7-3) d Topics in Business Administration
Restricted to students in one of: E.M.B.A., M.B.A., J.D./M.B.A., M.M., or M.B.A./M.A.A. This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAAC: Business Administration: Accounting

BAAC 500 (1.5) Financial Reporting
This course is not eligible for Credit/D/Fail grading.

BAAC 501 (1.5) Financial Statement Analysis I
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAAC 500.
BAAC 505 (2.3) Fundamentals of Accounting  
This course is not eligible for Credit/D/Fail grading.

BAAC 510 (1.5) Cost Analysis for Decision Making  
This course is not eligible for Credit/D/Fail grading.

BAAC 511 (1.5) Intermediate Managerial Accounting: Decision Making and Performance Evaluation  
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAAC 550, BAAC 551.

BAAC 520 (1.5) Taxation and Decision Making I  
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BAFI 500, BAFI 541.

BAAC 521 (1.5) Taxation and Decision Making II  
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BAFI 500, BAFI 541.

BAAC 540 (0.7) Accounting  
This course is not eligible for Credit/D/Fail grading.

BAAC 550 (1.5) Foundations in Accounting  
Same as HCEC 502; credit will not be given for both. This course is not eligible for Credit/D/Fail grading.

BAAC 551 (1.5) Foundations in Accounting II  
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BAAC 550, COMM 320.

BAAC 580 (1.5) Topics in Accounting  
This course is not eligible for Credit/D/Fail grading.

BAAC 590 (1.5/3) Directed Studies in Accounting  
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

**BABS: Business Administration: Business Statistics**

BABS 500 (1.5) Applied Business Statistics I  
This course is not eligible for Credit/D/Fail grading.

BABS 502 (1.5) Forecasting and Time Series Prediction  
Time series forecasting including common smoothing methods and autocorrelation methods; students will work with publicly available data. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BABS 500, BABS 507, COMM 581.

BABS 506 (1.5) Analyzing and Modeling Uncertainty  
Probability and models that incorporate uncertainty; working with data and extracting information to provide input for predictive and prescriptive analytic models within the Master of Business Analytics program. This course is not eligible for Credit/D/Fail grading.

BABS 507 (1.5) Descriptive and Predictive Business Analysis  
Descriptive data analysis and extraction of useful information; predictive analytics and other clustering techniques; use of appropriate software. This course is not eligible for Credit/D/Fail grading.

BABS 508 (1.5) Advanced Predictive Business Analytics  
Application of descriptive analytic skills to predictive analytics; using single/multiple regression, logistic regression and Poisson regression use of Discrete Choice Model. This course is not eligible for Credit/D/Fail grading.

BABS 540 (0.8) Data Analysis and Utilization  
This course is not eligible for Credit/D/Fail grading.

BABS 550 (1.5) Application of Statistics in Management  
Not available to MBA students. This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 554.

BABS 580 (1.5) Topics in Business Statistics  
This course is not eligible for Credit/D/Fail grading.
BABS 590 (1.5/3) d Directed Studies in Business Statistics
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAEN: Business Administration: Entrepreneurship

BAEN 500 (1.5) Entrepreneurship and New Venture Creation
This course is not eligible for Credit/D/Fail grading.

BAEN 501 (1.5) Corporate Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 502 (1.5) Growing and Exiting a Venture
This course is not eligible for Credit/D/Fail grading.

BAEN 503 (1.5) Managing Risk and Uncertainty
This course is not eligible for Credit/D/Fail grading.

BAEN 504 (1.5) Preparing the Business Development Plan
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAEN 500.

BAEN 505 (1.5) Entrepreneurial Finance
This course is not eligible for Credit/D/Fail grading.

BAEN 506 (3) Technology Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 510 (1.5) Intrapreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 541 (0.7) Innovation and Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 542 (0.8) Prototyping
This course is not eligible for Credit/D/Fail grading.

BAEN 543 (0.7) Disruption
This course is not eligible for Credit/D/Fail grading.

BAEN 544 (0.8) Pitching Your Idea
This course is not eligible for Credit/D/Fail grading.

BAEN 545 (0.7) Qualitative Models
This course is not eligible for Credit/D/Fail grading.

BAEN 546 (0.8) Social Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 547 (0.7) Innovation and Sustainability
This course is not eligible for Credit/D/Fail grading.

BAEN 548 (1.5) Social Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 549 (1.5) Innovation and Sustainability
This course is not eligible for Credit/D/Fail grading.

BAEN 550 (1.5) Fundamentals in Entrepreneurship
Not available to M.B.A. students. This course is not eligible for Credit/D/Fail grading.

BAEN 580 (1.5) Topics in Entrepreneurship
This course is not eligible for Credit/D/Fail grading.

BAEN 590 (1.5/3) d Directed Studies in Entrepreneurship
This course is not eligible for Credit/D/Fail grading.
BAFI: Business Administration: Finance

BAFI 500 (1.5) Introductory Finance
This course is not eligible for Credit/D/Fail grading.

BAFI 501 (1.5) Banking and Capital Markets
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BAFI 500, BAFI 541.

BAFI 502 (1.5) Corporate Finance
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 503 (1.5) Topics in Corporate Finance
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAFI 502, BAFI 511.

BAFI 504 (1.5) Capital Structure and Dividend Policy
This course is not eligible for Credit/D/Fail grading.

BAFI 506 (1.5) Financial Strategies
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BAFI 500, BAFI 541.

BAFI 507 (1.5) Mergers and Acquisitions
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 509 (1.5) Debt, Financial Distress, and Reorganization
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAFI 502, BAFI 511.

BAFI 510 (1.5) Security Analysis
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 511 and one of BAFI 500, BAFI 540.

BAFI 511 (1.5) Investment Theory and Asset Pricing
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 512 (1.5) Options and Futures
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 511.

BAFI 513 (1.5) Risk Management
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 514 (1.5) Portfolio Strategies
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 515 (1.5) Portfolio Tactics
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAFI 511, BAFI 520.

BAFI 516 (1.5) Financial Engineering
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 517 (1.5) Options on Real Assets
This course is not eligible for Credit/D/Fail grading.

BAFI 518 (1.5) Fixed Income Securities
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAFI 511, BAFI 520.

BAFI 519 (1.5) Topics in Investment Management
This course is not eligible for Credit/D/Fail grading.

BAFI 520 (1.5) Empirical Finance
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BAFI 502, BAFI 511.

BAFI 522 (1.5) Market Microstructure
This course is not eligible for Credit/D/Fail grading.

BAFI 530 (1.5) International Financial Environment
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.
BAFI 532 (1.5) International Financial Management
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAFI 500.

BAFI 540 (0.8) Finance
This course is not eligible for Credit/D/Fail grading.

BAFI 541 (0.7) Principles of Finance
This course is not eligible for Credit/D/Fail grading.

BAFI 580 (1.5) Special Topics in Finance
This course is not eligible for Credit/D/Fail grading.

BAFI 590 (1.5/3) Directed Studies in Finance
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAHC: Business Administration: Health Care

BAHC 500 (1.5) Introduction to Health Care Management
Foundations and structure of the Canadian health care system, funding and government relations, human resource issues, comparative health systems, ethical issues, patient flow, demand management, and operations. This course is not eligible for Credit/D/Fail grading.

BAHC 510 (1.5) Managing Health Care System Operations
This course is not eligible for Credit/D/Fail grading.

BAHC 580 (1.5) Topics in Health Care Management
This course is not eligible for Credit/D/Fail grading.

BAHC 590 (1.5/3) Directed Studies in Health Care Management
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAHR: Business Administration: Human Resources Management

BAHR 500 (1.5) Organizational Analysis
This course is not eligible for Credit/D/Fail grading.

BAHR 501 (1.5) Power, Politics and Corporate Culture
This course is not eligible for Credit/D/Fail grading.

BAHR 502 (1.5) Business Ethics
This course is not eligible for Credit/D/Fail grading.

BAHR 503 (1.5) Reorganizing Corporations
This course is not eligible for Credit/D/Fail grading.

BAHR 504 (1.5) Restructuring Corporate Governance
This course is not eligible for Credit/D/Fail grading.

BAHR 505 (1.5) Leadership
This course is not eligible for Credit/D/Fail grading.

BAHR 506 (1.5) Improving Team Performance
This course is not eligible for Credit/D/Fail grading.

BAHR 507 (1.5) Two-Party Negotiations
This course is not eligible for Credit/D/Fail grading.

BAHR 508 (1.5) Managing Change
This course is not eligible for Credit/D/Fail grading.
BAHR 509 (1.5) Managing the Family Business
   This course is not eligible for Credit/D/Fail grading.

BAHR 510 (1.5) Strategic Human Resource Management
   This course is not eligible for Credit/D/Fail grading.

BAHR 511 (1.5) Compensation and Benefits Management
   This course is not eligible for Credit/D/Fail grading.

BAHR 512 (1.5) Managing Diversity
   This course is not eligible for Credit/D/Fail grading.

BAHR 513 (1.5) Motivation and Performance Appraisal
   This course is not eligible for Credit/D/Fail grading.

BAHR 514 (1.5) Staffing
   This course is not eligible for Credit/D/Fail grading.

BAHR 515 (1.5) Management of Health and Safety
   This course is not eligible for Credit/D/Fail grading.

BAHR 516 (1.5) Leading Teams
   Techniques and approaches for building effective teams, handling decision-making in teams, creating reward structures, and
   developing appropriate leadership models. This course is not eligible for Credit/D/Fail grading.

BAHR 517 (1.5) Business Communications
   This course is not eligible for Credit/D/Fail grading.

BAHR 520 (1.5) Managing the Employment Relationship
   This course is not eligible for Credit/D/Fail grading.

BAHR 521 (1.5) Collective Bargaining
   This course is not eligible for Credit/D/Fail grading.

BAHR 530 (1.5) International Industrial Relations
   Credit will be granted for only one of BAHR 530 or BAIM 523. This course is not eligible for Credit/D/Fail grading.

BAHR 531 (1.5) International Human Resource Management
   Credit will be granted for only one of BAHR 531 or BAIM 524. This course is not eligible for Credit/D/Fail grading.

BAHR 540 (0.8) Organizational Behaviour
   This course is not eligible for Credit/D/Fail grading.

BAHR 550 (1.5) Organizational Behavior
   This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 521.

BAHR 560 (1.5) Building High Performance Teams and Organizations
   Frameworks and processes for effectively leading high performance organizations. Emphasizes the key factors that can
   motivate high performance as individuals and teams. This course is not eligible for Credit/D/Fail grading.

BAHR 580 (1.5) Topics in Human Resources
   This course is not eligible for Credit/D/Fail grading.

BAHR 590 (1.5/3) Directed Studies in Human Resources
   This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAIM: Business Administration: International Management

BAIM 580 (1.5) Topics in International Management
   This course is not eligible for Credit/D/Fail grading.

BAIM 590 (1.5/3) Directed Studies in International Management
   This course is not eligible for Credit/D/Fail grading.
Commerce, Faculty of Commerce & Business Administration

BAIT: Business Administration: Business Technology Management

BAIT 501 (1.5) Survey of Information Technology Applications in Business
This course is not eligible for Credit/D/Fail grading.

BAIT 504 (1.5) Business Database Technology
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAIT 502.

BAIT 506 (1.5) Business Modeling for Information Technology Applications
This course is not eligible for Credit/D/Fail grading.

BAIT 507 (1.5) Data Management for Business Analytics
Databases and data management, data designs for business analytics; data access using structured query language; design interfaces facilitating user-centric access and queries. This course is not eligible for Credit/D/Fail grading.

BAIT 508 (1.5) Business Analytics Programming
Programming for business analytics; problem definition, software design, program design, and system implementation; development of systems to implement common business applications. This course is not eligible for Credit/D/Fail grading.

BAIT 509 (1.5) Business Applications of Machine Learning
Supervised and unsupervised machine learning algorithms, support vector machines, and ensemble methods for text mining projects. Applications in descriptive and predictive analytics. This course is not eligible for Credit/D/Fail grading.

BAIT 510 (1.5) Project Management in Delivering Business Solutions
This course is not eligible for Credit/D/Fail grading.

BAIT 511 (1.5) Managing Information Technology
This course is not eligible for Credit/D/Fail grading.

BAIT 513 (1.5) Managing e-Business
This course is not eligible for Credit/D/Fail grading.

BAIT 521 (1.5) Introduction to Business Programming
This course is not eligible for Credit/D/Fail grading.

BAIT 527 (1.5) Business Intelligence for Management
This course is not eligible for Credit/D/Fail grading.

BAIT 550 (1.5) Information Technology for Management
Not available to MBA students. This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 543.

BAIT 580 (1.5) Topics in Information Technology Management
This course is not eligible for Credit/D/Fail grading.

BAIT 590 (1.5/3) Directed Studies in Information Technology and Management
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BALA: Business Administration: Law

BALA 500 (1.5) Business and Securities Law
This course is not eligible for Credit/D/Fail grading.

BALA 501 (1.5) Employment Law
This course is not eligible for Credit/D/Fail grading.

BALA 502 (1.5) The Law and Public Policy
This course is not eligible for Credit/D/Fail grading.
BALA 503 (1.5) Commercial Law
This course is not eligible for Credit/D/Fail grading.

BALA 530 (1.5) The Law and International Business Transactions
Credit will be granted for only one of BALA 530 or BAIM 504. This course is not eligible for Credit/D/Fail grading.

BALA 580 (1.5) Topics in Law
This course is not eligible for Credit/D/Fail grading.

BALA 590 (1.5/3) Directed Studies in Law
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAMA: Business Administration: Marketing

BAMA 500 (1.5) Marketing Strategy
This course is not eligible for Credit/D/Fail grading.

BAMA 501 (1.5) Pricing and Revenue Management
This course is not eligible for Credit/D/Fail grading.

BAMA 503 (1.5) New Product Development
This course is not eligible for Credit/D/Fail grading.

BAMA 504 (1.5) Integrated Marketing Communication
This course is not eligible for Credit/D/Fail grading.

BAMA 505 (1.5) Business Development
Study of business development as a tool for creating long-term value from clients, markets and relationships. This course is not eligible for Credit/D/Fail grading.

BAMA 506 (1.5) Consumer Behaviour
This course is not eligible for Credit/D/Fail grading.

BAMA 508 (1.5) Marketing Research
This course is not eligible for Credit/D/Fail grading.

BAMA 509 (1.5) Marketing Analytics
Nature and scope of marketing research problems; methods used to solve those problems, including interview, focus groups, surveys, experiments, and web-tracking paradigms. This course is not eligible for Credit/D/Fail grading.

BAMA 510 (1.5) Public and Nonprofit Marketing Management
This course is not eligible for Credit/D/Fail grading.

BAMA 511 (1.5) Pricing Analytics
Proven concepts, techniques, and frameworks for assessing and formulating pricing strategies. Understanding the process of making pricing decisions and exploring innovative approaches for setting prices. State-of-the-art frameworks for analyzing pricing decisions; strategies for revenue model migration and increasing profitability. This course is not eligible for Credit/D/Fail grading.

BAMA 512 (1.5) Database Marketing and Data Mining
This course is not eligible for Credit/D/Fail grading.

BAMA 513 (1.5) Digital Marketing
This course is not eligible for Credit/D/Fail grading.

BAMA 514 (1.5) Brand Management
Restricted to students in one of the following programs: M.B.A., J.D./M.B.A., M.B.A./M.A.A.P.S., M.Sc.B., M.M., I.M.B.A.; or a Ph.D. with a BADM specialization. This course is not eligible for Credit/D/Fail grading.

BAMA 515 (1.5) Services Management
This course is not eligible for Credit/D/Fail grading.

BAMA 516 (1.5) Customer Relationship Management
Concepts of customer relationship management; metrics for customer loyalty satisfaction; RFM (recency, frequency, monetary)
analysis in direct marketing, economics of customer relationship and customer loyalty program designs; exposure to trending
topics; managerial understanding; practical analytical experience on real customer databases. 

This course is not eligible for Credit/D/Fail grading.

**BAMA 517 (1.5) Data Driven Marketing**
Statistical models of customer behaviour and past marketing actions, and applications to determining elements of the marketing mix. 
This course is not eligible for Credit/D/Fail grading.

**BAMA 518 (1.5) Sales Management**
This course is not eligible for Credit/D/Fail grading.

**BAMA 540 (0.8) Marketing Fundamentals**
This course is not eligible for Credit/D/Fail grading.

**BAMA 541 (0.8) Product Service Management**
This course is not eligible for Credit/D/Fail grading.

**BAMA 550 (1.5) Marketing**
This course is not eligible for Credit/D/Fail grading.

**BAMA 580 (1.5) Topics in Marketing**
This course is not eligible for Credit/D/Fail grading.

**BAMA 590 (1.5/3) Directed Studies in Marketing**
This course is not eligible for Credit/D/Fail grading.

### Commerce, Faculty of Commerce & Business Administration

**BAMS: Business Administration: Management Science**

**BAMS 500 (1.5) Management Science - Best Practices**
This course is not eligible for Credit/D/Fail grading.

**BAMS 501 (1.5) Probabilistic Models for Management**
This course is not eligible for Credit/D/Fail grading.

**BAMS 502 (1.5) Stochastic Processes**
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAMS 501.

**BAMS 503 (1.5) Simulation Modeling I: Data Processing and Monte Carlo Simulation**
Computer simulation concepts such as Monte Carlo simulation and its benefits; developing simulation models; fitting probability distributions to available data in Excel; analyzing and processing available data for use in simulation models. 
This course is not eligible for Credit/D/Fail grading.

**BAMS 504 (1.5) Simulation Modeling II: Queuing and Discrete Event Simulation**
Simulation concepts such as Discrete Event Simulation and its benefits; queueing processes and theory; performing simulation optimization; discerning appropriateness of steady-state simulation models and conducting them; analyzing simulation outcomes and making comparisons. 
This course is not eligible for Credit/D/Fail grading.

**BAMS 506 (1.5) Optimal Decision Making I**
Models and methods in continuous optimization; linear and nonlinear programming; applications to functional business areas and related fields. Students will learn to formulate an optimization model, solve it, interpret results, and derive insight relevant to intended application. 
This course is not eligible for Credit/D/Fail grading.

**BAMS 507 (1.5) Theory of optimization**
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAMS 506.

**BAMS 508 (1.5) Optimal Decision Making II**
Models and methods in discrete optimization; emphasis on useful modeling methodologies and their applications. Students will learn to formulate an optimization model, solve it, interpret results, and derive insight relevant to intended application. 
This course is not eligible for Credit/D/Fail grading.

**BAMS 509 (1.5) Theory of Discrete Optimization**
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAMS 508.
BAMS 517 (1.5) Decision Analysis Under Uncertainty
Decision making under uncertainty; using decision trees; the value of information; utility and risk preferences; behavioral aspects of decision making under uncertainty. This course is not eligible for Credit/D/Fail grading.

BAMS 518 (1.5) Markov Decision Processes
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAMS 517.

BAMS 521 (1.5) Consulting Practices and Project Management
Non-technical skills and practices for consulting; project management and problem solving for business consulting projects in analytics. This course is not eligible for Credit/D/Fail grading.

BAMS 522 (1.5) Consulting Practices II
This course is not eligible for Credit/D/Fail grading.

BAMS 523 (1.5) Managerial Decisions Modeling and Analytics
This course is not eligible for Credit/D/Fail grading.

BAMS 550 (1.5) Operations and Logistics
Not available to MBA students. This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 542.

BAMS 580 (1.5) Topics in Applied Management Science
This course is not eligible for Credit/D/Fail grading.

BAMS 590 (1.5/3) d Directed Studies in Management Science
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BAPA: Business Administration: Policy Analysis

BAPA 501 (1.5) Government and Business
This course is not eligible for Credit/D/Fail grading.

BAPA 517 (1.5) Managerial Problem Solving and Decision-Making
This course is not eligible for Credit/D/Fail grading.

BAPA 518 (1.5) Managerial Irrationalities
This course is not eligible for Credit/D/Fail grading.

BAPA 550 (1.5) Foundations of Managerial Economics
This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 530.

BAPA 551 (1.5) Managerial Economics II
This course is not eligible for Credit/D/Fail grading. Prerequisite: BAPA 550.

BAPA 560 (1.5) Foundations of Managerial and Business Economics
Framework for analyzing economic and managerial problems, fundamental market forces of supply and demand, and the drivers of firms’ production and pricing choices. This course is not eligible for Credit/D/Fail grading.

BAPA 580 (1.5) Topics in Policy Analysis
This course is not eligible for Credit/D/Fail grading.

BAPA 590 (1.5/3) d Directed Studies in Policy Analysis
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BASC: Business Administration: Supply Chain

BASC 500 (1.5) Process Fundamentals
This course is not eligible for Credit/D/Fail grading.
BASC 510 (1.5) Operating Supply Chains  
This course is not eligible for Credit/D/Fail grading.

BASC 512 (1.5) Supply Chain Management for E-Business  
This course is not eligible for Credit/D/Fail grading.

BASC 515 (1.5) Total Quality Management  
This course is not eligible for Credit/D/Fail grading.

BASC 517 (1.5) Operations Strategy  
This course is not eligible for Credit/D/Fail grading.

BASC 521 (1.5) Project Governance and Oversight  
This course is not eligible for Credit/D/Fail grading.

BASC 523 (1.5) Supply Chain Management  
This course is not eligible for Credit/D/Fail grading.

BASC 524 (1.5) Supply Chain Analytics  
This course is not eligible for Credit/D/Fail grading.

BASC 525 (1.5) Supply Chain Strategy and Analytics  
Strategic and operational decision-making within a supply chain and service provision context. Focuses on managerial decision-making using cases, decision models, and analytics. This course is not eligible for Credit/D/Fail grading.

BASC 540 (0.7) Operations Fundamentals  
This course is not eligible for Credit/D/Fail grading.

BASC 550 (1.5) Operations and Logistics  
This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 542.

BASC 580 (1.5) Current Issues in Logistics and Operations Management  
This course is not eligible for Credit/D/Fail grading.

BASC 590 (1.5/3) Directed Study in Supply Chain Management  
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BASD: Business Administration: Sustainable Development

BASD 501 (1.5) Corporate Social Responsibility  
Measuring and reporting environmental, social, and economic impacts of business practices. This course is not eligible for Credit/D/Fail grading.

BASD 504 (1.5) Environmental Marketing  
Environmental marketing, including green consumerism, environmental and sustainable certification, and segmentation. This course is not eligible for Credit/D/Fail grading.

BASD 505 (1.5) Environmental Economics, Management, and Technology  
Restricted to students in one of the following programs: M.B.A., LL.B./M.B.A., M.Sc.B., Ph.D. with B.A.D.M. specialization, M.B.A./M.A.A., M.M., or I.M.B.A. This course is not eligible for Credit/D/Fail grading.

BASD 580 (1.5-6) Special Topics in Sustainability and Business  
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BASM: Business Administration: Strategic Management

BASM 501 (1.5) Business Strategy  
This course is not eligible for Credit/D/Fail grading.
BASM 502 (1.5) Corporate Strategy
This course is not eligible for Credit/D/Fail grading. Prerequisite: BASM 501.

BASM 504 (1.5) Intellectual Property and Business Strategy
This course is not eligible for Credit/D/Fail grading.

BASM 507 (1.5) Creative Thinking and Problem Solving
This course is not eligible for Credit/D/Fail grading.

BASM 510 (1.5) Consulting Simulation
This course is not eligible for Credit/D/Fail grading.

BASM 514 (1.5) Strategy in Organizations
Impact of corporate and organizational design on achieving profitability. Introduces the underlying economics of organizational design, including incentive pay, decentralization, transfer pricing, and complementarities. This course is not eligible for Credit/D/Fail grading.

BASM 523 (1.5) Management Consulting and Corporate Decision Support
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of BASM 501, BAFI 500.

BASM 530 (1.5) International Trading Environment
Credit will be granted for only one of BASM 530 or BAIM 500. This course is not eligible for Credit/D/Fail grading.

BASM 531 (1.5) Multinational Enterprises
Credit will be granted for only one of BASM 531 or BAIM 501. This course is not eligible for Credit/D/Fail grading.

BASM 550 (1.5) Strategic Management
Not available to MBA students. This course is not eligible for Credit/D/Fail grading. Equivalency: HCEC 561.

BASM 580 (1.5) Topics in Strategic Management
This course is not eligible for Credit/D/Fail grading.

BASM 590 (1.5/3) Directed Studies in Strategic Management
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration

BATL: Business Administration: Transportation and Logistics

BATL 500 (1.5) Transportation Services Management
This course is not eligible for Credit/D/Fail grading.

BATL 501 (1.5) Transportation Policy
This course is not eligible for Credit/D/Fail grading.

BATL 502 (1.5) Applied Demand Analysis
This course is not eligible for Credit/D/Fail grading.

BATL 503 (1.5) Cost and Productivity Analysis
This course is not eligible for Credit/D/Fail grading.

BATL 510 (1.5) Introduction to Logistics and Operations Management
This course is not eligible for Credit/D/Fail grading.

BATL 530 (1.5) International Shipping and Logistics
Credit will be granted for only one of BATL 530 or BAIM 526. This course is not eligible for Credit/D/Fail grading.

BATL 590 (1.5/3) Directed Studies in Transportation and Logistics
This course is not eligible for Credit/D/Fail grading.

Commerce, Faculty of Commerce & Business Administration
BAUL: Business Administration: Urban Land Economics

**BAUL 500 (1.5) Real Estate Markets**
This course is not eligible for Credit/D/Fail grading.

**BAUL 501 (1.5) Real Estate Investment Analysis**
This course is not eligible for Credit/D/Fail grading.

**BAUL 503 (1.5) Land Development and Real Options**
This course is not eligible for Credit/D/Fail grading.

**BAUL 508 (1.5) Real Estate Securitization**
This course is not eligible for Credit/D/Fail grading. **Prerequisite:** All of BAFI 500, BABS 500, BAPA 500.

**BAUL 509 (1.5) Real Estate Development**
This course is not eligible for Credit/D/Fail grading.

**BAUL 580 (1.5) Topics in Urban Land Economics**
This course is not eligible for Credit/D/Fail grading.

Biochemistry and Molecular Biology, Faculty of Medicine

**BIOC: Biochemistry**

**BIOC 202 (3) Introductory Medical Biochemistry**
Introduction to proteins and enzymes, carbohydrate metabolism, and glucose homeostasis. The course emphasis is on human biochemistry and it is designed for students going into health science fields. Credit will be granted for only one of BIOC 202, BIOC 203 or BIOL 201. [3-0-0]
**Prerequisite:** Either (a) CHEM 203 or (b) CHEM 233 or (c) all of CHEM 233, PHAR 220. For option (a), a corequisite of CHEM 213 is required. For option (b), a corequisite of CHEM 205 is required.
**Equivalency:** BIOC 202, BIOC 203, BIOL 201.

**BIOC 203 (3) Fundamentals of Biochemistry**
Amino acids and proteins. Enzymes and enzymology. Human metabolic pathways. Structure, function and metabolism of carbohydrates including glycogen storage and gluconeogenesis. Restricted to students in Biochemistry specializations. Credit will be granted for only one of BIOC 202, BIOC 203 or BIOL 201. [3-0-1]
**Prerequisite:** All of BIOL 200, CHEM 203.
**Corequisite:** CHEM 213.

**BIOC 301 (3) Biochemistry Laboratory**
Techniques by which the chemical and physical properties of fundamental components of the cell are studied. [0-3-1]
**Corequisite:** One of BIOC 300, BIOC 302, BIOC 303.

**BIOC 302 (3) General Biochemistry**
Metabolic reactions of lipids, steroids, amino acids and nucleotides; the biochemistry of replication, transcription and translation. Credit will be granted for only one of BIOC 300, BIOC 302 or BIOC 303. [3-0-1]
**Prerequisite:** One of BIOL 201, BIOC 202, BIOC 203 and either (a) one of CHEM 204, CHEM 213 or (b) all of CHEM 205, CHEM 233 or (c) all of PHAR 220, CHEM 233.

**BIOC 303 (6) Molecular Biochemistry**
Structure, function and metabolism of lipids, steroids, amino acids and nucleotides; the biochemistry and molecular biology of replication, transcription, translation and gene regulation. For students in Biochemistry and Honours programs in other life sciences. Credit will be granted for only one of BIOC 300, BIOC 302 or BIOC 303. [3-0-0]
**Prerequisite:** One of BIOC 203, BIOL 201 and either (a) one of CHEM 204, CHEM 213 or (b) all of CHEM 205, CHEM 233.

**BIOC 304 (3) Contemporary Biochemical Research**
Exploration of the breadth and importance of biochemical research to present day challenges in medicine and biotechnology. Detailed experimental research case studies of novel biochemical methods used to address pressing and ongoing biochemical issues. [3-0-0]
**Prerequisite:** One of CHEM 213, CHEM 204.
**Corequisite:** BIOC 303.
BIOC 398 (3) Internship Work Placement I
Approved and supervised technical work experience in an industrial or academic laboratory for three or four months. Technical report required. Restricted to students admitted to the Internship Program in Biochemistry and Molecular Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Completion of academic third year in Biochemistry major or honours program is required.

BIOC 399 (3) Internship Work Placement II
Approved and supervised technical work experience in an industrial or academic research setting for four months. Technical report required. Restricted to students admitted to the Internship Program in Biochemistry and Molecular Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BIOC 398.

BIOC 402 (3) Proteins: Structure and Function
Structural components of proteins, classification by primary, secondary and tertiary structure, protein chemistry and purification, peptide and protein synthesis by chemical means and three-dimensional structure determination using X-ray diffraction and NMR. [3-0-0]
Prerequisite: One of BIOC 302, BIOC 303, BIOT 380. A minimum standing of 65% is recommended in these courses.

BIOC 403 (3) Enzymology
Kinetic analysis, catalytic mechanisms, transition state stabilization and regulation of activity, strategies for active site characterization and case studies of well-documented enzyme systems. Credit will be granted for only one of BIOC 403, CHEM 413 or CHEM 569. [3-0-0]
Prerequisite: BIOC 402. A minimum standing of 65% is recommended.

BIOC 404 (3) Biochemical Methods
Theory and application of classical and emerging technologies in biochemical research. Emphasis on using primary literature and oral presentation skills. Restricted to Honours students in Biochemistry or others with permission of the instructor. [1-0; 2-0]

BIOC 410 (3) Nucleic Acids-Structure and Function
Chemical, physical and biological properties of nucleic acids and their role in replication, transcription, translation and regulation of expression of genetic material. Credit will be granted for only one of BIOC 410 or BIOC 510. [3-0-0]
Prerequisite: Either (a) all of BIOC 303, BIOL 335 or (b) BIOT 380. A minimum standing of 65% is recommended in these courses.

BIOC 420 (3) Advanced Biochemical Techniques
Multi-week experiments in areas of contemporary biochemistry research using classical and modern techniques. Emphasis on experimental design, technique, critical analysis of data, and scientific communication skills. Restricted to Honours students in Biochemistry and others with permission of the instructor. [0-6-0]
Corequisite: BIOC 404.

BIOC 421 (3) Recombinant DNA Techniques
Multi-week experiments involving contemporary nucleic acid research, cloning and recombinant protein engineering. Emphasis is on experimental design, critical analysis of data and scientific communication skills. Restricted to Major students in Biochemistry. [0-6-0]
Prerequisite: All of BIOC 301, BIOC 410.

BIOC 440 (3) Concepts in Molecular Biology
Developing areas of molecular biology, focusing on experimental design and data analysis. Signal transduction, the use of model eukaryotes, and the regulation of gene expression. [3-0-0]
Prerequisite: One of BIOC 303, BIOT 380 and all of BIOC 402, BIOC 410.

BIOC 448 (3/6) c Directed Studies in Biochemistry
A library (3 credits) or a laboratory project with written report (3 or 6 credits) allowing a student to undertake an investigation on a specific topic as agreed upon by the faculty and student.
Prerequisite: Permission of the Department Head is required.

BIOC 449 (3/6) c Honours Thesis
A research problem under the direction of a faculty member. Restricted to Honours students.

BIOC 450 (3) Membrane Biochemistry
Biochemistry of membranes and membrane proteins, membrane fusion, electrical signaling, and the involvement of membrane proteins in disease and drug development. [3-0-0]
Prerequisite: One of BIOC 303, BIOT 380 and all of BIOC 402, BIOC 410.
BIOC 460 (3) Advanced Techniques in Biochemistry
Theoretical basis and practical applications of a selection of advanced techniques currently used in biochemical research. Topics will vary. [3-0-0]
Prerequisite: One of BIOC 303, BIOT 380 and all of BIOC 402, BIOC 410.

BIOC 490 (3) Student Directed Seminars
Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the “Handbook for Student Directed Seminars”. Not given every year. [3-0-0]
Prerequisite: Third-year standing.
Corequisite: One of BIOC 300, BIOC 302, BIOC 303.

BIOC 498 (3) Internship Work Placement III
Approved and supervised technical work experience in an industrial or academic research setting for four months. Technical report required. Restricted to students admitted to the Internship Program in Biochemistry and Molecular Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BIOC 399.

BIOC 499 (3) Internship Work Placement IV
Approved and supervised technical work experience in an industrial or academic research setting for four months. Technical report required. Restricted to students admitted to the Internship Program in Biochemistry and Molecular Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BIOC 498.

BIOC 501 (2-6) c Advanced Biochemistry Laboratory
Practical applications of advanced biochemical techniques. Admission is limited and is by permission of the department head. This course is not eligible for Credit/D/Fail grading.
Corequisite: BIOC 404.

BIOC 509 (3) Membrane Structure and Function
The physical properties and functional roles of lipids in membranes, liposomes, membrane permeability; membrane function; structure, biosynthesis and cell sorting of membrane proteins; and the structure-function relationships of channels, transporters and receptors. Given in alternate years. This course is not eligible for Credit/D/Fail grading. [3-0]

BIOC 510 (3) Nucleic Acids: Structure and Function
Structure and function of nucleic acids and their role in replication, transcription, translation and expression of genetic information. Credit will be granted for only one of BIOC 410 or BIOC 510. This course is not eligible for Credit/D/Fail grading. [3-0]

BIOC 511 (3) Biochemical Aspects of Cellular Regulation
A lecture and discussion course on the molecular basis of cellular regulation with special emphasis on mammalian cells. Mechanisms involved in the responses of cells to adrenergic, steroid and peptide hormones and growth factors. Regulation of the concentration and specific activity of key enzymes, transport systems and structural proteins. Given in alternate years. This course is not eligible for Credit/D/Fail grading. [3-0]

BIOC 514 (3) Advanced Topics in Protein Chemistry
Topics will include contemporary theoretical and experimental investigation of protein structure-function relationships. Topics will vary. Given in alternate years. This course is not eligible for Credit/D/Fail grading. [3-0]

BIOC 521 (3) Advanced Topics in Molecular Biology
Discussions based on topics in the current literature. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: One of BIOC 410, BIOC 510.

BIOC 522 (1.5) Membrane Proteins
Structure, biosynthesis and cell sorting of membrane proteins; and the structure-function relationships of channels, transporters and receptors. This course is not eligible for Credit/D/Fail grading.

BIOC 530 (3) Seminar in Biochemistry
Attendance is required of all graduate students in Biochemistry. Normally students will make a presentation once per year on a topic approved by their research advisor or committee or on the results of their research. This course is not eligible for Credit/D/Fail grading.

BIOC 548 (2-6) c Directed Studies
In special cases, with approval of the department head, advanced courses may be arranged for graduate students in
This document contains information about academic courses offered by the Faculty of Science and the Bioinformatics program. Here is a summary of some of the courses:

**BIOC 549 (18)** M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

**BIOC 551 (3)** Advanced Topics in Biochemistry and Molecular Biology
Discussions based on topics in the current literature. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: One of BIOC 410, BIOC 510.

**BIOC 552 (1.5)** Membrane Proteins
Structure, biosynthesis and cell sorting of membrane proteins; and the structure-function relationships of channels, transporters and receptors. This course is not eligible for Credit/D/Fail grading.

**BIOC 553 (1.5)** Advanced Topics in Lipid Biology
Principles of lipid structure and dynamics; biochemical approaches to study lipids and applications of lipid biology. This course is not eligible for Credit/D/Fail grading.

**BIOC 554 (1.5)** Nucleic Acids: DNA/RNA Structure and Function
Mechanisms, regulation and dynamics of DNA and RNA biology. Structure and function of nucleic acids and their role in replication, transcription, translation and expression of genetic information. This course is not eligible for Credit/D/Fail grading.

**BIOC 555 (1.5)** Epigenetics
Principles, regulation and dynamics of epigenetics. This course is not eligible for Credit/D/Fail grading.

**BIOC 556 (1.5)** Biochemical Aspects of Cellular Regulation
Mechanisms involved in the responses of cells to adrenergic, steroid and peptide hormones and growth factors. Recent advances in approaches and regulation of the concentration and specific activity of key enzymes, transport systems and structural proteins. Given in alternate years. This course is not eligible for Credit/D/Fail grading. [3-0]

**BIOC 557 (1.5)** Advanced Topics in Biochemistry
Advances in biochemical approaches. Topics vary. This course is not eligible for Credit/D/Fail grading.

**BIOC 558 (1.5)** Advanced Topics in Protein Chemistry I
Contemporary theoretical and experimental investigation of protein structure-function relationships. Topics will vary. This course is not eligible for Credit/D/Fail grading.

**BIOC 559 (1.5)** Advanced Topics in Protein Chemistry II
Contemporary theoretical and experimental investigation of protein structure-function relationships. Topics will vary. This course is not eligible for Credit/D/Fail grading.

**BIOC 560 (1.5)** Computational Approaches in Biochemistry
Computational approaches to study protein and nucleic acids. This course is not eligible for Credit/D/Fail grading.

**BIOC 649 (0)** Doctoral Dissertation

**Bioinformatics, Faculty of Science**

**BIOF: Bioinformatics**

**BIOF 501 (3)** Special Topics in Bioinformatics
This course is not eligible for Credit/D/Fail grading.

**BIOF 520 (3)** Problem-Based Learning In Bioinformatics
Develops the student’s ability to exchange ideas in small groups focused on real but simplified problems in bioinformatics. Problems are carefully selected to cover all aspects of Bioinformatics research. Required of students in the Bioinformatics graduate program. Students not registered in the Bioinformatics graduate program must get permission to register in this course. This course is not eligible for Credit/D/Fail grading.

**BIOF 540 (1-3)** Statistical Methods for High Dimensional Biology
This course is not eligible for Credit/D/Fail grading. Equivalency: STAT 540, GSAT 540.

**BIOF 548 (3-6)** Directed Studies
Advanced study under the direction of a faculty member composed of laboratory sessions and directed readings related to selected areas of bioinformatics. Students must get permission to register in this course. This course is not eligible for Credit/D/Fail grading.
Botany, Faculty of Science

**BIOL: Biology**

BIOL 111 (3) **Introduction to Modern Biology**
Concepts fundamental to biological issues, such as the genetic basis of biological variation, evolution, infectious diseases, causes of cancer, population growth, and human effects on ecosystems. Not open to students who have credit for Biology 12 (including AP, IB). [3-0-0]

BIOL 112 (3) **Biology of the Cell**
The principles of cellular and molecular biology using bacterial and eukaryotic examples. [3-0-0]
Prerequisite: One of CHEM 12, CHEM 111 and one of BIOL 11, BIOL 12, BIOL 111.

BIOL 121 (3) **Genetics, Evolution and Ecology**
Principles of storage and transmission of genetic variation; origin and evolution of species and their ecological interactions. Credit will be granted for only one of BIOL 121 or BIOL 344. [3-0-0]
Prerequisite: One of BIOL 11, BIOL 12, BIOL 111.

BIOL 140 (2) **Laboratory Investigations in Life Science**
Guided experimental investigations of biological questions. [1-2-0]
Prerequisite: One of BIOL 11, BIOL 12, BIOL 111.

BIOL 153 (7) **Human Biology**
The principles of biology with particular reference to the human body (anatomy and physiology). Laboratories include selected experiments on organ physiology and general anatomy. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414;this course is not eligible for Credit/D/Fail grading. [3-3*-0; 3-3*-0]

BIOL 155 (6) **Human Biology**
The principles of biology with particular reference to the human body (anatomy and physiology). [3-0-0; 3-0-0]

BIOL 200 (3) **Fundamentals of Cell Biology**
Structure and function of plant and animal cells; membrane models, cytoplasmic organelles, biological information from gene to protein, the endomembrane system, secretion, intracellular digestion, endocytosis, transport processes, cytoskeleton and cell motility. [3-0-1]
Prerequisite: Either (a) BIOL 112 and one of CHEM 123, CHEM 113; or (b) SCIE 001 or (c) 8 transfer credits of first-year BIOL and 6 credits of first-year CHEM or (d) one of BIOL 112 or BIOL 121 and a corequisite of CHEM 203.

BIOL 201 (3) **Introduction to Biochemistry**
Biological molecules, protein structure and enzyme action, energy transfer, central metabolic pathways and their regulation. Examples drawn from plants, animals and microorganisms. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar.) Credit will be granted for only one of BIOL 201, BIOC 202, or BIOC 203. [3-0-1]
Prerequisite: BIOL 200 and one of CHEM 233, CHEM 260; or BIOL 200 and a corequisite of CHEM 213; or a corequisite of either CHEM 313 or CHEM 330.
BIOL 203 (4) Eukaryotic Microbiology
Introduction to the origin and diversity of protists (protozoa and algae) at both cellular and genomic levels, including the role of endosymbiosis in evolution. [3-3-0]
Prerequisite: BIOL 140 and one of BIOL 121, SCIE 001. BIOL 200 recommended.

BIOL 204 (4) Vertebrate Structure and Function
Introduction to the vertebrate phyla and their evolution; a comparative study of vertebrate structure and function, with dissection of representative forms. [3-3-0]
Prerequisite: Either (a) all of BIOL 121, BIOL 140 or (b) all of SCIE 001, BIOL 140. Or (c) 8 transfer credits of first-year biology.

BIOL 205 (4) Comparative Invertebrate Zoology
An introduction to the unity, diversity and evolutionary history of invertebrates. [3-3-0]
Prerequisite: Either (a) all of BIOL 121, BIOL 140 or (b) all of SCIE 001, BIOL 140. Or (c) 8 transfer credits of first-year biology.

BIOL 209 (4) Biodiversity of Algae, Fungi and Bryophytes
Diversity, ecology, cell biology and evolutionary origins of multicellular eukaryotes, illustrated through mosses and liverworts; fungi and slime molds; and fresh water and marine algae. [3-3-0]
Prerequisite: One of BIOL 121, SCIE 001. Or 8 transfer credits of first-year biology.

BIOL 210 (4) Vascular Plants
A comparative study of pteridophytes, gymnosperms and angiosperms, integrating form, function and ecology. [3-3-0]
Prerequisite: One of BIOL 121, SCIE 001 or 8 transfer credits of first-year biology.

BIOL 230 (3) Fundamentals of Ecology
Dynamics of plant and animal populations, structure of ecological communities and functioning of ecosystems. Interpretation of research results and application to environmental issues. Labs meet once a month. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-3*-0]
Prerequisite: One of BIOL 121, SCIE 001.

BIOL 233 (3) Genetics for Life
How genetic differences determine individual characteristics, and how they are inherited, analyzed, and modified. Emphasis on genetic diversity, human ancestry, personal genomics, and cancer genetics. [3-0-2]
Prerequisite: Either (a) all of BIOL 112, BIOL 121 or (b) SCIE 001; or (c) a corequisite of CHEM 203 and one of BIOL 112 or BIOL 121.

BIOL 234 (3) Fundamentals of Genetics
Genotype and phenotype, mechanisms of inheritance, genetic analysis. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-2]
Prerequisite: Either (a) all of BIOL 112, BIOL 121 or (b) SCIE 001 or (c) a corequisite of CHEM 203 and one of BIOL 112 or BIOL 121.

BIOL 260 (3) Fundamentals of Physiology
Principles of cellular and organismal physiology illustrated with examples from unicellular organisms, plants and animals, focusing on transport processes, water balance, nutrient acquisition and communication. [3-0-0]
Prerequisite: Either (a) all of BIOL 112, BIOL 121 or (b) SCIE 001 or (c) 8 transfer credits of 1st year BIOL and 6 credits of 1st year chemistry.

BIOL 300 (3) Fundamentals of Biostatistics
Statistical procedures for biological research; estimation, hypothesis testing, goodness of fit, analysis of variance and regression; use of computers for statistical analysis. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-2-0]
Prerequisite: Either (a) BIOL 121 and one of MATH 101, MATH 103, MATH 105, MATH 121; or (b) SCIE 001.

BIOL 301 (3) Biomathematics
Introduction to uses of mathematics in the biological sciences; experimental design and modelling of biological processes. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-2]
Corequisite: One of BIOL 300, STAT 200.

BIOL 306 (3) Advanced Ecology
Ecology of populations, communities and ecosystems. Tests of ecological theory with experiments and application to environmental issues. Labs meet once a month. Please consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-3*-0]
Prerequisite: BIOL 230.

BIOL 310 (3) Introduction to Animal Behaviour
Animal behavior from an ecological and evolutionary perspective; the methods used to study behaviour and test its adaptive significance. [3-0-2]
Prerequisite: BIOL 121. Third-year standing is required.

BIOL 317 (4) Weed Science
Importance, identification, dissemination and biology of weeds; preventative, cultural, biological and chemical methods of control. [3-2-0]
Equivalency: APBI 328.

BIOL 320 (4) Survey of Algae
A survey of the algae, considering their morphology, life history, classification, and ecology. [3-3-0]
Prerequisite: BIOL 121.

BIOL 321 (3) Morphology and Evolution of Bryophytes
A study of evolution, taxonomy and morphology of mosses, liverworts and hornworts with emphasis on living plants in their environment. [2-4-0]
Prerequisite: BIOL 121.

BIOL 322 (3) Structure and Evolution of Ferns and Fern-allies
Anatomy, morphology and relationships of the ferns and fern-allies, with assessment of both fossil and extant taxa. [2-4-0]
Prerequisite: BIOL 121.

BIOL 323 (3) Structure and Reproduction of Fungi
The evolutionary diversity of the fungi as shown by their morphology and reproductive biology. [2-3-0]
Prerequisite: BIOL 121.

BIOL 324 (3) Introduction to Seed Plant Taxonomy
Introduction to seed plant taxonomy emphasizing descriptive morphology and identification. Each student will be required to submit a plant collection. [2-3-0]
Prerequisite: BIOL 121.
Equivalency: APBI 324.

BIOL 325 (3) Introduction to Animal Mechanics and Locomotion
Comparative aspects of the functional design of skeletal systems and the mechanics of swimming, flying and terrestrial locomotion, with particular reference to the vertebrates. [3-0-0]
Prerequisite: BIOL 121.

BIOL 326 (3) Experimental Biology of Invertebrates
Behaviour and ecology of invertebrates as revealed by hands-on experiments in the laboratory and field. Marine emphasis. [1-4-0]
Prerequisite: BIOL 205.
Corequisite: Either (a) STAT 200 or (b) BIOL 300.

BIOL 327 (3) Introduction to Entomology
A survey of the structure, classification and biology of insects; ecology, life-histories and insect-plant relations.
Prerequisite: One of BIOL 121, SCIE 001.
Equivalency: APBI 327.

BIOL 328 (3) Introductory Parasitology
Classification, morphology and life histories of animal parasites affecting humans and other animals. [2-3-0]
Prerequisite: BIOL 121.

BIOL 331 (4) Developmental Biology
Animal development and its underlying causal principles; introductory embryology. [3-3-0]
Prerequisite: Either (a) BIOL 201 or (b) all of BIOL 200, BIOL 260 and one of BIOL 233, BIOL 234.

BIOL 332 (4) Protistology
Cell biology, ecology, and evolution of protists; origins of multicellularity; the role of protists in micropaleontology, parasitology, and oceanography. [3-3-0]
Prerequisite: BIOL 200.

BIOL 335 (3) Molecular Genetics
Isolation and identification of genes, analysis of gene structure; gene expression and its regulation in prokaryotes and in eukaryotes; developmental genetics. [3-0-2]

Prerequisite: One of BIOL 233, BIOL 234, MICB 322, FRST 302.

BIOL 336 (3) Fundamentals of Evolutionary Biology

Natural selection; population genetics, quantitative genetics and systematics; classical and molecular approaches to the study of evolution. [3-0-2]

Prerequisite: One of BIOL 233, BIOL 234.

BIOL 337 (3) Introductory Genetics Laboratory

A laboratory course demonstrating the fundamental principles of inheritance: Mendel's Laws, sex-linkage, mapping, mutagenesis, chromosome structure, developmental biology, biochemical and population genetics. [1-4-0]

Prerequisite: BIOL 200.

Corequisite: One of BIOL 233, BIOL 234.

BIOL 338 (4) Introduction to Genomics

An introduction to genome biology and applications of genomics. [3-0-1.5]

Prerequisite: One of BIOL 234, BIOL 233, FRST 302.

BIOL 340 (2) Introductory Cell Biology Laboratory

Experiments using unicellular eukaryotes or prokaryotes with emphasis on techniques in microscopy and cell biology. [1-3-0]

Prerequisite: All of BIOL 140, BIOL 200. And at least third-year standing in Science.

BIOL 341 (2) Introductory Molecular Biology Laboratory

Use of recombinant DNA techniques. [1*-4-0]

Prerequisite: BIOL 200. And at least third-year standing in Science.

BIOL 342 (2) Integrative Biology Laboratory

Field-based and laboratory-based investigation of organisms. [1-3-0]

Prerequisite: Either (a) all of BIOL 121, BIOL 140 or (b) all of SCIE 001, BIOL 140 or (c) 8 transfer credits of first-year biology; and third-year standing or higher in Combined Major in Science.

BIOL 343 (3) Plants and Peoples

The interactions of plants and human societies; the role of people in the origin, evolution and dispersal of food, drug and economic plants, and the influences of plants on human societies. Suitable for upper-level Arts students. [2-2-1]

BIOL 344 (3) Human Heredity and Evolution

Relates genetic and evolutionary concepts to humans. Primarily for upper-level students in the Faculty of Arts. Credit will be granted for only one of BIOL 121 or BIOL 344. Not open to students in the Life Sciences. [3-0-2]

BIOL 345 (3) Human Ecology

Basics of ecology are introduced, focussing on observations of the natural world. Assignments, including a group project, consider connections between research, awareness and practical uses of ecology. Not for credit in the Life Sciences. [3-0-2]

BIOL 346 (3) Microbes and Society

An elementary course in molecular biology primarily for Arts students. The historical development of recent discoveries in molecular biology with emphasis on bacteria and viruses and their interaction with humans. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar.) Not for credit in Life Sciences. [3-0-0]

BIOL 347 (3) Principles and Methodology in Biological Research

Contemporary research in the Botany and Zoology Departments; history and methodology of scientific discovery; seminars on current problems. Restricted to Honours students in Biology. Not to be taken concurrently with BIOL 449. [2-3-0]

BIOL 351 (4) Plant Physiology I

Mechanisms and regulation of functional processes contributing to the assimilation, transport and utilization of water, mineral nutrients and carbon by plants. Restricted to Majors and Honours students in Biology. [3-3-0]

Prerequisite: One of BIOL 121, SCIE 001 and either (a) CHEM 123 or (b) all of CHEM 111, CHEM 113. CHEM 233 is recommended.

Equivalency: APBI 351, FRST 311.

BIOL 352 (3) Plant Physiology II: Plant Development

Introduction to the processes involved in growth and development: cell division, tissue culture, meristems, differentiation, and the action of major growth regulators, and photomorphogenesis. Emphasis on experimental approaches. [2-3-1]

Prerequisite: Either (a) BIOL 200 and one of BIOL 233, BIOL 234; or (b) FRST 302. CHEM 233 is recommended.
BIOL 361 (3) Physiology of Sensory, Nervous and Muscular Systems
Excitable membranes, neural signaling and transmission; transduction and coding of sensory information; muscle contraction.
Prerequisite: BIOL 200. One of BIOL 260 or BIOL 201 recommended.

BIOL 362 (2) Cellular Physiology
The cytoskeleton, cell dynamics, and regulation of cellular activities. Preference will be given to Majors or Honours students in Biology and Honours Biophysics. [2-0-1]
Prerequisite: Either (a) BIOL 361 or (b) all of BIOL 201, BIOL 351.

BIOL 363 (2) Laboratory in Animal Physiology
Experimental studies in animal physiology. Restricted to Majors and Honours students in Biology, Nutritional Sciences and Biophysics. [1-3-1]
Prerequisite: BIOL 204.
Corequisite: BIOL 361.

BIOL 364 (3) Comparative Cardiovascular, Respiratory and Osmoregulatory Physiology
Cardiovascular, respiratory, and osmoregulatory physiology. Preference will be given to students who are in Biology, Nutritional Sciences, and Honours Biophysics. [3-0-0]
Prerequisite: BIOL 204 and one of BIOL 260, BIOL 361.
Equivalency: APBI 311.

BIOL 398 (3) Co-operative Work Placement I
Work experience in an industrial setting, taken during Winter Session (Term 2) of third year. Restricted to students admitted to the Co-operative Education Program in Biology. This course is not eligible for Credit/D/Fail grading.

BIOL 399 (3) Co-operative Work Placement II
Work experience in an industrial research setting, taken during Summer Session (Terms 1 and 2) following third year. Restricted to students admitted to the Co-operative Education Program in Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BIOL 398.

BIOL 401 (3) Theory of Evolutionary Dynamics
Evolution as a dynamical system based on ecological interactions. Adaptive dynamics and evolutionary game theory. Credit will be granted for only one of BIOL 401 or BIOL 560. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: BIOL 301 and one of MATH 101, MATH 103, MATH 105, MATH 121.

BIOL 402 (3) Aquatic Ecology
Theoretical and applied limnology; ecology of inland water organisms in relation to physical, chemical and biological factors. One weekend field trip required. [2-4-0]
Prerequisite: BIOL 230 and one of BIOL 300, STAT 200.

BIOL 404 (3) Ecological Methodology
Design, execution, and analysis of ecological surveys and experiments. Practical field methods for estimating population metrics and describing community structure. Computer techniques for the statistical analysis of ecological data. [2-4-0]
Prerequisite: BIOL 230 and one of BIOL 300, STAT 200.

BIOL 406 (4) Plant Ecology I
Plant community ecology including a consideration of the major approaches to sampling, analyzing and interpreting vegetation patterns. Instruction given in field work and computer analysis of field data. [3-3-0]
Prerequisite: BIOL 230. BIOL 324 is recommended.

BIOL 408 (6) Principles of Applied Ecology
Principles of animal and community ecology applicable to the management of animal resources; application of statistical and computer techniques for measuring, analyzing, modelling, and simulating resource systems; problems of multiple resource use. [2-2-0]
Prerequisite: BIOL 300.

BIOL 409 (3) Field Course in Ecology
A two-week intensive course in field methods used in ecology. Fieldwork for this course is normally in the summer. A fee will be assessed for living and traveling expenses. Pre-registration required.
Prerequisite: BIOL 230 and one of BIOL 300, STAT 200. BIOL 306 is recommended.

BIOL 410 (3) Current Topics in Animal Behaviour
Lectures and seminar discussions on selected topics in animal behaviour. [2-0-2]

Prerequisite: BIOL 310. Permission of the head of Zoology is also acceptable.

**BIOL 411 (3) Insect Ecology**

Behavioural, population and community ecology of insects. Interactions between insects and plants and the application of the principles of insect ecology to biological control of insects and weeds. [3-0-0]

Prerequisite: Either (a) BIOL 205 or (b) all of AGRO 327, BIOL 327.

Equivalency: APBI 427.

**BIOL 412 (3) Phytogeography**

Description and interpretation of present and past floristic vegetational patterns; integration of evolutionary, ecological, and phytogeographical concepts. Terrestrial and aquatic plants are considered. Restricted to students of third and fourth years. [3-0-0]

Prerequisite: BIOL 121.

**BIOL 413 (3) Zoogeography**

The role of physical, ecological, and evolutionary processes in determining the geographic distribution of animals including humans, with implications for speciation and conservation. Restricted to students in third and fourth year. [3-0-0]

Prerequisite: BIOL 121.

**BIOL 415 (3) Evolutionary Processes in Plants**

Experimental and comparative analysis of evolutionary processes, speciation, and phylogenetic patterns in plants. [2-0-0]

Prerequisite: BIOL 336. BIOL 324 is recommended.

**BIOL 416 (3) Principles of Conservation Biology**

Ecological basis of conserving biological diversity and ecosystem services; application of ecological theory to global and local conservation problems in the context of economic, legal, political, and social perspectives. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [2-0-2]

Prerequisite: One of BIOL 230, FRST 201.

**BIOL 417 (3) Phylogenetic Biology**

Biodiversity from an evolutionary perspective. The evolutionary (phylogenetic) tree of genetic descent that links all organisms: its reconstruction, interpretation, and implications for fields from ecology to molecular biology. [2-0-2]

Prerequisite: BIOL 200 and one of BIOL 233, BIOL 234. BIOL 336 is recommended

**BIOL 418 (3) Evolutionary Ecology**

Ecological adaptation and evolutionary processes in contemporary populations; natural selection, variation, optimization, foraging theory, coevolution, arms races; life history theory, evolution of sex, sexual selection, evolution in managed populations. [2-2-0]

Prerequisite: BIOL 336 and BIOL 230.

**BIOL 420 (3) Ocean Conservation and Sustainability**

An interdisciplinary conservation course with a solutions-oriented approach to marine issues, drawing from natural sciences, social sciences, business, law, and communication. *This course is not eligible for Credit/D/Fail grading.* [2-0-3]

Prerequisite: Fourth-year standing.

**BIOL 421 (3) Plant-Microbe Interactions**

Biology and physiology of selected plant-microbe relationships. Impacts of plant-microbe relationships on society. [3-0-2]

Prerequisite: BIOL 200 and one of BIOL 233, BIOL 234, BIOL 260, BIOL 201.

Equivalency: APBI 426.

**BIOL 423 (3) Plant Stress Ecophysiology**

Molecular mechanisms of plant responses to extreme environments. Consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: BIOL 351. BIOL 406 or 407 are recommended.

**BIOL 425 (3) Biomechanics**

An analytical approach to the study of skeletal mechanics and animal locomotion. Selected topics in the structure and properties of biological materials, the functional design of skeletons for locomotion, and the fluid mechanics of swimming and flight. [2-3-0]

Prerequisite: BIOL 325.

**BIOL 426 (3) Mammalogy**

Natural history, behavioral ecology and conservation of terrestrial mammals. The laboratory includes classification, life histories, and ecology, with particular attention to species from British Columbia. [2-3-0]

Prerequisite: BIOL 204.
BIOL 427 (3) Ornithology and Herpetology
Ecology, evolution, behavior, and conservation of birds, amphibians, and reptiles. Laboratories and field projects will focus on identification, systematics, and natural history, with particular attention to species from British Columbia. [2-3-0]
Prerequisite: BIOL 121.

BIOL 428 (3) Evolutionary Morphology of Marine Invertebrates
Comparative analysis of marine invertebrate morphology from a macroevolutionary perspective. Origin and evolution of reoccurring adaptations in meiofaunal, benthic, pelagic, and deep-sea invertebrates, including their larval stages. [3-0-0]
Prerequisite: BIOL 205. And third-year standing.

BIOL 430 (3) Genome Evolution
Integration of molecular genetics and genomics with evolutionary biology. Emphasis on the evolutionary dynamics of genomes and the evolutionary implications of recent discoveries in molecular genetics and genomics. [3-0-0]
Prerequisite: One of BIOL 335, BIOL 338. Or with instructor permission BIOL 336.

BIOL 431 (3) Evolutionary Cell Biology
Ultrastructure, biogenesis, and evolution of eukaryotic cells and cell organelles, including their macromolecular basis. [3-0-0]
Prerequisite: BIOL 200. And fourth-year standing.

BIOL 432 (3) Research Strategies and Techniques in Cell Biology
Major physiological mechanisms that define eukaryotic cells, explored through student visits to UBC research laboratories and discussion of recent scientific literature, with emphasis on the techniques and strategies that enable researchers to test hypotheses and advance new concepts. [3-0-0]
Prerequisite: BIOL 200 and one of BIOL 233, BIOL 234. And fourth-year standing.

BIOL 433 (4) Plant Genetics
Emphasis on molecular aspects. Systems and techniques for genetic analysis in plants; isolation and regulation of plant genes; genetic dissection of plant-specific processes; transposable elements; gene transfer in plants; cytoplasmic inheritance; genetic engineering. [3-0-2]
Prerequisite: BIOL 335.

BIOL 434 (3) Population Genetics
Theoretical and experimental aspects of population and quantitative genetics. [3-0-2]
Prerequisite: BIOL 336 and either (a) BIOL 200 and one of BIOL 233, BIOL 234; or (b) FRST 302.

BIOL 436 (3) Integrated Functional Genomics
Global transcript, protein, and metabolite profiling technologies and their integration; applications focus on plant functions and plant interactions with pathogens and pests. [3-0-0]
Prerequisite: One of BIOL 335, BIOL 338.
Equivalency: FNH 436.

BIOL 437 (3) Laboratory in Animal Cell Molecular Biology
The use of recombinant DNA techniques to explore problems in animal developmental biology. [2-4-0]
Prerequisite: All of BIOL 331, BIOL 335 and one of BIOL 201, BIOL 203, BIOL 205. Permission of the department head is also required.

BIOL 438 (3) Zoological Physics
Animal systems viewed from a physicist's perspective. Topics include sensory systems, energy budgets, locomotion, internal flows, physical advantages of grouping. [3-0-0]
Prerequisite: One of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157, SCIE 001. BIOL 325 is recommended.
Equivalency: PHYS 438.

BIOL 440 (3) Plant Genomics
Concepts, principles, applications, and recent discoveries in genome structure, genetics, and comparative genomics in plants with a focus on economically important plants. [3-0-0]
Prerequisite: One of BIOL 335, BIOL 338.
Equivalency: APBI 440.

BIOL 441 (3) Cell Biology of Intracellular Trafficking
Analysis of cellular organelles and the intracellular traffic between them, concentrating on mammalian cell systems. [3-0-0]
Prerequisite: BIOL 335 and one of BIOL 340, BIOL 341 and one of BIOL 361, BIOL 362 and one of BIOL 201, BIOL 202, BIOC 203.
BIOL 444 (3) Techniques in Plant Molecular Biology
Purification and analysis of nucleic acids, electrophoresis and immunodetection of proteins. Restricted to Honours students with permission of the Head of Botany and the Biotechnology Teaching Laboratory. [0-7-0]
Prerequisite: BIOL 335.
Corequisite: BIOL 433 is recommended.

BIOL 445 (3) Darwin's Fishes
A series of computer-assisted lectures using ichthyology and the work of Charles Darwin to illustrate basic principles of biology, and their practical implementation, i.e., how biologists select research programs, generate and test hypotheses, and present their case to peers and the public. [2-0-2]
Prerequisite: Third-year standing in Science is required.

BIOL 446 (3) History and Philosophy of Biology
The nature of science, this history of evolutionary and molecular biology, philosophical questions about scientific methods and fundamental conclusions of biology. [3-0-0]
Prerequisite: Fourth-year standing in any degree program is required.

BIOL 447 (3) Principles and Methodology in Biological Research
Seminars, debates, workshops and tutorials designed to produce competence in specific areas of Biology. Restricted to Honours students in Biology. [2-3-0]
Corequisite: BIOL 449.

BIOL 448 (3-12) Directed Studies in Biology
A course designed to allow students to undertake an investigation on a specific topic as agreed upon by the faculty member and the student. Permission of the supervisor required. No more than six credits of BIOL 448 may be taken with the same supervisor.

BIOL 449 (6) Directed Biological Research
A course designed to allow students to undertake a research project in selected fields. Open only to Honours students in Biology, with permission of the supervisor. Presentation of a thesis and an oral examination are required.
Corequisite: BIOL 447.

BIOL 450 (3) Molecular Adaptation of Animals to the Environment
Physiological, biochemical, and molecular strategies of adaptation of animals to environmental challenges. The evolution of genetic and biochemical systems, and their impact on animal structure and function. [3-0-0]
Prerequisite: One of BIOL 361, BIOL 362, BIOL 364 and one of BIOL 201, BIOC 202, BIOC 203. BIOL 457 is recommended.

BIOL 454 (3) Comparative Animal Physiology
Selected topics in physiology emphasizing comparisons between diverse phylogenetic groups of animals. [3-0-0]
Prerequisite: One of BIOL 362, BIOL 364.

BIOL 455 (3) Comparative Neurobiology
Current approaches in neurobiology, from the cellular to the behavioural level, are examined using representatives of vertebrate and invertebrate nervous systems. [3-0-2*]
Prerequisite: One of BIOL 361, BIOL 362, BIOL 364, CAPS 301, PSYC 360.

BIOL 456 (3) Comparative and Molecular Endocrinology
A comparative study of vertebrate and invertebrate endocrinology. [3-0-0]
Prerequisite: BIOL 364.

BIOL 457 (3) Comparative Environmental Physiology
A survey of physiological adaptations of animals to different environments. [3-0-0]
Prerequisite: BIOL 364.

BIOL 458 (3) Developmental Neurobiology
Cellular, molecular and physiological aspects of nervous system development with applications to understanding adult nervous system function and neurological disorders. [3-0-0]

BIOL 459 (3) Neurobiology of Sensory and Motor Systems
Analysis of the mechanisms of sensory processing and motor orchestration using vertebrate and invertebrate model systems. Neural circuit structure, specialization, information coding, integration, and behaviour. [3-0-0]
Prerequisite: BIOL 455.

BIOL 462 (3) Ecological Plant Biochemistry
The structure, biosynthesis, distribution and biological function of secondary plant metabolites. [3-0-0]
Prerequisite: All of BIOL 200, BIOL 201. BIOL 209 or BIOL 210 is recommended.
Equivalency: FRST 413.

BIOL 463 (3) Gene Regulation in Development
Control of gene expression in development; the genetic and physiological basis of epigenetic determination; inductive interactions. [3-0-0]
Prerequisite: BIOL 335 and one of BIOC 302, BIOC 303. BIOL 331 is recommended.

BIOL 464 (3) Animal Developmental Genetics
Role of genes in embryonic development. Emphasis on tissue specific expression patterns and the role of genetic networks in establishing cell types. [3-0-0]
Prerequisite: BIOL 463.

BIOL 465 (3) Diversity and Evolution of Fishes
Introduction to fish diversity, with a focus on their phylogenetic interrelationships and the evolutionary, ecological, and biogeographic processes involved in generating patterns of fish biodiversity. [2-3-0]
Prerequisite: BIOL 463.

BIOL 466 (3) Applied Biology of Fishes
Physiological ecology and exploitation biology of teleost fishes; computer-based analysis and modeling of fish populations. Prerequisite: BIOL 465.

BIOL 490 (3) Student Directed Seminars
Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the "Handbook for Student Directed Seminars". Normally not suitable as a specific BIOL program elective. [3-0]
Prerequisite: Third-year standing.

BIOL 498 (3) Co-operative Work Placement III
Work experience in an industrial research setting, taken during the Summer Session (Terms 1 and 2) following fourth year. Restricted to students admitted to the Co-operative Education Program in Biology. This course is not eligible for Credit/D/Fail grading.

BIOL 499 (3) Co-operative Work Placement IV
Work experience in an industrial research setting, taken during the Winter Session (Terms 1 and 2) following fourth year. Restricted to students admitted to the Co-operative Education Program in Biology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of BIOL 399, BIOL 498.

BIOL 501 (3) Quantitative Methods in Ecology and Evolution
This course is not eligible for Credit/D/Fail grading. Prerequisite: BIOL 300 or equivalent and graduate student standing.

BIOL 509 (3) Population and Quantitative Genetics
This course is not eligible for Credit/D/Fail grading.

BIOL 510 (3) Applied Population Genetics
This course is not eligible for Credit/D/Fail grading. Equivalency: FRST 535.

BIOL 525 (2-6) d Topics in Systematics and Evolution
This course is not eligible for Credit/D/Fail grading.

BIOL 530 (3) The Biology of the Cell
This course is not eligible for Credit/D/Fail grading.

BIOL 535 (3) Teaching and Learning in the Life Sciences
This course is not eligible for Credit/D/Fail grading.

BIOL 537 (3) Topics in Biotechnology
Research reviews, class discussions, and presentations about current research in the diverse areas of biotechnology. Topics include the research interests of members of the UBC Biotechnology Laboratory. This course is not eligible for Credit/D/Fail grading. [1.5-0]

BIOL 548 (1-6) c Advanced Topics in Biology
This course is not eligible for Credit/D/Fail grading.

BIOL 560 (3) Theory of Adaptive Dynamics and Evolutionary Games
Consult the credit exclusion list within the Faculty of Science section of the Academic Calendar: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. Credit will be granted for only one of BIOL 560 or BIOL 401. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**Prerequisite:** An introductory course in the mathematical treatment of population biology as well as a course in integral calculus.

## Biotechnology, Faculty of Science

**BIOT: Biotechnology**

The following UBC Senate approved courses are restricted to students enrolled in the Joint Degree Honours Bachelor of Science in Biotechnology. They are taught at the British Columbia Institute of Technology (BCIT) campus and show on the BCIT transcript under the BCIT course numbers.

- **BIOT 201 (0)** Lab Safety
  Enrolment limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 1371.

- **BIOT 203 (2)** Introduction to Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 3210.

- **BIOT 205 (3)** Microbiology I
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 3201.

- **BIOT 206 (3)** Microbiology II
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 4201.

- **BIOT 207 (3)** Principles of Animal Physiology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 3260.

- **BIOT 208 (2)** Plant Anatomy and Physiology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 4260.

- **BIOT 210 (3)** Animal Cell Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 4230.

- **BIOT 221 (3)** Organic Chemistry I for Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT CHEM 3338.

- **BIOT 222 (3)** Organic Chemistry II for Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT CHEM 4438.

- **BIOT 231 (2)** Communications for Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT COMM 3343.

- **BIOT 232 (0)** Communication Workshop
  Enrolment limited to students in the Joint Degree Program in Biotechnology. Same as BCIT COMM 4443.

- **BIOT 241 (1)** Basic Statistics and Information Technology for Biotechnology
  Enrolment limited to students in the Joint Degree Program in Biotechnology. Same as BCIT MATH 2444.

- **BIOT 242 (2)** Inferential Statistics and Research Methodology for Biotechnology
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT MATH 4442.

- **BIOT 280 (0)** Introductory Biotechnology
  Block registration for the biotechnology, microbiology, physiology, communication for biotechnology, organic chemistry, information technology, plant anatomy, plant physiology and cell biology courses taken in the Joint BCIT/UBC Degree in Biotechnology. Credit limited to students in the Joint Degree Program.

- **BIOT 306 (2)** Microbiology III
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 6201.

- **BIOT 307 (3)** Molecular Genetics I
  Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 5220.
BIOT 308 (3) Molecular Genetics II
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 6220.

BIOT 309 (2) Advanced Plant Cell Biotechnology
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 5230.

BIOT 310 (2) Process Systems
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 5361.

BIOT 311 (3) Biochemistry I
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 5240.

BIOT 312 (3) Biochemistry II
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 6240.

BIOT 313 (3) Introduction to Pharmaceutical Development
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 5250.

BIOT 323 (2) Analytical Chemistry I
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT CHEM 5509.

BIOT 324 (2) Analytical Chemistry II
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT CHEM 6609.

BIOT 331 (3) Critical Reading & Writing
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT LIBS 7001.

BIOT 351 (0) Management Skills and Applications
Enrolment limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BUSA 7250.

BIOT 352 (2) Management and Regulatory Affairs
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT BIOT 6270.

BIOT 361 (3) Applied Ethics
Credit limited to students in the Joint Degree Program in Biotechnology. Same as BCIT LIBS 7002.

BIOT 380 (0) Advanced Biotechnology
Block registration for the microbiology, molecular genetics, biochemistry, management and regulatory affairs, process systems, analytical chemistry and communication courses taken in the BCIT/UBC Joint Degree in Biotechnology. Credit limited to students in the Joint Degree Program.

BIOT 398 (3) Co-operative Work Placement I
Credit limited to students in the Joint Degree Program in Biotechnology.

BIOT 399 (3) Co-operative Work Placement II
Credit limited to students in the Joint Degree Program in Biotechnology.

School of Biomedical Engineering, Faculty of Applied Science

BMEG: Biomedical Engineering

BMEG 101 (3) Introduction to Biomedical Engineering
Core principles of biomedical engineering from a clinical perspective. Sensors and instrumentation, bioelectric phenomenon, biosignals, physiological modeling, biomechanics, biomaterials, tissue engineering, the principles of and design for medical imaging equipment, clinical engineering, moral and ethical issues.This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of PHYS 157, PHYS 158, MATH 100, MATH 101.

BMEG 102 (2) Biomedical Engineering Lab
Rapid prototyping of mechanical, electrical and electromechanical systems. Building parts with state of the art software and 3-D printing. Use of laboratory equipment and instrumentation.This course is not eligible for Credit/D/Fail grading. [1-2-0]
Prerequisite: All of PHYS 157, PHYS 158.
Corequisite: BMEG 101.

BMEG 150 (4) The Fundamental Units of Life: From Cells To Systems
The structure and function of cells and how they are organized to generate tissues and organ systems [3-3*-0]

**Prerequisite:** All of BIOL 12 and CHEM 12

**BMEG 201 (3) Technical Communication for Biomedical Engineers**
Report preparation, business correspondence, and oral presentation in biomedical engineering specific cases and projects.
Credit will be granted for only one of BMEG 201 or APSC 201 **This course is not eligible for Credit/D/Fail grading.** [3-0-0]
**Prerequisite:** All of ENGL 112, BMEG 101, BMEG 102.

**BMEG 210 (2) Thermodynamics in Biomedical Engineering**
Work, heat and energy; material and energy balances; the first law and second law of thermodynamics; entropy and process reversibility; availability (energy) analysis; Hess’s Law; thermodynamic properties of fluids; and applications to biomedical systems **This course is not eligible for Credit/D/Fail grading.** [2-0-2]
**Prerequisite:** CHEM 123 is recommended

**BMEG 220 (4) Circuits and Electromagnetics with Application to Biomedical Engineering**
Electromagnetic phenomena in the body; bioinstrumentation; electrostatic and electromagnetic fields, forces, capacitance and inductance; bio-effects of electromagnetic fields; and modelling electrical components of physiological and biomedical systems **This course is not eligible for Credit/D/Fail grading.** [3-1-0]
**Prerequisite:** All of PHYS 157, PHYS 158, MATH 100, MATH 101, MATH 253, MATH 256.
**Corequisite:** MATH 264.

**BMEG 230 (4) Biomechanics I**
Integrating the study of two dimensional movement of animals and humans with the study of the manner in which forces on biomechanical structures such as bones, ligaments, tendons, muscles and joints cause motion. Techniques of solid mechanics and two dimensional rigid body dynamics **This course is not eligible for Credit/D/Fail grading.** [3-1-0]
**Prerequisite:** All of BMEG 101, PHYS 170.

**BMEG 250 (4) Cellular Physiology and Biophysics**
Cellular structure and mechanisms of membrane transport, signal transduction, muscle mechanochemistry and neurotransmission. Structure and hierarchical organization up to the level of tissues. Light and electron microscopy **This course is not eligible for Credit/D/Fail grading.** [3-1-0]
**Prerequisite:** BMEG 150.

**BMEG 257 (4) Biomedical Engineering Design I**
Engineering design process for medical technologies. Clinical practice, the healthcare system, medical approach to diagnosis, ethics and regulations for clinical trials, medical technology management, medical device development and standards, use of statistics for evaluating medical technologies **This course is not eligible for Credit/D/Fail grading.** [2-4-0]
**Prerequisite:** All of BMEG 101, BMEG 102.

**BMEG 310 (3) Introduction to Bioinformatics**
Principles behind the methods of bioinformatics. The use of bioinformatics databases and tools for solving problems in genomics, proteomics, structural biology and evolutionary biology **This course is not eligible for Credit/D/Fail grading.** [3-0-2*]
**Prerequisite:** All of BMEG 150, APSC 160.

**BMEG 320 (3) Bioengineering Feedback Systems and Controls**
Modeling, analysis and simulation of dynamic systems; system modeling by state space; linearization; feedback, stability and sensitivity; control system design. Examples from biological systems, assistive systems and biomedical equipment **This course is not eligible for Credit/D/Fail grading.** [3-0-0]
**Prerequisite:** All of PHYS 157, MATH 253, MATH 256, BMEG 220.

**BMEG 330 (3) Biomechanics II**
Principles and common elements of sports-, orthopaedic-, injury- and cellular length-biomechanics. Improving sports performance and preventing overuse injuries through sports biomechanics, designing orthopaedic implants through orthopaedic biomechanics, preventing injuries through injury biomechanics and identifying and filtering cancerous blood cells through cellular biomechanics **This course is not eligible for Credit/D/Fail grading.** [3-0-1]
**Prerequisite:** BMEG 230.

**BMEG 350 (4) Human Structure/Function from Cells to Systems**
Human anatomy, histology and physiology with examples from biomedical engineering. Anatomical compartmentation and function regulation; homeostatic control systems, sensors and effectors; intercellular communication strategies; and cellular and organ function assessment **This course is not eligible for Credit/D/Fail grading.** [4-0-0]
**Prerequisite:** All of BMEG 150, BMEG 250.
BMEG 357 (3) Biomedical Engineering Design II
Creating innovations in medical technologies. Case studies in need clinical identification. Supervised design process, building and testing prototypes with potential users. This course is not eligible for Credit/D/Fail grading. [3*-3*-0]
Prerequisite: BMEG 257.

BMEG 370 (3) Cellular Responses to Forces and Biomaterials
Mechanical forces and biomaterials regulating cellular functions critical to tissue development, regeneration and repair. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of BMEG 150, BMEG 250, BMEG 350.

BMEG 371 (3) Transport Phenomena within Cells and Tissues
Fluid flow and mass transport analysis within healthy and diseased cells and tissues using mathematics. Drug delivery and tissue engineering. This course is not eligible for Credit/D/Fail grading. [3-0-2*]
Prerequisite: All of MATH 100, MATH 101, MATH 253, MATH 256.

BMEG 372 (3) Biomedical Materials and Drug Delivery
Biomaterials science/engineering applied to design and synthesis of drug delivery systems. Biomaterial types, synthesis and testing; the use of biomaterials; biological response; biocompatibility and degradation; drug delivery systems; nanocarriers; modification of polymers; liposomes and micelles; nucleic acid, transdermal and oral delivery. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of BMEG 150, BMEG 250, CHEM 123.

BMEG 373 (3) Microfluidics
Advantages and disadvantages of miniaturization of complex fluid flow processes. Manipulating liquid flow; electrophoretic velocity and mobility; serial dilution; capillary electrophoresis; integrated microfluidic platforms; and blood and the motility of bacteria. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CHBE 251.

BMEG 390 (3) Medical Imaging
Physical principles of ultrasound, magnetic resonance, computed tomography, X-ray projection imaging and molecular imaging in medical imaging for diagnostics, therapeutics and interventions. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of BMEG 220, BMEG 250, ELEC 371.

BMEG 410 (3) Biomedical Equipment, Physiology, and Anatomy
Principles and operation of biomedical equipment for cardiovascular system, respiratory system, renal dialysis, endoscopy, surgery, and imaging. Functional relationships of biomedical equipment to physiology and anatomy of major body systems. Restricted to students in EECE and MECH Biomedical Engineering options. Credit will be granted for only one of BMEG 410 or BMEG 510. [3-0-2*]

BMEG 430 (3) Economics of Healthcare Solutions
Canadian and USA engineering economics in BME and healthcare systems. Economic equivalence, cost estimation, risk assessment, regulatory frameworks, economic optimization, intangible factors, ethics, sustainability, financial tools, commercialization and regulator regimes. This course is not eligible for Credit/D/Fail grading. [3-0-0]

BMEG 450 (6) Biomedical Engineering Design Project
Capstone design and development of a practical biomedical device or system. Projects provided by local industry and engineering research laboratories. This course is not eligible for Credit/D/Fail grading. [1-3-1; 1-3-1]
Prerequisite: BMEG 350.

BMEG 456 (3) Clinical and Industrial Biomedical Engineering
Principles of clinical practice, Canadian healthcare system, medical approach to diagnosis, ethics and regulations for clinical trials, medical technology management, medical device development and standards, biostatistics. Restricted to students in EECE and MECH Biomedical Engineering options. Credit will be granted for only one of BMEG 456 or BMEG 556. This course is not eligible for Credit/D/Fail grading. [3-0-0]

BMEG 474 (3) Stem Cells and Regenerative Medicine
Biology and applications of stem cells in regenerative medicine. Modeling human biology and disease in vitro and in vivo. Regulatory and commercialization pathways for regenerative medicine innovations. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of BMEG 150, BMEG 250, BMEG 350.

BMEG 500 (1) Orientation to Clinical Environment
Operation of biomedical and clinical engineering facilities at hospitals. Daily activities of healthcare workers. Patients'
experience. This course is not eligible for Credit/D/Fail grading.

**BMEG 501 (3) Interdisciplinary Team Project in Medical Technology Innovation**
This course is not eligible for Credit/D/Fail grading.

**BMEG 510 (4) Anatomy and Physiology with Applications to Biomedical Devices**
Anatomical structures and physiological principles of major body systems. Functional connections to operation of diagnostic and therapeutic equipment. Exploration of recent advances. Credit will be granted for only one of BMEG 410 or BMEG 510. This course is not eligible for Credit/D/Fail grading.

**BMEG 511 (2) Fundamentals of Applied Pathophysiology in Biomedical Engineering**
This course is not eligible for Credit/D/Fail grading.

**BMEG 550 (3) Biomedical Engineering Technology**
Principles of operation, clinical applications, and engineering design of common medical devices for measuring physiological signals. This course is not eligible for Credit/D/Fail grading. [3-3*-0]

**BMEG 554 (1-3) Directed Studies in Biomedical Engineering**
This course is not eligible for Credit/D/Fail grading.

**BMEG 556 (3) Clinical and Industrial Biomedical Engineering**
Principles of professional engineering practice, the Canadian healthcare system, medical approach to diagnosis, principles and management of common medical devices, ethics and regulations for clinical trials, codes and regulations of medical devices, applications of biomedical engineering. Credit will be granted for only one of BMEG 456 or BMEG 556. This course is not eligible for Credit/D/Fail grading.

**BMEG 557 (1) Statistical Methods for Evaluating Medical Technologies**
This course is not eligible for Credit/D/Fail grading.

**BMEG 590 (1) Biomedical Engineering Professional Skills**
Formulate and implement a professional skills development plan involving workshops on topics such as writing, presentation, teaching, finance, marketing, equity, ethics. Pass/Fail grading. This course is not eligible for Credit/D/Fail grading.

**BMEG 591 (1-6) Topics in Biomedical Engineering**
This course is not eligible for Credit/D/Fail grading.

**BMEG 597 (6) Master of Engineering Project**
Supervised industrial, clinical, or research project for students registered in Biomedical Engineering program. This course is not eligible for Credit/D/Fail grading.

**BMEG 598 (1) Biomedical Engineering Seminar**
Presentation and discussion of current topics in biomedical engineering research and development. A required course for all graduate students in Biomedical Engineering. This course is not eligible for Credit/D/Fail grading.

**BMEG 599 (12) M.A. Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**BMEG 699 (0) Doctoral Dissertation**

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**Botany, Faculty of Science**

**BOTA: Botany**

All undergraduate courses in Botany are listed under Biology.

**BOTA 501 (3) Seminar in Botany**
This course is not eligible for Credit/D/Fail grading.

**BOTA 502 (0) Thesis Seminar**

**BOTA 526 (3) Advanced Plant Community Analysis**
This course is not eligible for Credit/D/Fail grading.
BOTA 527 (3) Dynamics of Plant Populations
    This course is not eligible for Credit/D/Fail grading. Prerequisite: BIOL 407.

BOTA 528 (3) Current Topics in Plant Biochemistry
    This course is not eligible for Credit/D/Fail grading.

BOTA 544 (3) Plant Molecular Biology Laboratory
    Admission to the course is limited and requires recommendation from the Head of Botany or the Director of the Biotechnology Laboratory. This course is not eligible for Credit/D/Fail grading.
    Prerequisite: BIOL 335 is recommended as either a prerequisite or corequisite.
    Equivalency: PLNT 540, FRST 503.

BOTA 546 (2-12) Topics in Botany
    This course is not eligible for Credit/D/Fail grading.

BOTA 548 (3) M.Sc. Major Essay
    This course is not eligible for Credit/D/Fail grading.

BOTA 549 (18) Master's Thesis
    This course is not eligible for Credit/D/Fail grading.

BOTA 649 (0) Doctoral Dissertation

Faculty of Medicine

BRDG: Bridge Program

Restricted to BRDG students only.

BRDG 500 (1.5) Thesis and Journal Seminar
    This course is not eligible for Credit/D/Fail grading.

BRDG 501 (3) Research Development
    This course is not eligible for Credit/D/Fail grading.

BRDG 590 (0) Internship
    4 months for M.Sc.

BRDG 600 (3) Thesis and Journal Seminar
    This course is not eligible for Credit/D/Fail grading.

BRDG 601 (6) Research Grant Development
    This course is not eligible for Credit/D/Fail grading.

BRDG 690 (0) Internship
    8 months for Ph.D. students.

Commerce, Faculty of Commerce & Business Administration

BUSI: Business

BUSI 100 (3) Micro Foundations of Real Estate Economics
    Basic principles of microeconomics and application to current economic problems.

BUSI 101 (3) Capital Markets and Real Estate
    Basic principles of macroeconomics and application to current economic problems.
    Prerequisite: BUSI 100.

BUSI 111 (3) British Columbia Real Estate Law and Real Estate Ethics
    Canadian legal system and contract law and detailed aspects of real estate law as it applies in British Columbia.
BUSI 112 (3) Canadian Real Property Law and Real Estate Ethics
Canadian legal system and contract law and detailed aspects of real estate law as it applies across Canada.

BUSI 121 (3) Foundations of Real Estate Mathematics
Introduction to mathematics of real estate finance and statistical measures and methods and their application to practical real estate concepts.
Prerequisite: Algebra 12 strongly recommended.

BUSI 221 (3) Real Estate Finance in a Canadian Context
History, function and mechanics of Canadian mortgage markets.
Prerequisite: BUSI 121.

BUSI 290 (3) Introduction to Quantitative Decision Analysis
Introduction to decision models in business, including basic optimization, linear programming, probability, decision analysis, random variables, simulation, and solving decision problems using spreadsheet tools. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 290.

BUSI 291 (3) Application of Statistics in Business
Methods and applications of statistics in business; data analysis, descriptive regression; data generation; sampling distributions; hypothesis testing; confidence intervals; two sample problems; inference in regression. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 291.

BUSI 293 (3) Introductory Financial Accounting
Introduction to the construction and interpretation of financial reports prepared primarily for external use. This course is not eligible for Credit/D/Fail grading.

BUSI 294 (3) Introductory Management Accounting
Introduction to the development and use of accounting information for management planning and control, and the development of cost information for financial reports. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 293 or equivalent.
Corequisite: BUSI 293 or equivalent.

BUSI 295 (3) Managerial Economics
Economic foundations of managerial decision making.

BUSI 299 (1) Business Communications
Basic communication theory, communications in organizations. Includes written and oral practice in lab sessions.
Equivalency: COMM 299.

BUSI 300 (3) Urban and Real Estate Economics
Comprehensive treatment of urban and real estate economics; introduction to study of cities and real estate market; analytical microeconomic principles.
Prerequisite: All of BUSI 100, BUSI 101.

BUSI 329 (3) Principles of Organizational Behaviour
An introductory examination of work organizations and the behaviour of individuals within them. Phenomena to be studied include organizational structure, environments, group processes, motivation and leadership. This course is not eligible for Credit/D/Fail grading.
Equivalency: BUSI 292, COMM 292.

BUSI 330 (3) Foundations of Real Estate Appraisal
Introduction to concepts and techniques for appraising the value of real estate.
Prerequisite: Recommend BUSI 121.

BUSI 331 (3) Real Estate Investment Analysis and Advanced Income Appraisal
Valuation techniques for income real estate, including income method of appraisal, tax consequences of real property ownership, and portfolio analysis methodology.
Prerequisite: All of BUSI 121, BUSI 330.

BUSI 335 (3) Information Systems
Introduction to information technology related to business use: design, implementation, and application of information systems. This course is not eligible for Credit/D/Fail grading.
BUSI 344 (3) Statistical and Computer Applications in Valuation
Explores creative, practical uses of statistical and computer applications in determining and analyzing real estate value. Through case studies and hands-on computer work, students will learn the fundamentals of exploratory data analysis and appraisal valuation modeling.

BUSI 352 (3) Case Studies in Residential Valuation
Examines common issues that affect the practice of residential real estate valuation. Credit will be granted for only one of BUSI 352 or both BUSI 442 and BUSI 452.
Prerequisite: BUSI 330. BUSI 121, BUSI 344 recommended.

BUSI 353 (3) Intermediate Financial Accounting I
An examination of accounting as a means of measurement and as an information system for external reporting purposes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 293 or equivalent.

BUSI 354 (3) Cost Accounting
The provision and analysis of cost accounting information that will assist management in making operating decisions and in evaluating operational performance. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 294 or equivalent.

BUSI 355 (3) Introduction to Income Tax
A study of income tax from the standpoint of the individual and business enterprise. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 293 or equivalent.

BUSI 370 (3) Business Finance
An introduction to the basic principles of financial valuation and an examination of corporate enterprise decisions including working capital management; capital budgeting; capital structures and dividend policy. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 293 or equivalent.

BUSI 391 (3) Introduction to Management Information Systems
Overview of computer technology and terminology; use of computers as managerial and administrative tools; the management of computer resources and the influence of information technology within the organization. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 391.

BUSI 393 (3) Introduction to Business Law
Introduction to the law of contracts, with particular reference to contracts for sale of goods and related law of personal property, principles of agency, partnership, and company law. This course is not eligible for Credit/D/Fail grading.

BUSI 398 (4) Residential Property Guided Case Study
The residential property appraisal process, focusing both on valuation techniques as well as general research and report writing skills.

BUSI 399 (3) Logistics and Operations Management
The design and management of systems to make products, provide services and deliver them to the end user. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of BUSI 290, BUSI 291 or equivalents.
Equivalency: COMM 299.

BUSI 400 (3) Residential Property Analysis
Underlying theory and techniques used in design, construction, and inspection of residential properties.

BUSI 401 (3) Commercial Property Analysis
Underlying theory and techniques used in the design and construction of commercial properties.

BUSI 433 (3) Real Estate Business
General business skills for real estate practitioners.

BUSI 441 (3) Real Estate Management I
Examines the day-to-day issues which affect the practice of property management.
Prerequisite: BUSI 330. BUSI 331 recommended.
BUSI 442 (3) Case Studies in Appraisal I
Examines the day-to-day issues that affect the practice of real estate appraisal.
Prerequisite: All of BUSI 121, BUSI 330, BUSI 331.

BUSI 443 (3) Assessment Administration
Introduces the practice of real property assessment, including the nature of the techniques used, the required duties of assessors, and how an assessment office is administrated.
Prerequisite: BUSI 330 recommended.

BUSI 444 (6) Computer Aided Mass Property Assessment
This course develops and applies the major techniques for valuing real property.
Prerequisite: Recommend all of BUSI 121, BUSI 330, BUSI 443.

BUSI 445 (3) Real Estate Development I
Real estate development process from the project idea to the cursory feasibility stage. Steps in development planning, including analysis, design and evaluation. Evaluating development potential, land acquisition, and site planning.
Prerequisite: All of BUSI 330, BUSI 331.

BUSI 446 (3) Real Estate Development II
Analysis of real estate development process with an examination of economic feasibility studies, approval processes, project financing, construction, project management, and marketing phases.
Prerequisite: BUSI 445.

BUSI 450 (3) Intermediate Financial Accounting II
A continuation of the examination of accounting as a means of measurement and as an information system for external reporting purposes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 353.
Corequisite: BUSI 353.

BUSI 451 (3) Real Estate Management II
Continuation of BUSI 441.

BUSI 452 (3) Case Studies in Appraisal II
Continuation of BUSI 442. This course is not eligible for Credit/D/Fail grading.

BUSI 453 (3) Advanced Financial Accounting
An examination of advanced financial accounting topics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 450.
Corequisite: BUSI 450.

BUSI 454 (3) Accounting for Management Control and Incentives
Design of accounting systems for facilitating and influencing management decisions, with emphasis on performance evaluation in organizations.
Prerequisite: BUSI 294.

BUSI 455 (3) Principles of Auditing
Principles of internal control; audit evidence; sampling and testing; audit reports; standards and responsibilities of the external audit. This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSI 353. Recommended prerequisite or corequisite: BUSI 450.

BUSI 460 (3) Critical Analysis and Forecasting in Real Estate
Delves into two quantitative decision-making methodologies—decision analysis and forecasting—and explores them using a problem-solving framework.
Prerequisite: BUSI 121. BUSI 331 and BUSI 444 are also recommended.

BUSI 465 (3) Marketing Management
Basic considerations affecting the domestic and international marketing of goods and services. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ECON 101, ECON 102, BUSI 293.
Equivalency: COMM 465, COMM 396.

BUSI 470 (3) Financial Management
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of BUSI 370, COMM 473.
BUSA 485 (3) Taxes and Decision Making
Analysis of business and financial decisions in the presence of taxes. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 452.

BUSA 486 (1-9) d Special Topics in Business

BUSA 493 (3) Strategic Management in Business
A conceptual and practical introduction to the major areas of business strategy with an integrative perspective on managing a business. Includes the analysis of a business and its environment, the development and evaluation of strategic alternatives, and implementation of change.
This course is not eligible for Credit/D/Fail grading.
Prerequisite: BUSA 293 and either (a) all of ECON 101, ECON 102 or (b) ECON 309.
Corequisite: Two of BUSA 294, BUSA 329, BUSA 370, BUSA 465.
Equivalency: COMM 493.

BUSA 497 (6) Guided Case Study in Agricultural Real Estate
An agriculturally-focused version of BUSA 499.
Prerequisite: All of BUSA 330, BUSA 331, BUSA 442, BUSA 452.

BUSA 498 (3) Special Topics in Business

BUSA 499 (6) Income Property Guided Case Study
The income property appraisal process, focusing both on valuation techniques as well as general research and report writing skills.
Prerequisite: All of BUSA 330, BUSA 331, BUSA 442, BUSA 452.

Cellular and Physiological Sciences, Faculty of Medicine

CAPS: Cellular, Anatomical and Physiological Sciences

CAPS 200 (3) Biomedical Research: Essential Skills and Concepts
Analysis of the underlying questions and assumptions, experimental approach, results and significance of work described in selected biomedical research presentations. [3-0-0]
Prerequisite: BIOL 200. Limited to students in second year.

CAPS 301 (6) Human Physiology
Organ systems function with particular reference to mammalian and human physiology. See credit exclusion list: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 [3-0-0]
Prerequisite: Either (a) SCIE 001 or (b) all of BIOL 112, BIOL 121 and one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 100, PHYS 101, PHYS 107, PHYS 117 and one of CHEM 203, CHEM 233, CHEM 260.

CAPS 302 (3) Human Physiology Laboratory
Physiological techniques and principles. Must be taken in conjunction with CAPS 301. Enrolment limited. Available only to students in the Faculty of Pharmaceutical Sciences. [0-3]

CAPS 303 (3) Laboratory in Human Physiology (Honours)
Techniques and principles of human physiology. This course must be taken in conjunction with CAPS 301. Restricted to Cellular, Anatomical and Physiological Sciences and Pharmacology Honours students. [0-3]

CAPS 390 (3) Introduction to Microscopic Human Anatomy
Organ system development, structure and function at the microscopic level. [3-0-0]
Prerequisite: One of BIOL 121, SCIE 001. BIOL 200 is recommended.

CAPS 391 (3) Introduction to Gross Human Anatomy
Structure and function of body regions at the macroscopic level. [3-0-0]
Prerequisite: One of BIOL 121, SCIE 001, KIN 190, KIN 191.
CAPS 398 (3) Cooperative Work Placement  
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks full-time. Work term report required. Restricted to students admitted to the Co-op Option in Honours Cellular, Anatomical and Physiological Sciences (B.Sc.). This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Co-op Workshops, CAPS 301, CAPS 303 (or, PHYL 301, PHYL 303).

CAPS 399 (3) Cooperative Work Placement II  
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks full-time. Work term report required. Restricted to students admitted to the Co-op Option in Honours Cellular, Anatomical and Physiological Sciences (B.Sc.). This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of CAPS 398, PHYL 398.

CAPS 421 (3) Advanced Cellular and Molecular Physiology  
Recent advancements in cellular and molecular physiology that have revolutionized our understanding of cell function in health and disease. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Either (a) all of ANAT 390, PHYL 301 or (b) all of CAPS 301, CAPS 390 and third-year standing.

CAPS 422 (3) Mammalian Cardiovascular and Respiratory Physiology  
The control and integration of cardio-pulmonary function in mammals. Intended for Honours students in Cellular, Anatomical and Physiological Sciences or other life sciences.  
Prerequisite: A cumulative average of 75% over at least 90 credits attempted in the first three years of a student's program and a minimum mark of 75% in CAPS 301 or PHYL 301 or its equivalent. Permission of the course director is also required.

CAPS 423 (3) Mammalian Renal and Gastrointestinal Physiology  
Control of mammalian renal and gastrointestinal systems. Role in homeostasis. Intended for Honours students in Cellular, Anatomical and Physiological Sciences or other life sciences.  
Prerequisite: A cumulative average of 75% over at least 90 credits attempted in the first three years of a student's program and a minimum mark of 75% in CAPS 301 or PHYL 301. Permission of the course director is also required.

CAPS 424 (3) Mammalian Endocrinology  
Hormonal control of homeostatic, metabolic and reproductive function. Intended for Honours students in Cellular, Anatomical and Physiological Sciences or other life sciences.  
Prerequisite: A cumulative average of 75% over at least 90 credits attempted in the first three years of a student's program and a minimum mark of 75% in CAPS 301 or PHYL 301. Permission of the course director is also required.

CAPS 426 (3) Physiological Basis of Central Nervous System Functions  
An integrated study of the structural and functional organization of the central nervous system with special emphasis on neurophysiological mechanisms.  
Prerequisite: A cumulative average of 75% over at least 90 credits attempted in the first three years of a student's program and a minimum mark of 75% in CAPS 301 or PHYL 301. Permission of the course director is also required.

CAPS 430 (6) Advanced Laboratory in Physiology  
Methods, techniques, and use of instruments required for physiological investigation. CAPS 303 or PHYL 303 and the consent of the department are required and enrolment will be limited.  
[0-6]

CAPS 448 (2-6) Directed Studies in Physiology  

CAPS 449 (6) Graduating Essay  
Written report and presentation on an independent investigation approved by the department head.

CAPS 498 (3) Cooperative Work Placement III  
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks full time. Work term report required. Restricted to students admitted to the Co-op Option in Honours Cellular, Anatomical and Physiological Sciences (B.Sc.). This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of CAPS 399, PHYL 399.

CAPS 499 (3) Cooperative Work Placement IV  
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks full time. Work term report required. Restricted to students admitted to the Co-op Option in Honours Cellular, Anatomical and Physiological Sciences (B.Sc.). This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of CAPS 498, PHYL 498.
Centre for Cross-Faculty Inquiry, Faculty of Education

**CCFI: Centre for Cross-Faculty Inquiry**

**CCFI 501 (3) Living Inquiry in Learning Communities**
This course is not eligible for Credit/D/Fail grading.

**CCFI 502 (3) Theorizing Knowing in Education**
This course is not eligible for Credit/D/Fail grading.

**CCFI 508 (3-12) c Review of Research in Educational Methods**
Studies are made of recent research bearing on educational practice. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: Appropriate senior undergraduate introductory or methods course is required.

**CCFI 561 (3-12) c Laboratory Practicum**
This course is not eligible for Credit/D/Fail grading.

**CCFI 565 (3/6) d Special Course in Subject Matter Field**
Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 567 (3/6) c Problems and Issues in Elementary Education**
Recent developments, current issues, analysis, and evaluation of research in elementary education. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 572 (3/6) d Advanced Seminar in Cross-Faculty Inquiry in Education**
Examination of current theories and practices in education emphasizing factors affecting decision-making. The emphasis of the seminar will vary according to faculty and student interests and students will be encouraged to investigate an area of personal concern and present their findings. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 580 (3-12) c Problems in Education**
Investigation and report of a problem. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 590 (3) Graduating Paper**
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 598 (3-12) c Field Experiences**
For those on master's, doctoral, and diploma programs. *This course is not eligible for Credit/D/Fail grading.*

**CCFI 599 (6-12) c Master's Thesis**
*This course is not eligible for Credit/D/Fail grading.*

**CCFI 601 (3-12) c Doctoral Seminar**
*This course is not eligible for Credit/D/Fail grading.*

**CCFI 699 (0) Doctoral Dissertation**

Art History, Visual Art and Theory, Faculty of Arts

**CCST: Critical and Curatorial Studies**

**CCST 500 (3) Seminar in Interdisciplinary Frameworks in Museum and Curatorial Studies**
Theoretical and historical foundations of visual representations and expressive culture. It explores the history of museums and galleries, and changes in the meaning of art and material culture as debates about cultural property intensify. *This course is not eligible for Credit/D/Fail grading.*

**CCST 501 (3) Seminar in Contemporary Contextual Issues for Museums and Curatorial Practice**
An examination of broad social and political issues that confront curators and museum professionals who construct representations in museums, art galleries and other sites of public display. *This course is not eligible for Credit/D/Fail grading.*

**CCST 502 (3) Case Studies in Museum and Gallery Exhibitions**
A case study approach to analyzing museum and gallery exhibitions that are historically significant either because they raised issues and stimulated public debate, or because of radical features that proved influential on subsequent exhibitions. Course not
offered every year.

**CCST 503 (9) Graduate Practicum and Major Paper in Curatorial Studies**
Practical on-site teamwork to produce exhibitions or other public displays in a museum, gallery, or alternative situation, offering opportunities for comparison, collaboration, and interdisciplinarity. Students concurrently produce a major paper from the ideas and research which generate the exhibition.

This course is not eligible for Credit/D/Fail grading.

**Canadian Studies, Faculty of Arts**

**CDST: Canadian Studies**

**CDST 250 (3/6) Introduction to Canada**
Approaches to the study of Canada from an interdisciplinary perspective, including cultural, political, historical, and economic dimensions.

**CDST 350 (3/6) Canadian Studies**
An interdisciplinary introduction to Canadian studies. Required of all Canadian Studies Majors.

**CDST 450 (3/6) Senior Seminar in Canadian Studies**
The Canadian experience from a variety of disciplinary perspectives. Offered by the McLean Chair in Canadian Studies. Required of all Canadian Studies Majors.

**Faculty of Applied Science**

**CEEN: Clean Energy Engineering**

**CEEN 501 (3) Energy System Fundamentals**
Thermodynamic analysis of energy conversion processes, power cycles and refrigeration cycles. Exergy analysis of conventional energy systems. Thermal conversion technologies. This course is not eligible for Credit/D/Fail grading.
**Prerequisite:** 3 credits of thermodynamics at the second- or third-year level.

**CEEN 502 (3) Alternative Energy Technologies**
Factors affecting energy source adoption. Solar, wind, small-scale hydro, tidal, geothermal, electrochemical (batteries, capacitors, and fuel cells), and biochemical energy, electromechanical conversion processes. Energy storage, microgrids, interfacing with main transmissions grids. Techno-economic assessment of alternative energy technologies. This course is not eligible for Credit/D/Fail grading.
**Prerequisite:** CEEN 501.

**CEEN 503 (2) Sustainable Energy Systems**
Planetary thermodynamics, energy system evolution, energy services, role of renewable energy sources. Alternative energy technologies. Solar, wind, small-scale hydro, tidal, geothermal, electrochemical (batteries, capacitors, and fuel cells), and biochemical energy, electromechanical conversion processes. Techno-economic assessment of alternative energy technologies.
This course is not eligible for Credit/D/Fail grading.
**Corequisite:** CEEN 501.

**CEEN 504 (2) Energy Storage and Transmission**
Analysis of energy systems from resource extraction to energy services. Storage and transport components of energy systems. System optimization including smart grid, transmission, and distribution design for electrical and thermal systems. Distributed generation systems.
This course is not eligible for Credit/D/Fail grading.

**CEEN 523 (3) Energy and the Environment**
Energy/environment/society interactions; development of energy resources; energy demand and its determinants; policy dimension of energy and climate change; impacts on ecosystems; life cycle analysis; impact assessment and other tools for quantitative and qualitative evaluation of alternative energy sources.
This course is not eligible for Credit/D/Fail grading.

**CEEN 525 (2) Energy Policy**
Energy policy process and governance. Sustainable energy as a social and political challenge, formal government structures and process, actors in the policy, policy analysis, policy instrument, and energy planning and approval processes, including environmental assessment. Introduction to demand-side energy policy.
This course is not eligible for Credit/D/Fail grading.
CEEN 550 (3) Energy Efficiency and Conservation
Engineering concepts of demand side management (DSM), energy auditing, analysis of buildings and industrial equipment, measurement & verification, and system data analysis. Energy efficient technologies for green buildings and industrial processes. Behavior and energy use. DSM policy concepts.

This course is not eligible for Credit/D/Fail grading.

CEEN 580 (1-6) Directed Studies in Clean Energy Engineering
Work not related to project or thesis. This course is not eligible for Credit/D/Fail grading.

CEEN 590 (1-6) Topics in Clean Energy Engineering
This course is not eligible for Credit/D/Fail grading.

CEEN 596 (6) Project and Report
For M.Eng. students. Carry out a project and prepare an engineering report under the supervision of a faculty member. This course is not eligible for Credit/D/Fail grading.

CEEN 597 (1) Seminar
Presentations and discussions of current topics in the area of Clean Energy Engineering. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Cell and Developmental Biology, Faculty of Medicine

CELL: Cell and Developmental Biology

CELL 501 (3) Cell and Developmental Biology Research Literature
Development of written communication and critical thinking skills. This course is not eligible for Credit/D/Fail grading. Prerequisite: BIOL 530.

CELL 502 (1.5) Current Topics in Developmental Biology
Cellular and molecular mechanisms of development from the earliest stages of axis formation to organogenesis. This course is not eligible for Credit/D/Fail grading.

CELL 503 (1.5) Current Topics in Cellular Communication
Cellular communication within tissues by direct contact and by modulating and responding to the microenvironment. This course is not eligible for Credit/D/Fail grading.

CELL 504 (1.5) Current Topics in Cytoskeleton and Cell Motility
Structure and function of the cytoskeleton, and its involvement in various forms of cell and intracellular motility. This course is not eligible for Credit/D/Fail grading.

CELL 505 (1.5) Current Topics in Intracellular Trafficking
Organization of membranes and organelles within cells and how molecules are targeted to intracellular sites. This course is not eligible for Credit/D/Fail grading.

CELL 506 (1.5) Fluorescence Microscopy
Principles and applications in biological research. This course is not eligible for Credit/D/Fail grading.

CELL 507 (1.5) Special Techniques and Protocols in Cell and Developmental Biology
This course is not eligible for Credit/D/Fail grading.

CELL 508 (1.5) Molecular Genetic Analysis
Methodologies and resources for genetic analysis of cellular function. This course is not eligible for Credit/D/Fail grading.

CELL 509 (1.5) Cell Systems Biology
The integration of basic cellular processes to produce a functioning cell. This course is not eligible for Credit/D/Fail grading.

CELL 510 (1.5) Molecular Embryology
Examination of the molecular interactions that underlie the later stages of embryological development. This course is not eligible for Credit/D/Fail grading.

CELL 511 (1.5) Cellular and Molecular Mechanisms of Human Disease
Cell biology in the age of evidence-based medicine. This course is not eligible for Credit/D/Fail grading.

CELL 512 (1.5) Gene and Cell-based Therapies for Disease
The development of gene and cell-based therapies and their translation into clinical use. This course is not eligible for
Central, Eastern and Northern European Studies, Faculty of Arts

CENS: Central, Eastern and Northern European Studies

CENS 201 (3) Contrasts and Conflicts: The Cultures of Central, Eastern and Northern Europe (in English)
An introduction to the cultural history of the peoples of Central, Eastern and Northern Europe as reflected in their literature, art and music.

CENS 202 (3) Great Works of Literature from Central, Eastern and Northern Europe (in English)
Major works of Central, Eastern and Northern European literature from the eighteenth century to the present in their European context.

CENS 303 (3/6) d Representations of the Holocaust (in English)
The Nazi Holocaust in film and literature from Central, Eastern, and Northern European Countries.

CENS 307 (3) Witches: Myth and Reality
Examination of the cultural, social, and historical construction of the witch in central and northern Europe with comparisons to recent history, current events, and popular culture.

CENS 404 (3) Gender and Nation: Women's State in Modern Central, Eastern and Northern European Literatures and Cultures
Cultural and social discourses of gender in literary works written in Central, Eastern and Northern Europe roughly between 1850 - 1930.

Chemical and Biological Engineering, Faculty of Applied Science

CHBE: Chemical and Biological Engineering

CHBE 201 (3) Integrated Technical Communication
Written and oral communication in chemical and biological engineering: business correspondence, laboratory reports, technical description, and poster presentations. Restricted to students in second year of the Chemical and Biological Engineering programs

Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: CHBE 262.
Equivalency: APSC 201.

CHBE 230 (3) Computational Methods
Mathematical formulation of chemical and biological engineering problems; standard techniques of numerical analysis and their application to chemical, environmental and biotechnological systems; program development; use of commercial numerical analysis software

Prerequisite: APSC 160.
Corequisite: MATH 256.

CHBE 241 (3) Material and Energy Balances
Introduction to Chemical and Biological Engineering; units; stoichiometry; phase equilibria; material balances; energy balances. Th

This course is not eligible for Credit/D/Fail grading.

CHBE 243 (1) Introduction to Chemical and Biological Engineering Process and Technology
Processes used in chemical and biological industries, which emphasize underlying physical, chemical, and biological principles. Th

This course is not eligible for Credit/D/Fail grading.

CHBE 244 (3) Chemical and Biological Engineering Thermodynamics I
Energy and the first law; second law of thermodynamics; entropy; availability (energy) analysis; thermodynamic properties of
fluids, application to power generation, refrigeration, and liquefaction, as well as biological, environmental, and electrochemical systems.

**This course is not eligible for Credit/D/Fail grading.** [3-0-2*]

**Prerequisite:** CHBE 241.

**CHBE 251 (3) Transport Phenomena I**

Fluid Mechanics. Momentum-transfer in fluids in laminar and turbulent flow; microscopic and macroscopic material; momentum and energy balances; rheology; dimensional analysis; flow in conduits; pumps; fluid metering.

**This course is not eligible for Credit/D/Fail grading.** [3-0-2*]

**Prerequisite:** PHYS 170.

**Corequisite:** MATH 256.

**CHBE 262 (4) Chemical Engineering and Applied Chemistry Laboratory**

Experiments chosen to illustrate and use material presented in 200-level CHBE and CHEM courses. This course is not eligible for Credit/D/Fail grading. [0-4-0; 0-4-0]

**Corequisite:** All of CHBE 201, CHBE 241, CHBE 251, CHEM 250, CHEM 251, CHEM 260.

**CHBE 344 (3) Unit Operations I**

Characterization of particles, droplets, and bubbles; comminution, screening and classification; filtration, sedimentation, centrifugal separations and fluidization; thermal operations including evaporation and crystallization.

**This course is not eligible for Credit/D/Fail grading.** [3-0-2*]

**Prerequisite:** All of CHBE 241, CHBE 244.

**CHBE 345 (4) Unit Operations II**

Stage-wise mass transfer operations; extraction and absorption; single and stage-wise binary and multi-component distillation; principles and equipment design for continuous contact mass transfer operations including absorption, binary distillation and others such as extraction, drying, humidification, membrane separations.

**This course is not eligible for Credit/D/Fail grading.** [4-0-2*]

**Prerequisite:** All of CHBE 244, CHBE 245.

**CHBE 346 (3) Chemical and Biological Engineering Thermodynamics**

Volumetric and thermodynamic properties of fluids; equations of state; heat effects; ideal and non-ideal mixtures; fugacities and activity coefficients; vapor-liquid and liquid-liquid phase equilibrium; solubility of gases and solids in liquids; chemical reaction equilibrium; equilibrium partitioning of pollutants.

**This course is not eligible for Credit/D/Fail grading.** [3-0-2*]

**Prerequisite:** All of CHBE 241, CHBE 244, CHEM 251.

**CHBE 351 (3) Transport Phenomena II**

Heat and mass transfer; conduction and molecular diffusion; convective transfer; thermal radiation; analogies among heat, mass and momentum transfer; heat exchanger design.

**This course is not eligible for Credit/D/Fail grading.** [3-0-2*]

**Prerequisite:** CHBE 251.

**CHBE 355 (3) Kinetics and Reactor Design**

Kinetics of homogeneous chemical and biological reactions, isothermal ideal reactor design, analysis of non-ideal reactors using residence time distribution and mixing models. [3-0-1]

**Prerequisite:** CHEM 251.

**CHBE 356 (3) Process Dynamics and Control**

Introduction to modeling of chemical processes; transient response analysis; design of feedback control systems; stability analysis; frequency response analysis; process control applications; instrumentation; advanced control techniques; distributed control systems.

**This course is not eligible for Credit/D/Fail grading.** [3-1-0]

**Prerequisite:** One of MATH 255, MATH 256.

**CHBE 362 (2) Process and Environmental Engineering Laboratory**

Experiments to illustrate and use material presented in 200 and 300-level CHBE courses. Field trips may be required.

**This course is not eligible for Credit/D/Fail grading.** [0-4-0]

**Prerequisite:** All of CHBE 241, CHBE 251, CHBE 262.

**Corequisite:** All of CHBE 344, CHBE 351.

**CHBE 364 (2) Environmental Engineering Laboratory**

Laboratory experiments to illustrate key concepts and measurement techniques in environmental engineering as used by engineers.

**This course is not eligible for Credit/D/Fail grading.** [0-4-0]

**Corequisite:** Third-year standing in ENVE program.

**CHBE 365 (2) Biological Engineering Laboratory**
Laboratory experiments to illustrate key concepts and measurement techniques in biotechnology as used by engineers. Field trips may be required. This course is not eligible for Credit/D/Fail grading. [0-4-0]

Prerequisite: All of CHBE 241, CHBE 262, BIOL 112.
Corequisite: CHBE 381.

CHBE 366 (2) Chemical Engineering Laboratory
Experiments to illustrate and use material presented in 300-level CHBE process option courses. Field trips may be required. This course is not eligible for Credit/D/Fail grading. [0-4-0]

Prerequisite: All of CHBE 241, CHBE 251, CHBE 262.
Corequisite: All of CHBE 345, CHBE 356.

CHBE 373 (3) Water Pollution Control
Legal, environmental and physicochemical aspects of industrial water pollution and its abatement will be surveyed; techniques for design of wastewater treatment processes currently used in industry; case studies from chemical and process industries will be considered in detail. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: One of CHBE 251, CIVL 215, MECH 280, MTRL 263.

CHBE 376 (3) Computer Flowsheeting and Fluid Properties Estimation
Theory and practice of computer flowsheeting in chemical plant design; hands-on use of modern process simulators, prediction of thermodynamic properties of fluids; behaviour of single and multiphase systems. This course is not eligible for Credit/D/Fail grading. [3-2*-0]

Prerequisite: CHBE 241.

CHBE 381 (3) Bioprocess Engineering I
Design of industrial bioreactor systems: organism selection; kinetics of microbial processes and enzyme reactions; design and modeling of single and multi-stage bioreactors. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: BIOL 112 and one of MATH 101, MATH 103, MATH 105, CHBE 241, CHBE 251. Third or fourth year standing.

CHBE 401 (3) Mechanical Pulping and Papermaking
Process and unit operations in mechanical pulping and papermaking, emphasizing principles and practice of refining, screening, cleaning, papermaking and properties of paper products, key economic and environmental issues. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CHBE 402 (3) Biomass Fractionation Technology
Process and unit operations in the conversion of wood chips to pulp and green bio-products. Biorefinery concepts and emerging technologies for the production of biomaterials, biochemicals and bioenergy. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CHBE 419 (3) Industrial Biotechnology Laboratory
Modern bioreactor technology, upstream and downstream processing of biotechnology products. Restricted to students in the Joint Degree in Biotechnology. [1-4-0]

CHBE 452 (6) Environmental Process Design Project
8-month project-based course, concepts from chemical, biological, and environmental science engineering with economics, life cycle analysis and health and safety considerations to solve problems related to the protection of the environment. [2-0-8]

Prerequisite: All of CHBE 254, CHBE 344, CHBE 346, CHBE 351, CHBE 356, CHBE 373.
Corequisite: CHBE 459.

CHBE 453 (6) Biological Process and Product Design
8-month project-based course, integrating chemical and biological engineering concepts with economics, life cycle analysis and health and safety considerations in the design of major biological processes. This course is not eligible for Credit/D/Fail grading. [2-0-8]

Prerequisite: All of BIOL 112, CHBE 346, CHBE 356, CHBE 376, CHBE 381.
Corequisite: All of CHBE 457, CHBE 459.

CHBE 454 (6) Chemical Process and Product Design
8-month project-based course, integrating chemical engineering concepts with economics, life cycle analysis and health and safety considerations in the design of major chemical processes. This course is not eligible for Credit/D/Fail grading. [2-0-8]

Prerequisite: All of CHBE 346, CHBE 351, CHBE 356, CHBE 376.
Corequisite: All of CHBE 457, CHBE 459.

CHBE 455 (3) Kinetics and Reactor Design
Kinetics of homogeneous chemical and biological reactions, isothermal ideal reactor design, analysis of non-ideal reactors using
residence time distribution and mixing models. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: CHEM 251.

CHBE 456 (3) Heterogeneous Catalysis and Advanced Reactor Design
Definition of heterogeneous catalysis; properties of catalysts; kinetics of catalytic reactions; ideal heterogeneous reactors; non-isothermal reactor design; mass and heat transfer effects in heterogeneous reactors; examples of industrial reactors. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: All of CHBE 351, CHBE 355.

CHBE 457 (3) Process Synthesis
Strategy for the conceptual design of industrial chemical and biological processes; rules of thumb for chemical engineers, simulation to assist process synthesis, reactor-separator network synthesis, introduction to product design and molecular structure design, efficiency and sustainability in the chemical industry. This course is not eligible for Credit/D/Fail grading. [3-0-2]

Prerequisite: All of CHBE 241, CHBE 346, CHBE 376, CHBE 344.

CHBE 459 (3) Chemical and Biological Engineering Economics
Estimation of capital and operating costs; interest calculations; taxes; economic comparison of alternatives; economic optimization. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CHBE 464 (4) Chemical and Biological Engineering Laboratory
Experiments in unit operations relating to process, environmental and biological engineering. Experiments are designed to provide experience in instrumentation and control. Field trips may be required. This course is not eligible for Credit/D/Fail grading. [0-6-0; 0-6-0]

Prerequisite: All of CHBE 345, CHBE 355, CHBE 356, CHBE 362 and one of CHBE 365, CHBE 366.

CHBE 465 (3) Rehabilitation and Design of Aquatic Habitat
Modeling the effects of the environment and nutrient availability on growth and waste production; designing closed and open environments for aquatic organisms; developing prescriptions for habitat rehabilitation. This course is not eligible for Credit/D/Fail grading. [2-2*-2*]

Prerequisite: BIOL 112 and third-year standing also required.

CHBE 470 (3) Transport in Biological Systems
Mass transport and fluid flow, including physiological tissues and tissue constructs. Mass transport deficiencies that lead to the development of pathological tissue and drug delivery to these tissues. Biological engineering for the design of tissue constructs and artificial organs. Credit will be granted for only one of CHBE 470 or CHBE 570. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: BIOL 112.

CHBE 474 (3) Process Control Engineering
Frequency response analysis; advanced control techniques; multivariable control systems; mathematical tools for computer control systems; design of computer control systems; engineering design of industrial control applications; plant wide control concepts; distributed control systems concepts. This course is not eligible for Credit/D/Fail grading. [3-2*-0]

Prerequisite: All of CHBE 356, CHBE 376.

CHBE 476 (3) Modelling and Optimization in Chemical Engineering
Mathematical modelling of chemical plants and processes; computer simulation; introduction to numerical optimization techniques. This course is not eligible for Credit/D/Fail grading. [3-2*-0]

Prerequisite: All of CHBE 344, CHBE 376.

CHBE 477 (3) Fuel Cell and Electrochemical Engineering
Stoichiometry, thermodynamics and kinetics of electrode reactions; conductivity and mass transport in electrolytes; material, energy and voltage balances; design of electrosynthesis, electrorecovery of metals, and energy generation of batteries and fuel cells. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CHBE 241, CHBE 345.

CHBE 479 (3) Chemical Engineering Aspects of Occupational Health and Safety
Relationship between current engineering practice and worker health and safety. Engineering analysis of industrial health and safety problems. This course is not eligible for Credit/D/Fail grading. [2-2-0]

Prerequisite: Third-year Chemical and Biological Engineering.

CHBE 480 (3) Hazardous Waste Processing Technology
Characterization, treatment and final disposal of hazardous waste with emphasis upon chemical engineering principles. Topics to include relevant legislation, in-plant minimization, treatment options and clean-up of contaminated sites. Case studies to be used
for illustration. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Third year Chemical and Biological Engineering.

CHBE 481 (3) Bioprocess Engineering II
Bioprocess flowsheeting; production-scale fermenter design; product recovery and purification; bioseparations; chromatography; viral inactivation and removal; process validation. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

Prerequisite: CHBE 381.

CHBE 482 (3) Petroleum Refining Process Modeling and Simulation
Petroleum feed stocks testing methods, pseudocomponents, and property methods. Design and simulation of separation and reaction systems, Steady state and dynamic simulation. This course is not eligible for Credit/D/Fail grading. [3-1-0]

Prerequisite: All of CHBE 345, CHBE 355, CHBE 376.

CHBE 483 (3) Energy Engineering
Supply and use of conventional and alternative fuels and energy. Design and operation of unit operations for processing of fossil fuels, biomass, and other energy sources. Environmental considerations of energy use. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Third-year Chemical and Biological Engineering.

CHBE 484 (3) Green Engineering Principles and Applications for Process Industries
Pollution prevention, cleaner production, green chemistry and engineering, industrial ecology, eco-industrial parks, and sustainable development; environmental impact assessment including life-cycle assessment, total cost analysis and environmental systems analysis; reduce/recycling/reuse of wastes and by-products. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CHBE 241, CHBE 244.

CHBE 485 (3) Air Pollution Prevention and Control
Impacts of air pollutants on health, visibility, smog formation, ozone depletion and global warming; air quality and emission standards; atmospheric dispersion of air pollutants; prevention and control technologies for particulates, SOx, NOx, VOCs, and CO2. This course is not eligible for Credit/D/Fail grading. [3-0-2*]

CHBE 486 (3) Waste Management for Resource Recovery
Physico-chemical, thermal, and biological methods for purification of solid waste and wastewater, and conversion to bioproducts/industrial products, energy and clean water. This course is not eligible for Credit/D/Fail grading. [2-0-2]

Prerequisite: All of CHBE 241, CHBE 244, CHBE 373.

CHBE 487 (3) Interfacial Phenomena
Outline of the physics and chemistry of interfaces; discussion of the part played by surface effects in technical processes. Credit will be granted for only one of CHBE 357 and CHBE 487. [3-0-0]

Prerequisite: CHBE 241.

CHBE 489 (3) Pollution Control in the Pulp and Paper Industry
Pollutants of concern in the pulp and paper industry; environmental impact of the industry; technologies used for the control of solid, liquid and gaseous wastes. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CHBE 491 (1) Thesis Proposal
Literature searching, planning, equipment design, experimental design for an individual research project leading to a written proposal and oral presentation. This course is not eligible for Credit/D/Fail grading. [0-2-0]

Prerequisite: All of CHBE 362, CHBE 366.

CHBE 492 (5) Thesis
Research project under the direction of a staff member. This course is not eligible for Credit/D/Fail grading. [0-8-0]

Prerequisite: CHBE 491.

CHBE 493 (1) Thesis Proposal-Environmental Topic
Literature search, planning, equipment design for an individual research project leading to a written proposal and oral presentation. Topic to be chosen from a selection of environmental topics offered by the department. This course is not eligible for Credit/D/Fail grading. [0-2-0]

Prerequisite: All of CHBE 362, CHBE 364.

CHBE 494 (5) Thesis-Environmental Topic
Environmental engineering research topic. This course is not eligible for Credit/D/Fail grading. [0-8-0]

Prerequisite: CHBE 493.
CHBE 495 (1) Thesis Proposal-Biotechnology Topic
Literature search, planning, equipment design for an individual research project leading to a written proposal and oral presentation. Topic to be chosen from a selection of biotechnology topics offered by the department. This course is not eligible for Credit/D/Fail grading. [0-2-0]
Prerequisite: All of CHBE 362, CHBE 365.

CHBE 496 (5) Thesis Biotechnology Topic
Biotechnological engineering research topic. This course is not eligible for Credit/D/Fail grading. [0-8-0]
Prerequisite: CHBE 495.

CHBE 498 (1) Engineering Report
This should be written on some subject of scientific interest or technical interest, based preferably on personal experience. Specifications are issued by the Department. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Third-year Chemical and Biological Engineering.

CHBE 506 (3) Industrial Process Engineering
Mass and energy balances. Stoichiometry. Flow diagrams. Key unit operations for selected process industries in Western Canada with special attention to emission controls and hazards. May require field trips. Not open to Chemical and Biological Engineering students. This course is not eligible for Credit/D/Fail grading.

CHBE 510 (3) Optimization of Bioprocesses
Experimental design, data analysis, model building, reactor dynamics and computer control for optimization. This course is not eligible for Credit/D/Fail grading.

CHBE 549 (12) Master’s Thesis for M.Sc
This course is not eligible for Credit/D/Fail grading.

CHBE 550 (3) Advanced Reactor Design
Topics vary from year to year, and may include kinetics of fluid-solid reactions of single particles, packed, moving, fluidized and transported bed reactors; rotary kilns; gas-liquid reaction kinetics and reactor design; reactor design for gas-liquid-solid and non-catalytic processes. This course is not eligible for Credit/D/Fail grading.

CHBE 551 (3) Chemical Engineering Thermodynamics
Pressure-volume-temperature relations; chemical equilibria by Gibbs' method; vapor-liquid equilibria; thermodynamic calculations by third law and quantum-statistical methods; irreversible thermodynamics and information theory. This course is not eligible for Credit/D/Fail grading.

CHBE 552 (3) Optimization Methods

CHBE 553 (3) Mathematical Operations in Chemical Engineering
Topics vary from year to year. Amongst these will be dimensional analysis and model theory; treatment and interpretation of chemical engineering data; formulation and solution of differential and finite difference equations; graphical, numerical and statistical methods. This course is not eligible for Credit/D/Fail grading.

CHBE 554 (3) Momentum, Heat and Mass Transfer
Prediction of velocity, temperature, and concentration profiles for flowing fluids; unifying concepts and analogies in momentum, heat, and mass transport; streamline flow and turbulence, molecular and eddy conduction and diffusion, boundary layers, smooth and rough conduits and other boundaries. This course is not eligible for Credit/D/Fail grading.

CHBE 557 (3) Fluid Dynamics
Topics vary from year to year and include: governing equations for Newtonian fluids; numerical solutions to Navier-Stokes equations; incompressible boundary layers; stability analysis; turbulence; applied Computational Fluid Dynamics (CFD); modeling multi-phase fluids by Eulerian and Lagrangian methods; commercial CFD software. This course is not eligible for Credit/D/Fail grading.

CHBE 559 (3) Topics in Chemical Engineering
A discussion of some aspects of modern Chemical Engineering. Subject matter varies each year. This course is not eligible for Credit/D/Fail grading.

CHBE 560 (3) Biological Engineering
Biological process engineering in the fields of biotechnology and biomedical engineering; enzymatic and cellular kinetics; cell
culture, process development and product recovery; bioreactor design and operation. Critical analysis of recent biological engineering research articles. This course is not eligible for Credit/D/Fail grading.

**CHBE 561 (3) Particle Technology**
Topics vary from year to year and include gas, liquid, and particle mechanics, fine and nano particles; colloidal phenomena; packed beds; filtration; sedimentation; two- and three-phase fluidized beds; spouted beds; hydraulic and pneumatic transport; multiphase flow. This course is not eligible for Credit/D/Fail grading.

**CHBE 563 (3) Applied Heterogeneous Catalysis**
Techniques for characterizing catalysts and their surfaces. Commercial methods of preparing catalysts. Chemistry of catalytic reactions and the impact of catalyst properties, mechanisms and kinetics on reactor engineering. Applications of catalytic oxidations, hydrogenations, C-C bond formation and cracking. This course is not eligible for Credit/D/Fail grading. [2-0]

**CHBE 564 (3) Industrial Biotechnology Laboratory**
Modern bioreactor technology, upstream and downstream processing of biotechnology products. Credit will be granted for only one of CHBE 564 or MICB 419. This course is not eligible for Credit/D/Fail grading. [1-4]

**CHBE 565 (3) Advanced Process Control**
Discrete-time chemical system modeling; model-based predictive control; predictive controller design; analysis of design parameters; controller stability; robustness and performance analysis; selected topics from current developments in the literature. This course is not eligible for Credit/D/Fail grading.

**CHBE 566 (3) Topics in Biological Engineering**
Critical analysis of biological engineering research articles and literature review in an area of focus. Topics chosen from: bioprocess, biosensor, biotechnology, and biomedical engineering. This course is not eligible for Credit/D/Fail grading. Prerequisite: BIOL 112.

**CHBE 567 (3) System Identification and Adaptive Control**
Input/Output modeling; frequency analysis; regression analysis; model parametrizations; recursive estimation methods; model validation; adaptive controller design; implementation issues; chemical process control applications; selected topics from current developments in the literature. This course is not eligible for Credit/D/Fail grading.

**CHBE 570 (3) Advanced Transport in Biological Systems**
Advanced studies in mass transport: material flow in biological systems from cellular to whole body level under normal and pathological conditions. Biological engineering approaches for designing tissue constructs and artificial organs. Credit will be granted for only one of CHBE 470 or CHBE 570. This course is not eligible for Credit/D/Fail grading. Prerequisite: BIOL 112.

**CHBE 571 (3) Non-Newtonian Fluid Behaviour**
Selections from the following topics: kinematics of deformation and flow, dynamics of continuous media, constitutive equations, physical chemical and molecular aspects of viscosity, engineering applications to pipe flow, mixing, heat transfer. Handling of suspensions and polymers. This course is not eligible for Credit/D/Fail grading.

**CHBE 573 (3) Environmental Engineering and Sustainability**
Topics may include: design of pollution control technologies, fate and transport of pollutants, function and rehabilitation of natural ecosystems, life cycle assessment, and industrial ecology and waste management. This course is not eligible for Credit/D/Fail grading.

**CHBE 574 (3) Equilibrium Properties of Non-Ideal Mixtures**
Discussion of various methods of calculating vapor-liquid, liquid-liquid equilibrium and thermal properties, including molecular thermodynamics. Excess free-energy of mixing. Thermodynamic consistency tests. Emphasis on engineering applications and newer approaches. This course is not eligible for Credit/D/Fail grading.

**CHBE 575 (3) Air Pollution Control**
Characteristics of various air pollutants, their behaviour in the atmosphere, monitoring problems, technology of particle collection and control of pollutant gases. Particular problems of regional interest are discussed. This course is not eligible for Credit/D/Fail grading.

**CHBE 577 (3) Electrochemical Science, Engineering and Technology**
Electrochemical interfaces; electrode reactions; thermodynamics; kinetics and transport processes in electrochemical systems; experimental techniques. Electrochemical reactors and processes; modelling, design and economics. Electrochemical technologies; electrosynthesis, batteries and fuel cells. Electro-metallurgy; electrowinning and refining of metals, corrosion, leaching and cementation. This course is not eligible for Credit/D/Fail grading.
CHBE 580 (3) Advanced Topics in Pulp and Paper Engineering  
Advanced material in selected topics in pulp and paper in science and engineering. Subject matter varies each year. This course is not eligible for Credit/D/Fail grading. [3-0]

CHBE 583 (3) Energy Engineering  
Supply and use of conventional and alternative fuels and energy. Design and operation of unit operations for processing of fossil fuels, biomass, and other energy sources. Environmental considerations of energy use. This course is not eligible for Credit/D/Fail grading.

CHBE 590 (3) Small Watershed Systems Design  
Hydrologic design of water management systems for the production of agricultural and other biological materials. Analysis and design of composite systems for watersheds. This course is not eligible for Credit/D/Fail grading.

CHBE 596 (6) Engineering Report  
For M.Eng. students. Carry out a literature review, conduct a research or design project and prepare an engineering report under the supervision of a faculty member. This course is not eligible for Credit/D/Fail grading.

CHBE 597 (2) M.A.Sc. Thesis Proposal Development  
Techniques for preparation of a critical literature review and focussed research proposal for M.A.Sc. candidates. Students perform oral and written critiques of published research in their area of study, define research questions and hypotheses, and develop a focussed research proposal. This course is not eligible for Credit/D/Fail grading.

CHBE 599 (1) Seminar  
Current topics in chemical and biological engineering research. A required seminar for all thesis graduate students (M.Sc., M.A.Sc., and Ph.D.) in the Department of Chemical and Biological Engineering. This course is not eligible for Credit/D/Fail grading.

CHBE 599 (12) Thesis  
For M.A.Sc. This course is not eligible for Credit/D/Fail grading.

CHBE 697 (2) Ph.D. Thesis Proposal Development  
Techniques for preparation of a critical literature review and focussed research proposal for Ph.D. candidates. Students perform oral and written critiques of published research in their area of study, define research questions and hypotheses, and develop a focussed research proposal. This course is not eligible for Credit/D/Fail grading.

CHBE 699 (0) Doctoral Dissertation

Chemistry, Faculty of Science

CHEM: Chemistry

Science students with BC Secondary School Chemistry 11, but not Chemistry 12, are required to take CHEM 111. Students taking CHEM 121 or CHEM 154 must have credit for Chemistry 12. CHEM 111 is not open to students with credit for Chemistry 12. Students with credit for CHEM 111 or CHEM 121 may take CHEM 123, a requirement for many Science programs. The following courses are for students in the Faculty of Applied Science: CHEM 154, CHEM 250, CHEM 251, CHEM 260.

CHEM 111 (4) Structure, Bonding, and Equilibrium in Chemistry  
Fundamentals of bonding theories, structural chemistry and equilibrium with applications relevant to modern society. [3-3-1]  
Prerequisite: Not open to students with credit for CHEM 12.

CHEM 113 (4) Principles of Chemistry II  
General and ionic equilibrium, solubility, thermodynamics. Introductory organic chemistry: stereochemistry; substitution, elimination and oxidation-reduction reactions. Can be used as prerequisite to subsequent CHEM courses. [3-3-1]  
Prerequisite: CHEM 111 and Not open to students with credit for CHEM 12 and Not open to students with credit for CHEM 121.

CHEM 121 (4) Structure and Bonding in Chemistry  
Fundamentals of bonding theories and structural chemistry, with applications relevant to modern society. [3-3-0]  
Prerequisite: CHEM 12.

CHEM 123 (4) Thermodynamics, Kinetics and Organic Chemistry  
Fundamentals of chemical reactivity: thermodynamics; kinetics; organic chemistry, including stereochemistry; applications
CHEM 154 (3) Chemistry for Engineering
Chemical bonding, properties of matter. Chemical thermodynamics with applications to phase equilibria, aqueous equilibria and electrochemistry. Processes at surfaces. [3-3*-0]
Prerequisite: CHEM 12.

CHEM 201 (3) Introduction to Physical Chemistry
Principles of chemical kinetics, reaction mechanisms and chemical thermodynamics. Credit will be granted for only one of CHEM 201 or CHEM 205. [2-3*-1]
Prerequisite: Either (a) SCIE 001 or (b) one of MATH 101, MATH 103, MATH 105, MATH 121 and either (a) all of CHEM 111, CHEM 113 or (b) all of CHEM 121, CHEM 123 or (c) CHEM 154. MATH 200 or MATH 217 or MATH 226 or MATH 253 or MATH 263 is recommended.

CHEM 202 (3) Coordination Chemistry
Coordination chemistry of the transition elements. [2-3*1]
Prerequisite: Either (a) all of CHEM 111, CHEM 113 or (b) all of CHEM 121, CHEM 123 or (c) one of SCIE 001, CHEM 154.

CHEM 203 (4) Introduction to Organic Chemistry
Structure, bonding and physical properties of aliphatic and aromatic compounds; mechanistic analysis of chemical reactivity of common functional groups with a focus on carbon-heteroatom bond formation; functional group interconversion and oxidation/reduction reactions. Only open to students in Chemistry or Biochemistry specializations. Credit will be granted for only one of CHEM 203 or CHEM 233, 235. [3-3-0]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001.

CHEM 205 (3) Physical Chemistry
Chemical kinetics and thermodynamics and spectroscopy useful in biological, medical, agricultural, earth, and related sciences. Credit will be granted for only one of CHEM 201 or CHEM 205. [3-0-0]
Prerequisite: Either (a) SCIE 001 or (b) one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184 and one of CHEM 113, CHEM 123, CHEM 154.

CHEM 208 (3) Coordination Chemistry
Fundamental concepts and principles governing bonding and reactivity of coordination complexes: ligand field theory; symmetry and point groups; frontier molecular orbital theory. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001.

CHEM 211 (4) Introduction to Chemical Analysis
Quantitative chemical analysis; chemical and physical principles of spectrophotometry, potentiometry, and chromatography. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001.

CHEM 213 (3) Organic Chemistry
Spectroscopy of organic compounds. Mechanistic analysis of chemical reactivity of common functional groups with a focus on carbon-carbon bond formation; functional group interconversion. Preference will be given to students in Chemistry or Biochemistry specializations. [3-0-0]
Prerequisite: Either (a) CHEM 203 or (b) a score of 76% or higher in CHEM 233.

CHEM 218 (3) Fundamentals of Reactivity in Inorganic Chemistry
Chemical reactivity of inorganic systems: oxidation/reduction chemistry; multiply-bonded systems; main group chemistry. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: CHEM 208.

CHEM 233 (3) Organic Chemistry for the Biological Sciences
Reactions and properties of carbonyl compounds, carbohydrates, amino acids, nucleic acids. Credit will be granted for only one of CHEM 233 or CHEM 203. [3-0-0]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001.

CHEM 235 (1) Organic Chemistry Laboratory
Techniques of organic chemistry. To be taken in conjunction with, or in the term following, CHEM 233. Credit will be granted for only one of CHEM 235 or CHEM 203. [0-3-0]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001.
Corequisite: CHEM 233.
CHEM 245 (1) Intermediate Synthetic Chemistry Laboratory
Techniques in synthetic organic and inorganic chemistry. Open only to students in Chemistry or Biochemistry specializations. This course is not eligible for Credit/D/Fail grading. [0-3-1]
Prerequisite: Either (a) CHEM 203 or (b) all of CHEM 233, CHEM 235.
Corequisite: CHEM 213.

CHEM 250 (2) Inorganic Chemistry
Chemistry of selected groups of inorganic compounds, considered in relation to industrial processes. [2-0-0]
Prerequisite: One of CHEM 113, CHEM 123, CHEM 154, SCIE 001.

CHEM 251 (3) Physical Chemistry for Engineers
States of matter, properties of gases, phase diagrams. Elementary chemical thermodynamics and kinetics. Reaction equilibria. [3-0-1]
Prerequisite: One of CHEM 113, CHEM 123, CHEM 154, SCIE 001.

CHEM 253 (3) Organic Chemistry for Engineers
A description of the properties and reactions of organic compounds. [3-0-0]
Prerequisite: One of CHEM 113, CHEM 123, CHEM 154, SCIE 001.

CHEM 260 (3) Communicating Chemistry
Effective argumentation and communication skills in chemistry. Only open to students in a Chemistry specialization. This course is not eligible for Credit/D/Fail grading. [1-0-3]
Prerequisite: Third year standing

CHEM 301 (3) Aqueous Environmental Chemistry
Properties of natural waters, including gas and solid equilibria, pH, redox, complexation analysis, corrosion treatment, ion exchange, colloids and microbial transformations. [3-0-0]
Prerequisite: One of CHEM 123, CHEM 251 and Third year standing.

CHEM 302 (3) Atmospheric Environmental Chemistry
Introduction to structure, composition and chemical processes occurring in Earth's atmosphere, including interactions with solar radiation, stratospheric ozone layer, photochemical smog and acid rain. [3-0-0]
Prerequisite: One of CHEM 123, CHEM 251 and Third year standing.

CHEM 304 (3) Fundamentals of Thermodynamics and Statistical Mechanics
Principles of chemical thermodynamics; introduction to statistical mechanics; phase equilibria; electrochemistry. [3-0-1]
Prerequisite: CHEM 123 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

CHEM 305 (3) Biophysical Chemistry
Diffusion and transport phenomena; interaction of radiation and matter. Methods for determining molecular weight, size, and shape of molecules in solution. [3-0-0]
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263 and either (a) CHEM 201 or (b) a score of 76% or higher in CHEM 205 or (c) CHEM 304 or (d) PHYS 203.

CHEM 309 (3) s- and p-Block Elements: Chemistry and Applications
Synthesis, structures, bonding and characterization of compounds of the s- and p-block elements. Industrial uses discussed include: hydrogen-based fuels, materials and high performance polymers. [3-0-0]
Prerequisite: CHEM 202.

CHEM 310 (3) d- and f-Block Elements: Chemistry and Applications
Representative chemistry of d- and f-block elements interpreted in terms of structure, mechanisms, and theoretical principles. Applications discussed include: organometallic catalysis, bioinorganic chemistry and materials. [3-0-0]
Prerequisite: CHEM 309.

CHEM 311 (3) Instrumental Analytical Chemistry
Theory, design, and application of instrumental methods of chemical analysis including spectroscopy, mass spectrometry, electroanalysis, and chemical separations. [3-0-1]
Prerequisite: CHEM 211.

CHEM 312 (3) Introduction to Quantum Mechanics and Spectroscopy
Principles of quantum mechanics; atomic wavefunctions; angular momentum; spin; atomic term symbols. [3-0-1]
Prerequisite: One of CHEM 113, CHEM 123, SCIE 001 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

CHEM 313 (3) Advanced Organic Chemistry for the Life Sciences
Chemistry of organic substances having particular relevance to the life sciences. [3-0-0]
Prerequisite: CHEM 213.

CHEM 315 (1) Chemistry Integrated Laboratory I
Principles and techniques of modern chemistry applied by integrating experiments chosen from organic, inorganic, physical, and analytical chemistry. [0-4-0]
Prerequisite: One of CHEM 201, CHEM 202, CHEM 203, CHEM 208, CHEM 211, CHEM 235.

CHEM 318 (3) Principles of Catalysis
Fundamental aspects of chemical catalysis: kinetic models; catalytic processes in biochemistry and industry; emerging topics in catalysis. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Either (a) CHEM 218 or (b) CHEM 250.

CHEM 319 (1) Practical Skills for Chemical Research
The nature of scientific research; practical skills for chemical research; communicating science. Restricted to Honours students with third year standing and, with permission of the department Head, to Major students with satisfactory third year standing. This course is not eligible for Credit/D/Fail grading. [1-0-0.5]

CHEM 325 (2) Integrated Chemistry Laboratory I
Principles and techniques of modern chemistry applied by integrating experiments chosen from organic, inorganic, physical, and analytical chemistry. Open only to students in Chemistry specializations. [0-8-0]
Prerequisite: All of CHEM 211, CHEM 213, CHEM 245 and either (a) all of CHEM 201, CHEM 202 or (b) CHEM 208.

CHEM 327 (3) Introduction to Materials Chemistry
Basic principles of materials chemistry: classification; nomenclature; synthetic methods; characterization. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of CHEM 208, CHEM 250 and one of CHEM 203, CHEM 233, CHEM 260.

CHEM 329 (1) Research Ethics and Data Analysis Skills
Research ethics; data analysis skills for chemical research. Restricted to Honours students with third year standing and, with permission of the department Head, to Major students with satisfactory third year standing. This course is not eligible for Credit/D/Fail grading. [1-0-0.5]

CHEM 330 (3) Advanced Organic Chemistry
Application of carbonyl group chemistry, cyclization reactions, conformational analysis and rearrangement reactions in organic synthesis. [3-0-0]
Prerequisite: CHEM 213.

CHEM 333 (3) Spectroscopic Techniques in Organic Chemistry
Application of mass spectrometry, and NMR, UV/visible, and IR spectroscopies to organic chemical problems. [3-0-0]
Prerequisite: Either (a) all of CHEM 203, CHEM 204 or (b) all of CHEM 233, CHEM 205 or (c) CHEM 213.

CHEM 335 (1) Chemistry Integrated Laboratory II
Further development of principles and techniques of modern chemistry applied by integrating experiments chosen from organic, inorganic, physical, and analytical chemistry. [0-4-0]
Prerequisite: CHEM 315.

CHEM 341 (3) Global Challenges: A Chemical Perspective
Importance of chemistry in society. Detailed case studies drawn from modern chemistry: human health, energy, commodity chemicals, materials, green chemistry, agriculture. [3-0-0]
Prerequisite: One of CHEM 203, CHEM 233, CHEM 260.

CHEM 345 (2) Integrated Chemistry Laboratory II
Further development of principles and techniques of modern chemistry applied by integrating experiments chosen from organic, inorganic, physical, and analytical chemistry. Open only to students in Chemistry Major or Honours specializations. [0-8-0]
Prerequisite: CHEM 325.

CHEM 398 (3) Co-operative Work Placement I
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Taken during the winter term of the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Chemistry. This course is not eligible for Credit/D/Fail grading.

CHEM 399 (3) Co-operative Work Placement II
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Taken during
the summer following the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Chemistry.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: CHEM 398.

CHEM 401 (3) Principles of Spectroscopy
Rotational, vibrational, electronic and magnetic resonance spectroscopy and associated techniques; group theory. [3-0-0]
Prerequisite: One of CHEM 312, PHYS 304.

CHEM 402 (3) Diffraction Methods
Crystal structures; point and space groups; X-ray diffraction, neutron diffraction, electron diffraction of gases and surfaces. Credit will be granted for only one of CHEM 402 or CHEM 514. [3-0-0]
Prerequisite: One of CHEM 202, CHEM 208.

CHEM 403 (3) Surface Chemistry and Surface Analysis
Surfaces and phenomena occurring at surfaces and interfaces: adsorption, thermodynamic treatments, technological applications. Methods for characterization and modification of surfaces. Dynamic electrochemistry and its application to understanding fuel cells. [3-0-0]
Prerequisite: CHEM 304 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

CHEM 404 (3) Computational Chemistry
Application of numerical techniques to study chemical systems; molecular simulation. Computer programming experience is not required. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of CHEM 123, CHEM 154 and one of PHYS 107, PHYS 108, PHYS 117, PHYS 118, PHYS 170 and one of MATH 101, MATH 103, MATH 105, MATH 121 and Third-year standing.

CHEM 405 (3) Biophysical Chemistry
Interactions of macromolecules in solution: ligand, antibody and ion binding to macromolecules; thermodynamics of polymer solutions; excluded volume effects; phase separation; partition in two phase polymer solutions. [3-0-0]
Prerequisite: One of CHEM 304, CHEM 305, PHYS 203.

CHEM 406 (3) Polymer Chemistry
Structure and availability of monomers; Propagation mechanisms; synthesis of polymers with predetermined properties; measurement and interpretation of physical properties of polymers. [3-0-0]
Prerequisite: One of CHEM 213, CHEM 260 and one of CHEM 304, CHEM 251.

CHEM 407 (3) Statistical Mechanics in Chemistry
Introductory concepts of statistical mechanics and statistical thermodynamics. Applications to chemistry with emphasis on understanding chemical reactivity. Credit will be granted for only one of CHEM 503/CHEM 407 or PHYS 455. [3-0-0]
Prerequisite: One of CHEM 304, PHYS 203.

CHEM 408 (3) Chemical Dynamics
Macroscopic and microscopic kinetics; photochemistry; theory of reaction rates; reaction cross sections, energy distributions, experimental methods. Credit will be granted for only one of CHEM 408 or CHEM 508. [3-0-0]
Prerequisite: One of CHEM 304, PHYS 203 and one of CHEM 312, PHYS 304.

CHEM 410 (3) Properties of Materials
Electromagnetic, optical, thermal and mechanical properties, and chemical reactivity of solids; electrons in periodic systems: bands, zones; excitations: excitons, phonons, plasmons, polaritons; crystalline order and disorder; ionic conductivity. Credit will be granted for only one of CHEM 410 or CHEM 502. [3-0-0]
Prerequisite: One of CHEM 304, PHYS 203 and one of CHEM 312, PHYS 304.

CHEM 411 (3) Synthesis and Chemistry of Natural Products
Methods and tactics for the synthesis of biologically active natural products and analogs, particularly alkaloids, polyketides, steroids and terpenes. Credit will be granted for only one of CHEM 411 or CHEM 566. [3-0-0]
Prerequisite: CHEM 460.

CHEM 412 (3) Electronic Structure of Atoms and Molecules
Introduction to variational methods; many-electron systems; semi-empirical methods; perturbation theory; computational methods. [3-0-0]
Prerequisite: One of CHEM 312, PHYS 304 and one of MATH 152, MATH 221, MATH 223.

CHEM 413 (3) Bioorganic Chemistry
Enzyme catalysis; mechanistic enzymology; chemistry of cofactors; biosynthetic transformations; natural product biosynthesis;
topics in chemical biology. Credit will be granted for only one of CHEM 413, CHEM 569, or BIOC 403. [3-0-0]  
Prerequisite: One of CHEM 313, CHEM 330.

CHEM 414 (3) Coordination Chemistry of the Transition Elements  
Molecular and electronic structures and reactivities of coordination compounds of the transition elements. Credit will be granted for only one of CHEM 414 or CHEM 525. [3-0-0]  
Prerequisite: One of CHEM 218, CHEM 310.

CHEM 416 (3) Physical and Theoretical Organic Chemistry  
Energetics and catalysis in organic reactions. Pericyclic reactions. Substituent effects. Linear free energy relationships. Credit will be granted for only one of CHEM 416 or CHEM 563. [3-0-0]  
Prerequisite: One of CHEM 313, CHEM 330.

CHEM 417 (3) Nuclear Chemistry and Radiochemistry  
Basic treatment of the nucleus, with analogy to concepts in chemistry. Nuclear stabilities and associated radioactive decay processes. Nuclear structure. Applications of radioisotopes in chemistry. The interaction of radiation with matter. [3-0-0]  
Prerequisite: CHEM 123 and Third year standing. CHEM 312 is recommended.

CHEM 418 (3) Organometallic Chemistry  
The chemistry of compounds containing organic groups directly bonded to metals and metalloids. Emphasis will be placed on the structure and bonding of the compounds and their use in synthetic chemistry. Credit will be granted for only one of CHEM 418 or CHEM 524. [3-0-0]  
Prerequisite: One of CHEM 310, CHEM 318.

CHEM 419 (1) Establishing a Career in Chemical Research  
Current research and career perspectives in chemistry. Restricted to Honours students with fourth year standing and, with permission of the department Head, to Major students with satisfactory fourth year standing. This course is not eligible for Credit/D/Fail grading. [1-0-0.5]

CHEM 427 (3) Applications of Materials Chemistry  
Contemporary materials chemistry, including design and synthesis of materials for energy, electronics, and health applications. [3-0-0]  
Prerequisite: CHEM 327.

CHEM 430 (3/6) d Developments in Contemporary Chemistry  
A review of modern developments in general chemistry for teachers of Secondary School chemistry (Not for credit in the Faculty of Science). Course is offered periodically in extra-sessional sessions.

CHEM 434 (3) Principles of Chemical Separation  
Unified theory of separation science; liquid and gas chromatography; capillary electrophoresis; electrochemical and spectroscopic detection; separation methods coupled with mass spectrometry and tandem mass spectrometry; biochemical applications. Credit will be granted for only one of CHEM 434 or CHEM 534. [3-0-0]  
Prerequisite: CHEM 311.

CHEM 435 (3) Bio-Inorganic Chemistry  
A discussion of the involvement of inorganic chemistry in biological systems. Chemistry of cations, metalloenzymes, and simpler model systems. Reactions of coordinated ligands, chemistry of sulphur and phosphorus. Credit will be granted for only one of CHEM 435 or CHEM 526. [3-0-0]  
Prerequisite: CHEM 304 and one of CHEM 218, CHEM 309.

CHEM 445 (3/6) d Projects in Experimental Chemistry  
Principles of experimental design, practice and problem solving in chemistry, including the opportunity to pursue projects in a research setting. [0-8-0]  
Prerequisite: One of CHEM 345, CHEM 335. Students satisfying the prerequisite requirement using CHEM 335 must have fourth-year standing in a Chemistry Combined Major specialization.

CHEM 448 (3/6) d Directed Studies in Chemistry  
Students will undertake an investigation of a specific topic as agreed upon by the student and the faculty supervisor. Open to third- and fourth-year chemistry students.

CHEM 449 (6) Seminar and Thesis  
Original research work under the direction of a faculty member. Weekly seminar. Required of all Honours students. Open to Majors students with a satisfactory standing and permission of the department head.
CHEM 460 (3) Organic Synthesis: A Mechanistic Approach
Presentation, mechanistic discussion and analysis of modern synthetic methods using principles of physical organic chemistry. Credit will be granted for only one of CHEM 460 or CHEM 560. [3-0-0]
Prerequisite: CHEM 330.

CHEM 461 (3) Synthetic Chemical Biology
Synthetic, mechanistic, and biochemical approaches to chemical biology, including the design of drugs, probes, and catalysts. Credit will be granted for only one of CHEM 461 or CHEM 561. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of CHEM 313, CHEM 330.

CHEM 473 (3) Structure Determination and Reaction Analysis
Application of mass spectrometry and modern spectroscopic techniques, including multidimensional NMR spectroscopy, to reaction analysis and detailed characterization of complex organic and organometallic molecular structures. [3-0-0]
Prerequisite: CHEM 245 and one of CHEM 313, CHEM 318, CHEM 330.

CHEM 498 (3) Co-operative Work Placement III
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Taken during the summer following fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Chemistry. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CHEM 399.

CHEM 499 (3) Co-operative Work Placement IV
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Taken during the fall term of the fifth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Chemistry.
Prerequisite: CHEM 498.

CHEM 501 (3) Applications of Quantum Mechanics in Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 502 (3) Advanced Physical Chemistry of the Solid State
Credit will be granted for only one of CHEM 502 or CHEM 410. This course is not eligible for Credit/D/Fail grading.

CHEM 503 (3) Equilibrium Statistical Mechanics in Chemistry
Introductory principles of Statistical Mechanics with illustrations of chemical importance. Applications to molecular gases, liquids, solids, independent particle statistics, electric and magnetic moments, radiation, chemical equilibrium and reaction rates. Credit will be granted for only one of CHEM 407/CHEM 503 or PHYS 455. This course is not eligible for Credit/D/Fail grading.

CHEM 507 (3/6) d Topics in Physical and Theoretical Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 508 (3) Chemical Kinetics and Reaction Dynamics
Macroscopic and microscopic kinetics; transition state theory; collision theory and reaction cross section, energy distributions, molecular beams and experimental techniques. Credit will be granted for only one of CHEM 408 or CHEM 508. This course is not eligible for Credit/D/Fail grading.

CHEM 510 (3) Advanced Electronic Structure Theory
This course is not eligible for Credit/D/Fail grading.

CHEM 513 (3) Surface Chemistry
Chemistry of the solid-gas interface: Modern methods for investigation of the structure of solid surfaces and interactions between solid surfaces and gases. Theory of adsorption, surface reactivity, and heterogeneous catalysis. This course is not eligible for Credit/D/Fail grading.

CHEM 514 (3) Crystal Structures
Crystal structures and structural analysis by the methods of X-ray diffraction and neutron diffraction. Credit will be granted for only one of CHEM 402 or CHEM 514. This course is not eligible for Credit/D/Fail grading.

CHEM 516 (3/6) d Topics in Biophysical Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 517 (3) Electrochemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 518 (3/6) d Topics in Magnetic Resonance
CHEM 519 (3/6) d Topics in Molecular Spectroscopy
This course is not eligible for Credit/D/Fail grading.

CHEM 521 (3/6) d Topics in Inorganic Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 524 (3) Advanced Applications in Organometallic Chemistry
Credit will be granted for only one of CHEM 418 or CHEM 524. This course is not eligible for Credit/D/Fail grading.

CHEM 525 (3) Advanced Coordination Chemistry
Credit will be granted for only one of CHEM 525 or CHEM 414. This course is not eligible for Credit/D/Fail grading.

CHEM 526 (3) Bioinorganic Chemistry
Inorganic aspects of biological chemistry; emphasis on the role of metal ions and metalloenzymes. Credit will be granted for only one of CHEM 526 or CHEM 435. This course is not eligible for Credit/D/Fail grading.

CHEM 527 (3) Nanomaterials
This course is not eligible for Credit/D/Fail grading.

CHEM 529 (3) Structural Methods in Inorganic Chemistry
NMR, ESR, mass spectrometry, photoelectron spectroscopy (Auger, UV, X-Ray), Mossbauer spectroscopy, electrochemistry. This course is not eligible for Credit/D/Fail grading.

CHEM 533 (3) Bioanalytical Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 534 (3) Principles of Chemical Separation
Credit will be granted for only one of CHEM 534 or CHEM 434. This course is not eligible for Credit/D/Fail grading.

CHEM 535 (3/6) d Topics in Analytical Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 540 (1) Seminar in Chemistry
Compulsory for all graduate students in Chemistry. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

CHEM 548 (0) Research Conference
Attendance is compulsory for all graduate students in each year of registration for the M.Sc. or Ph.D. in chemistry. No credit value.

CHEM 549 (18) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

CHEM 560 (3) Organic Chemistry: Building Molecules and Understanding Reactivity
Credit will be granted for only one of CHEM 460 or CHEM 560. This course is not eligible for Credit/D/Fail grading.

CHEM 561 (3) Advanced Chemical Biology
Credit will be granted for only one of CHEM 461 and CHEM 561. This course is not eligible for Credit/D/Fail grading.

CHEM 563 (3) Advanced Physical Organic Chemistry
Discussion of acidity functions, photochemistry and reactive intermediates in organic chemistry. Applications of molecular orbital theory to organic systems. Credit will be granted for only one of CHEM 563 or CHEM 416. This course is not eligible for Credit/D/Fail grading.

CHEM 566 (3) Advanced Organic Synthesis
Discussion of modern synthetic methods and applications to the synthesis of complex organic molecules. Credit will be granted for only one of CHEM 566 or CHEM 411. This course is not eligible for Credit/D/Fail grading.

CHEM 568 (3/6) d Topics in Organic Chemistry
This course is not eligible for Credit/D/Fail grading.

CHEM 569 (3) Advanced Bioorganic Chemistry
Credit will be granted for only one of CHEM 569, CHEM 413, or BIOC 403. This course is not eligible for Credit/D/Fail grading.

CHEM 573 (3) Application of Spectroscopy to Organic Structural Determinations
A problem solving course to illustrate the application of NMR, mass spectrometry, ORD, CD, etc. to elucidation of structures of organic and organometallic compounds. This course is not eligible for Credit/D/Fail grading.
Library, Archival and Information Studies, Faculty of Arts

CHIL: Children’s Literature

CHIL 599 (6) Thesis for Master of Arts in Children’s Literature
This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

CHIN: Chinese

For each academic session (W and S), prior to registration in any CHIN course, students are required to complete the online Chinese Placement Questionnaire at https://placement.asia.ubc.ca/ to obtain a placement approval certificate. Students are only eligible for courses listed on their placement approval certificate. Please contact the placement coordinator at chinese.placement@ubc.ca if there are any concerns about the placement approval certificate. Please submit the certificate to the Instructor on the first day of class. For more information on placement approval, please visit Placement Tests at http://asia.ubc.ca/undergraduate/placement-tests/. Note: Students must obtain a minimum grade of 60% to advance to the next level of language. This applies to all students in CHIN language courses, not just language majors.

CHIN 131 (3) Basic Chinese I: Part 1 (Non-Heritage)
Skills in listening, speaking, reading, and writing in Mandarin Chinese, an active vocabulary of about 250 Chinese words, and basic grammar. Credit will be granted for only one of CHIN 131 or CHIN 101 or CHIN 134. This course is not eligible for Credit/D/Fail grading.

CHIN 133 (3) Basic Chinese I: Part 2 (Non-Heritage)
Continuation of CHIN 131. Credit will be granted for only one of CHIN 133 or CHIN 103 or CHIN 134. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 101, CHIN 131.

CHIN 134 (6) Intensive Basic Chinese I (Non-Heritage)
Skills in listening, speaking, reading, and writing in Mandarin Chinese, an active vocabulary of about 500 Chinese words, and basic grammar. Credit will be granted for only one of CHIN 134 or CHIN 104 or both CHIN 101, CHIN 103, or both CHIN 131, CHIN 133. This course is not eligible for Credit/D/Fail grading.

CHIN 141 (3) Basic Chinese I: Part 1 (Heritage)
Skills in listening to and speaking Mandarin and reading and writing modern written Chinese. Emphasis on reading and writing. Credit will be granted for only one of CHIN 141 or CHIN 111 or CHIN 144. This course is not eligible for Credit/D/Fail grading.

CHIN 143 (3) Basic Chinese I: Part 2 (Heritage)
Continuation of CHIN 141. Credit will be granted for only one of CHIN 143 or CHIN 113 or CHIN 144. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 111, CHIN 141.

CHIN 144 (6) Intensive Basic Chinese I (Heritage)
Skills in listening to and speaking Mandarin and in reading and writing modern written Chinese. Emphasis on reading and writing. Credit will be granted for only one of CHIN 144 or CHIN 114 or both CHIN 111, CHIN 113, or both CHIN 141, CHIN 143. This course is not eligible for Credit/D/Fail grading.
Equivalency: CHIN 141, CHIN 143.

CHIN 161 (9) Enriched Summer Intensive Beginning Chinese
An integrated language course developing communicative competence in speaking, listening to, reading, and writing modern Mandarin Chinese. This course is not eligible for Credit/D/Fail grading.

CHIN 231 (3) Basic Chinese II: Part 1 (Non-Heritage)
Skills in listening, speaking, reading, and writing Mandarin Chinese, active vocabulary of about 750 Chinese words, and basic
grammar. Credit will be granted for only one of CHIN 231 or CHIN 105 or CHIN 234.

CHIN 233 (3) Basic Chinese II: Part 2 (Non-Heritage)
Continuation of CHIN 231. Credit will be granted for only one of CHIN 233 or CHIN 107, or CHIN 234. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 105, CHIN 231.

CHIN 234 (6) Intensive Basic Chinese II (Non-Heritage)
Skills in listening, speaking, reading, and writing in Mandarin Chinese, an active vocabulary of about 1000 Chinese words, and basic grammar. Credit will be granted for only one of CHIN 234 or CHIN 108 or both CHIN 105, CHIN 107, or both CHIN 231, CHIN 233This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 103, CHIN 104, CHIN 133, CHIN 134.

CHIN 241 (3) Basic Chinese II: Part 1 (Heritage)
Skills in listening to and speaking Mandarin and reading and writing modern written Chinese. Emphasis on reading and writing. Credit will be granted for only one of CHIN 241 or CHIN 115 or CHIN 244This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 113, CHIN 114, CHIN 143, CHIN 144.

CHIN 243 (3) Basic Chinese II: Part 2 (Heritage)
Continuation of CHIN 241. Credit will be granted for only one of CHIN 243 or CHIN 117 or CHIN 244. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 115, CHIN 241.

CHIN 244 (6) Intensive Basic Chinese II (Heritage)
Skills in listening to and speaking Mandarin and reading and writing modern written Chinese. Emphasis on reading and writing. Credit will be granted for only one of CHIN 244 or CHIN 118 or both CHIN 115, CHIN 117 or both CHIN 241, CHIN 243This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 113, CHIN 114, CHIN 143, CHIN 144.

CHIN 331 (3) Intermediate Chinese I: Part 1 (Non-Heritage)
Skills in listening, speaking, reading, and writing, and understanding of Chinese culture. Credit will be granted for only one of CHIN 331 or CHIN 201 or CHIN 334This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 107, CHIN 108, CHIN 233, CHIN 234.

CHIN 333 (3) Intermediate Chinese I: Part 2 (Non-Heritage)
Continuation of CHIN 331. Credit will be granted for only one of CHIN 333 or CHIN 203 or CHIN 334. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 201, CHIN 331.

CHIN 334 (6) Intensive Intermediate Chinese I (Non-Heritage)
Skills in listening, speaking, reading, and writing, and better understanding of Chinese culture. Credit will be granted for only one of CHIN 334 or CHIN 204 or both CHIN 201, CHIN 203 or both CHIN 331, CHIN 333This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 107, CHIN 108, CHIN 233, CHIN 234.

CHIN 335 (3) Intermediate Chinese II: Part I (Non-Heritage)
Skills in listening, speaking, reading, and writing, and better understanding of Chinese culture. Credit will be granted for only one of CHIN 335 or CHIN 205 or CHIN 338This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 203, CHIN 204, CHIN 333, CHIN 334.

CHIN 337 (3) Intermediate Chinese II: Part 2 (Non-Heritage)
Continuation of CHIN 335. Credit will be granted for only one of CHIN 337 or CHIN 207 or CHIN 338. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 205, CHIN 335.

CHIN 338 (6) Intensive Intermediate Chinese II (Non-Heritage)
Skills in listening, speaking, reading, and writing, and understanding of Chinese culture. Credit will be granted for only one of CHIN 338 or CHIN 208 or both CHIN 205, CHIN 207 or both CHIN 335, CHIN 337This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 203, CHIN 204, CHIN 333, CHIN 334.
CHIN 341 (3) Intermediate Chinese I: Part 1 (Heritage)
Integrated skills in modern Chinese. Focus on reading, writing, and better understanding of Chinese culture. Credit will be granted for only one of CHIN 341 or CHIN 211 or CHIN 344. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 117, CHIN 118, CHIN 243, CHIN 244.

CHIN 343 (3) Intermediate Chinese I: Part 2 (Heritage)
Continuation of CHIN 341. Credit will be granted for only one of CHIN 343 or CHIN 213 or CHIN 344. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 211, CHIN 341.

CHIN 344 (6) Intensive Intermediate Chinese I (Heritage)
Integrated skills in modern Chinese. Emphasis on reading and writing and better understanding of Chinese culture. Credit will be granted for only one of CHIN 344 or CHIN 214 or both CHIN 211, CHIN 213 or both CHIN 341, CHIN 343. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 117, CHIN 118, CHIN 243, CHIN 244.

CHIN 345 (3) Intermediate Chinese II: Part I (Heritage)
Integrated skills in modern Chinese. Focus on reading, writing, and better understanding of Chinese culture. Credit will be granted for only one of CHIN 345 or CHIN 215 or CHIN 348. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 213, CHIN 214, CHIN 343, CHIN 344.

CHIN 347 (3) Intermediate Chinese II: Part 2 (Heritage)
Continuation of CHIN 345. Credit will be granted for only one of CHIN 347 or CHIN 217 or CHIN 348. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 215, CHIN 345.

CHIN 348 (6) Intensive Intermediate Chinese II (Heritage)
Communication skills. Focus on reading, writing, and better understanding of Chinese culture. Credit will be granted for only one of CHIN 348 or CHIN 218 or both CHIN 215, CHIN 217 or both CHIN 345, CHIN 347. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 213, CHIN 214, CHIN 343, CHIN 344.

CHIN 380 (6) Reading Course in Chinese for Honours Students

CHIN 381 (3) Mandarin for Cantonese Speakers I
Strictly for Cantonese speakers from Hong Kong who cannot speak Mandarin but who have advanced Chinese reading and writing skills (2,000 characters). Credit will be granted for only one of CHIN 381 or CHIN 221. This course is not eligible for Credit/D/Fail grading.

CHIN 383 (3) Mandarin for Cantonese Speakers II
Continuation of CHIN 381. Credit will be granted for only one of CHIN 383 or CHIN 223. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 221, CHIN 381.

CHIN 401 (3) Advanced Chinese Reading and Writing I (Non-Heritage)
Reading and writing skills addressing social, cultural, and economic issues. Can be taken concurrently with CHIN 405. Credit will be granted for only one of CHIN 401 or CHIN 301 or CHIN 404. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 207, CHIN 208, CHIN 337, CHIN 338.

CHIN 403 (3) Advanced Chinese Reading and Writing II (Non-Heritage)
Continuation of CHIN 401. Can be taken concurrently with CHIN 407. Credit will be granted for only one of CHIN 403 or CHIN 303 or CHIN 404. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 301, CHIN 401.

CHIN 404 (6) Intensive Advanced Chinese Reading and Writing (Non-Heritage)
Reading and writing skills addressing social, cultural, and economic issues. Can be taken concurrently with CHIN 408. Credit will be granted for only one of CHIN 404 or CHIN 304 or both CHIN 301, CHIN 303 or both CHIN 401, CHIN 403. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 207, CHIN 208, CHIN 337, CHIN 338.

CHIN 405 (3) Advanced Chinese Speaking and Writing I (Non-Heritage)
More formal styles of oral and written communication. Can be taken concurrently with CHIN 401. Credit will be granted for only one of CHIN 405 or CHIN 305 or CHIN 408. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 207, CHIN 208, CHIN 337, CHIN 338.

CHIN 407 (3) Advanced Chinese Speaking and Writing II (Non-Heritage)
Continuation of CHIN 405. Can be taken concurrently with CHIN 403. Credit will be granted for only one of CHIN 407 or CHIN 307 or CHIN 408. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 305, CHIN 405.

CHIN 408 (6) Intensive Advanced Chinese Speaking and Writing (Non-Heritage)
More formal styles of oral and written communication. Can be taken concurrently with CHIN 404. Credit will be granted for only one of CHIN 408 or CHIN 308 or both CHIN 305, CHIN 307 or both CHIN 405, CHIN 407. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 207, CHIN 208, CHIN 337, CHIN 338.

CHIN 415 (3) Media Chinese I (Non-Heritage)
Reading and understanding Chinese as used in newspapers, radio/TV, and the internet news. Credit will be granted for only one of CHIN 415 or CHIN 309. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 207, CHIN 208, CHIN 337, CHIN 338.

CHIN 422 (6) Twentieth-Century Chinese Literature
Selected short stories, novels, plays, essays, and poems from 1917 to the end of the twentieth century. For students who have a good reading knowledge of modern Chinese.
Prerequisite: 12 credits at CHIN 300 level or above is recommended.

CHIN 435 (3) Business Chinese I (Heritage)
Reading, writing, and presentation skills in business documentation, focusing on technical Chinese as used in the workplace. Emphasis on specialized vocabulary and development of communicative competence as relevant to advertising, the stock market and E-commerce. Credit will be granted for only one of CHIN 435 or CHIN 321. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 437 (3) Business Chinese II (Heritage)
Reading, writing, and presentation skills in business documentation, focusing on technical Chinese as used in the workplace. Emphasis on specialized vocabulary and development of communicative competence as relevant to legal and financial documents such as contracts, investments, and insurance. Credit will be granted for only one of CHIN 437 or CHIN 323. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 441 (3) Advanced Chinese Reading and Writing I (Heritage)
Transition from language to literature. Can be taken concurrently with CHIN 435 and CHIN 445. Credit will be granted for only one of CHIN 441 or CHIN 311 or CHIN 444. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 443 (3) Advanced Chinese Reading and Writing II (Heritage)
Continuation of CHIN 441. Can be taken concurrently with CHIN 437 and/or CHIN 447. Credit will be granted for only one of CHIN 443 or CHIN 313 or CHIN 444. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 311, CHIN 441.

CHIN 444 (6) Intensive Advanced Chinese Reading and Writing (Heritage)
Transition from language to literature. Can be taken concurrently with CHIN 448. Credit will be granted for only one of CHIN 444 or CHIN 314 or both CHIN 311, CHIN 313 or both CHIN 441, CHIN 443. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 445 (3) Advanced Chinese Speaking and Writing I (Heritage)
Public-speaking and writing skills at an advanced level. Can be taken concurrently with CHIN 435 and/or CHIN 441. Credit will be granted for only one of CHIN 445 or CHIN 315 or CHIN 448. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 447 (3) Advanced Chinese Speaking and Writing II (Heritage)
Continuation of CHIN 445. Can be taken concurrently with CHIN 437 and/or CHIN 443. Credit will be granted for only one of CHIN 447 or CHIN 317 or CHIN 448. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 315, CHIN 445.

CHIN 448 (6) Intensive Advanced Chinese Speaking and Writing (Heritage)
Public-speaking and writing skills at an advanced level. Can be taken concurrently with CHIN 438 and/or CHIN 444. Credit will be granted for only one of CHIN 448 or CHIN 318 or both CHIN 315, CHIN 317 or both CHIN 445, CHIN 447. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 217, CHIN 218, CHIN 347, CHIN 348.

CHIN 451 (3) Introductory Modern Chinese Literature I (Non-Heritage)
A reading-intensive introduction to modern Chinese literature from 1900 to 1949, with a focus on fiction. Credit will be granted for only one of CHIN 451 or CHIN 411. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 303, CHIN 304, CHIN 403, CHIN 404 and one of CHIN 307, CHIN 308, CHIN 407, CHIN 408.

CHIN 453 (3) Introductory Modern Chinese Literature II (Non-Heritage)
A reading-intensive introduction to modern Chinese literature from 1949 to the present, with a focus on fiction. Credit will be granted for only one of CHIN 453 or CHIN 413. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 411, CHIN 451.

CHIN 455 (3) Introductory Classical Chinese Literature (Early Periods) (Non-Heritage)
Early fiction, including tales of the supernatural and romance, to the Tang Dynasty. Credit will be granted for only one of CHIN 455 or CHIN 421 or CHIN 458. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 303, CHIN 304, CHIN 403, CHIN 404 and one of CHIN 307, CHIN 308, CHIN 407, CHIN 408.

CHIN 457 (3) Introductory Classical Chinese Literature (Later Periods) (Non-Heritage)
Texts in vernacular Chinese, including drama and fiction, from the Yuan to the Qing Dynasties. Credit will be granted for only one of CHIN 457 or CHIN 423 or CHIN 458. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 303, CHIN 304, CHIN 403, CHIN 404 and one of CHIN 307, CHIN 308, CHIN 407, CHIN 408.

CHIN 458 (6) Introductory Classical Chinese Literature (Intensive) (Non-Heritage)
Covers a range of stories, fiction, and drama to the Qing Dynasty. Only for students who did not have a good reading knowledge of modern Chinese before entering university. Credit will be granted for only one of CHIN 458 or CHIN 424 or both CHIN 421, CHIN 423 or both CHIN 455, CHIN 458. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 303, CHIN 304, CHIN 403, CHIN 404 and one of CHIN 307, CHIN 308, CHIN 407, CHIN 408.

CHIN 461 (3) Early Classical Chinese Poetry (to Han)
Readings in classical poetry from the pre-Qin to the end of the Han Dynasties, at an advanced level. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/443/444/445/447/448/435/437. Credit will be granted for only one of CHIN 461 or CHIN 464. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 463 (3) Early Classical Chinese Poetry (Han to Tang)
Readings in classical poetry from the Six Dynasties to early Tang, at an advanced level. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/443/444/445/447/448/435/437. Credit will be granted for only one of CHIN 463 or CHIN 464. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 464 (6) Early Classical Chinese Poetry (Intensive)
A combination of CHIN 461 and 463. Classical poetry from pre-Qin to the early Tang Dynasties, at an advanced level. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/443/444/445/447/448/435/437. Credit will be granted for only one of CHIN 464 or both CHIN 461, CHIN 463. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 471 (3) Later Classical Chinese Poetry (Tang)
Readings in classical poetry from the time of Du Fu (712-770) to the end of the Tang Dynasty, at an advanced level. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/443/444/445/447/448/435/437. Credit will be granted for only one of CHIN 471 or 474. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 473 (3) Later Classical Chinese Poetry (after Tang)
Readings in classical poetry from the Song to the Qing dynasties, at an advanced level. Not to be taken concurrently with any CHIN courses lower than 400-level. Not to be taken concurrently with any of the following CHIN 400-level language courses:
CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 473 or 474.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 474 (6) Later Classical Chinese Poetry (Intensive)
A combination of CHIN 471 and 473. Classical poetry from the time of Du Fu (712-770) to the end of the Qing Dynasty, at an advanced level. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 474 or both CHIN 471, CHIN 473.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 480 (3-12) d Tutorial in Chinese for Honours Students
Will require the presentation of at least one research paper. Review the course section information or consult the Department for details. May be taken for up to a total of 12 credits. Restricted to students in the Honours Asian Area Studies or Asian Language and Culture program.

CHIN 481 (3) Modern Chinese Literature I (Heritage)
Selected readings from the May Fourth Era to present. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 481 or CHIN 484.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 482 (3-18) d Supervised Study in the Chinese Language
Focus changes from year to year. Please see Department website (asia.ubc.ca) for further details. Open to undergraduate and graduate students.

CHIN 483 (3) Modern Chinese Literature II (Heritage)
Historical continuation of CHIN 481. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 483 or CHIN 484.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 484 (6) Intensive Modern Chinese Literature (Heritage)
A combination of CHIN 481 and 483. Selected readings from the May Fourth Era to the present. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 484 or both CHIN 481, CHIN 483.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 491 (3) Classical Chinese I (Heritage)
The development of early Chinese from the classical period through the Six Dynasties (5th century BCE to 6th century CE). Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 491 or CHIN 431 or CHIN 494.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 493 (3) Classical Chinese II (Heritage)
Focus in on the Tang and Song dynasties (617 - 1279). Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 493 or CHIN 433 or CHIN 494.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.

CHIN 494 (6) Intensive Classical Chinese (Heritage)
A combination of CHIN 491 and 493. Readings on classical philosophy, history, literature, and culture. Not to be taken concurrently with any of the following CHIN 400-level language courses: CHIN 441/ 443/ 444/ 445/ 447/ 448/ 435/ 437. Credit will be granted for only one of CHIN 494 or CHIN 434 or both CHIN 431, CHIN 433 or both CHIN 491, CHIN 493.
Prerequisite: One of CHIN 313, CHIN 314, CHIN 317, CHIN 318, CHIN 323, CHIN 437, CHIN 443, CHIN 444, CHIN 447, CHIN 448.
Faculty of Applied Science

CICS: Computing Information and Cognitive Systems

CICS 500 (0) Software Systems Internship
   Technological work experience in an approved company or organization for a four-month period. A required internship to be taken as part of the M.S.S. (Master of Software Systems) program.
   Prerequisite: All of CICS 505, CICS 510, CICS 515, CICS 520, CICS 525.

CICS 506 (3) Operating Systems
   Concepts, structure and mechanisms of modern operating systems. This course is not eligible for Credit/D/Fail grading.
   Corequisite: All of CICS 507, CICS 511, CICS 520.

CICS 507 (3) Software Engineering
   This course covers the latest development in software engineering theory and practice, and integrates software engineering with the relevant aspects of system engineering. This course is not eligible for Credit/D/Fail grading.
   Corequisite: All of CICS 506, CICS 511, CICS 520.

CICS 511 (1.5) Computational Structures
   Main theoretical foundations of computer science, design and analysis of algorithms with applications in computer science and engineering. This course is not eligible for Credit/D/Fail grading.
   Corequisite: All of CICS 505, CICS 520.

CICS 514 (1.5) Computer Networks and Cloud Computing
   Concept, design, and implementation of computer communication protocols and networks. Fundamentals of computer networking, internet protocols and technology, and cloud computing. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: All of CICS 505, CICS 511, CICS 520.

CICS 516 (3) Web Technologies
   Computer network protocols, web application development technologies, and software engineering. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: All of CICS 505, CICS 511, CICS 520.

CICS 518 (3) Computer and Information System Security
   Technical, operational, and managerial issues of computer system security, computer security threats, techniques for detecting and preventing security violations, instituting safeguards, and applying appropriate levels of security for the perceived risk. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: All of CICS 505, CICS 511, CICS 520.

CICS 520 (3) Database Systems
   Relational database design, table design, formal and commercial relational database languages, storage structures, query optimization, data mining, and other applications. This course is not eligible for Credit/D/Fail grading.

CICS 525 (3) Real-time and Distributed Systems
   Analysis, analysis design, and programming. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: All of CICS 505, CICS 511, CICS 520.

CICS 530 (3) Advanced Software Engineering Project
   Design implementation and test of a large software system in an operational environment with emphasis on a team approach. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: All of CICS 505, CICS 511, CICS 514, CICS 516, CICS 520, CICS 525.

Civil Engineering, Faculty of Applied Science

CIVL: Civil Engineering

CIVL 200 (3) Engineering and Sustainable Development
   Implications of a finite biosphere and the complexities inherent in environmental decision-making. This course is not eligible for
CIVL 201 (3) Introduction to Civil Engineering

The design process; graphical, visualization and computational tools; civil engineering disciplines; decision-making; teamwork; conceptual design project reflecting community, economic, environmental, sustainability and technical considerations. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: CIVL 203.

CIVL 202 (3) Civil Engineering II

The social and biophysical context of infrastructure and the impact of technologies on people, the economy, and the environment. Specific topics vary from year to year. This course is not eligible for Credit/D/Fail grading. [1-0-4]

CIVL 203 (3) Technical Communication in Civil Engineering

Written and oral communication in civil engineering. Business correspondence, business meetings, poster presentations, oral presentations and technical reports. Restricted to students in second year of the Civil Engineering program. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: CIVL 201.
Equivalency: APSC 201.

CIVL 204 (3) Fundamentals of Environmental Engineering

Environmental engineering issues and projects; application of scientific and engineering principles to addressing these; soil, water and air pollution, and remediation. [3-0-0]
Prerequisite: CHEM 154.

CIVL 210 (4) Soil Mechanics I

Soil classification, principle of effective stress, analysis of seepage, filter criteria, introduction to shear strength and slope stability analysis. This course is not eligible for Credit/D/Fail grading. [3-2*-1]
Prerequisite: One of CIVL 230, MECH 260.
Corequisite: EOSC 210 and one of CIVL 215, MECH 280, EOSC 329.

CIVL 215 (4) Fluid Mechanics I

Fluid properties, hydrostatics, kinematics, and fluid dynamics: energy and momentum methods with applications. Dimensional analysis, modelling, introduction to flow in pipes and forces on immersed objects. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: All of PHYS 170, MATH 101.

CIVL 230 (4) Solid Mechanics I

Stress and strain, Hooke’s law, axially loaded members, torsion, shear forces and bending moments in beams, bending of beams, shear stresses in beams, shear centre, composite members, introduction to elasto-plastic and statically indeterminate problems. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: All of PHYS 170, MATH 101.

CIVL 231 (4) Introduction to Structural Engineering

Advanced solid mechanics: combined axial load and bending, beam-columns, principal axes and moments of inertia, deflection of members and systems, buckling (stability); Analysis and design of structural systems: trusses, frames; Construction and testing of model structures. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: All of MATH 152, CIVL 230.
Corequisite: CIVL 203.

CIVL 235 (4) Plane Surveying

Theory and application of plane surveying methods. Introduction to and use of compass, transit, tape, and level. Construction and topographic surveys. Reduction of field data and construction of drawings. Demonstration of modern instruments, remote sensing methods and geographical information systems (GIS). This course commences immediately after spring examinations and continues full time for two weeks, including Saturdays. Information on the exact dates will be available in the Civil Engineering Office following publication of the final Examination Timetable. This course is not eligible for Credit/D/Fail grading.

CIVL 250 (3) Engineering and Sustainable Development

Implications of a finite biosphere and the complexities inherent in environmental decision-making. Credit will only be granted for only one of CIVL 200 or CIVL 250. [3-0-0]

CIVL 300 (3) Construction Engineering and Management
Project delivery systems: traditional; construction management; turnkey; project management. Network planning methods. Activity planning, including construction methods selection. Estimating, bidding and bonding. Project control tools and procedures. Human resources, including equity considerations; occupational health and safety and quality control. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: CIVL 203.
Corequisite: CIVL 302.

CIVL 301 (3) Modelling and Decision-Making in Civil Engineering
Introduction to systems engineering; applications of decision-making, modelling, and programming, including probabilistic analyses and optimization, to civil engineering projects; review of numerical methods. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: All of MATH 152, CIVL 201, STAT 251.

CIVL 302 (3) Civil Engineering Impacts
The social and biophysical context of infrastructure and the impact of civil engineering technologies on people, the economy, and the environment. Specific topics vary from year to year. [1-0-4]
Prerequisite: CIVL 201.

CIVL 304 (3) Fundamentals of Environmental Engineering
Environmental engineering issues and projects; application of scientific and engineering principles to addressing these; soil, water and air pollution, and remediation. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CIVL 305 (3) Introduction to Environmental Engineering
Environmental legislation; risk assessment; urban water; mass balance; water and wastewater treatment; environmental impact assessment. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 204.

CIVL 311 (4) Soil Mechanics II
One-dimensional compression and stress-strain response of soils with application to estimation of the settlements and capacities of foundations and of retaining walls. This course is not eligible for Credit/D/Fail grading. [3-2*-1]
Prerequisite: CIVL 210.

CIVL 315 (4) Fluid Mechanics II
Two dimensional flow around immersed objects; velocity and pressure fields; lift and drag on cylinders and aerofoils; fluid loads on structures and structural response; pumps and turbines; analysis and design of pipeline systems; unsteady flow in pipes; frictionless waterhammer analysis. This course is not eligible for Credit/D/Fail grading. [3-2*-1]
Prerequisite: CIVL 215 and one of APSC 201, CIVL 203.
Corequisite: MATH 257.

CIVL 316 (4) Hydrology and Open Channel Flow
Introduction to open channel hydraulics, engineering hydrology, and water resource systems; estimation of design discharge; flood statistics; nonuniform steady open channel flow; energy and momentum principles, backwater analysis; culvert and bridge hydraulics. This course is not eligible for Credit/D/Fail grading. [3-2*-1]
Prerequisite: All of APSC 201, CIVL 215.

CIVL 320 (3) Civil Engineering Materials
The structure and properties of common Civil Engineering materials: aggregates, Portland cement, concrete, wood, steel and other construction materials. The emphasis is on the relationship between the structure of materials and their mechanical and durability properties. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of APSC 278, APSC 279.

CIVL 331 (4) Steel and Timber Design
Introduction to limit states design of steel and timber structures: design objectives, design loads and load combinations, structural safety, material properties, design of tension and compression members, beams, columns, and connections. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: All of CIVL 228, CIVL 231.

CIVL 332 (3) Structural Analysis
Introduction to indeterminate structural analysis; approximate analysis of structures; calculation of displacements using virtual work; flexibility (force) method; stiffness method for frames; moment distribution method; introduction to structural dynamics. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: All of CIVL 231, MATH 152.
CIVL 340 (3) Transportation Engineering I
The analysis and design of the elements of transportation facilities in development of transport technology; vehicle motion; vehicle/pavement interaction; elements of road design; principles of queuing and roadway capacity; rail transit performance and capacity analysis; economics as applied to transport. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Corequisite: STAT 251.

CIVL 402 (3) Professionalism and Law in Civil Engineering
The Engineers and Geoscientists Act; professional ethics, conflicts of interest, confidentiality and accountability; health and safety; sustainable development and environmental stewardship; equity considerations; design and construction contracts, specifications and tendering; labour and employment law; dispute resolution; evidence and expert witnesses; torts and legal liability. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing.

CIVL 403 (3) Engineering Economic Analysis
Time value of money; cash flow analysis; comparing options; depreciation, taxes, and inflation; financial accounting; company structures; public sector projects; decision-making. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing required.

CIVL 404 (3) Introduction to Solid Waste Management
Characteristics of solid wastes; solid waste collection, treatment, and disposal; evaluation and analysis of landfills, composting, combined treatment, recycle, and re-use. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 304.

CIVL 406 (3) Water Treatment and Waste Management
Processes used in water and wastewater treatment. Conditions which necessitate treatment of water or wastewater, water and wastewater treatment processes and plant design. Municipal services required and associated with solid waste management. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 305.

CIVL 407 (3) Environmental Laboratory Analysis
Testing procedures used in water quality studies and in the operation of water and wastewater treatment plants. This course is not eligible for Credit/D/Fail grading. [1-3-0]
Prerequisite: CHEM 154.

CIVL 408 (3) Geo-Environmental Engineering
Environmental contamination, regulatory requirements, site investigation, migration of contaminants, containment systems, site remediation technologies, design considerations related to soil-contaminant interactions, hydrogeology, geochemistry and types of contaminants. Design and performance case histories. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 210.

CIVL 409 (3) Municipal Engineering
Design of municipal infrastructure, including streets, water supply networks, and sewers, garbage collection and solid waste management. Focus is on solutions for providing an adequate water supply, collecting and disposing of stormwater and sewage, and managing excess stormwater flow. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of CIVL 315, CIVL 316.

CIVL 410 (3) Foundation Engineering I
An introduction to the process of foundation engineering. Empirical and analytical approaches used in current professional practice. Topics include site investigation, preload testing, liquefaction assessment, ground improvement, design of shallow and deep foundations, and retaining structures. The importance of geology and technical communication are emphasized. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 311.

CIVL 411 (3) Foundation Engineering II
Aspects of Geotechnical Engineering. Design considerations illustrated by case histories pertinent to BC. Topics include: site investigation, terrain analyses, in situ testing, groundwater problems, deep foundations, tie back walls and bracing, tailings impoundments, Northern construction, ground ice, dikes and dams engineering. Many case histories presented in part by prominent consulting engineers in BC. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 311.

CIVL 413 (3) Design of Earth Dams and Containment Structures
Purpose and types of dams; design criteria; construction sequence; compaction; seepage; filter design; factors influencing the
design of earth dams; stability and deformation under static and earthquake loading; slope protection; field instrumentation. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: CIVL 311. Fourth-year standing.

CIVL 415 (3) Water Resource Engineering
An introduction to the planning and design of water resource systems, stream systems, and municipal and hydropower engineering. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CIVL 315, CIVL 316, STAT 251.

CIVL 416 (3) Environmental Hydraulics
Application of hydraulic engineering principles to problems of environmental concern. Pollutant transport and dispersion. Mixing in rivers and lakes. Theory of jets and plumes. Design of outfall diffusers. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CIVL 316, MATH 257.

CIVL 417 (3) Coastal Engineering
General discussion of waves; linear wave theory; finite amplitude waves; standing waves; seiches; harbour design; wave shoaling, refraction and diffraction; beaches and coasts; wave statistics; wave generation; wave forces on piles, walls and breakwaters; tides; instrumentation and modelling techniques. Credit will be granted for only one of CIVL 417 or CIVL 540.

This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CIVL 316, MATH 257.

CIVL 418 (3) Engineering Hydrology
Hydrologic processes - weather, precipitation, infiltration, evaporation, snowmelt and runoff generation. Emphasis on quantitative techniques including: hydrograph analysis, reservoir and channel routing, statistical methods and design floods, hydrologic modelling. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: CIVL 316.

CIVL 420 (3) Concrete Technology
Physical and chemical properties and microstructure of hydrated Portland cement; construction practices; modern use of industrial by-products such as fly ash, blast furnace slag, silica fume and metakaolin; use of chemical admixtures; environmental issues; properties of hardened concrete; issues in standardized and accelerated testing, non-destructive testing. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: CIVL 320.

CIVL 422 (3) Project Based Learning in Civil Engineering Materials
Some topical problems will be identified and students in groups will carry out experiments to study the materials involved. Site visits and external consultations are an integral requirement. [1-4-0]

Prerequisite: CIVL 320.
Corequisite: APSC 201.

CIVL 425 (3) Case Studies of Construction Methods
Identification and evaluation of solutions to construction site operation problems: the relationship between design and construction; factors affecting productivity and safety; measurement of on-site performance. Credit will be granted for only one of CIVL 425 or CIVL 521. [3-0-0]

Prerequisite: Fourth-year standing.

CIVL 426 (3) Virtual Design and Construction
Creation and use of building information models (BIM) for managing the construction process. 3D parametric modeling, 4D modeling, design coordination, model-based cost estimating, BIM performance measurement, and integrated project delivery methods. Credit will be granted for only one of CIVL 426 or CIVL 526. This course is not eligible for Credit/D/Fail grading.

CIVL 430 (3) Design of Concrete Structures
Non-linear response of reinforced concrete members subjected to axial load, bending and shear; design of simple one-way members including beams, columns, slabs and footings. This course is not eligible for Credit/D/Fail grading. [3-2*-1]

Prerequisite: CIVL 332.

CIVL 432 (3) Advanced Structural Steel Design
Design of steel structures to resist vertical and lateral loads. Floor and roof systems including conceptual layout, floor deck, beams, joists, trusses, and columns. Stability issues and limit states design. Connections and construction aspects. Seismic design. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of CIVL 331, CIVL 332.

CIVL 433 (3) Advanced Concrete Design
Design of continuous reinforced concrete building frames and structures. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 430.

CIVL 435 (3) Advanced Structural Analysis
Shear flow, shear deformation, St. Venant torsion, warping torsion, P-delta and geometric stiffness, buckling of columns and frames, cylindrical shells, beams on elastic foundation, shear wall analysis, elasto-plastic analysis. Introduction to the finite element method. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 332.

CIVL 436 (3) Matrix Structural Analysis and Dynamics
Further techniques in matrix structural analysis; non-rigid supports, temperature-shrinkage effects, computer implementation; matrix representation of structural dynamics; mode shapes, natural frequencies, continuous systems; lumped mass models, modal analysis, response spectra. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of CIVL 332, MECH 360.

CIVL 437 (3) Introduction to Ship Structures
Structural theory and practice of ship structural design; longitudinal and transverse strength of hull girder; plates and shells; matrix analysis; introduction to classification society rules; ship section design synthesis; finite element analysis. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of CIVL 230, WOOD 376.
Equivalency: WOOD 476.

CIVL 440 (3) Transportation Engineering II
Traffic operations and network analysis: traffic studies and data design; traffic stream flow and roadway analysis; weaving and interchange ramp analysis; intersection traffic control measures and control design; progressive signal system design; flows prediction; road network simulation and assignment algorithms; motor vehicle accident analysis; field exercise. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 340.

CIVL 441 (3) Transportation Planning and Analysis
Transportation systems planning and analysis: data needs; surveys and analysis; sampling techniques; trip generation; trip distribution; modal choice; trip assignment; traffic impact studies; system evaluation. Credit will be granted for only one of CIVL 441, CIVL 583 or PLAN 535. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: CIVL 340. Fourth-year standing.

CIVL 445 (3) Engineering Design and Analysis I
Integration and application of previously acquired knowledge and skills to find design solutions. Focus on conceptual designs. This course is not eligible for Credit/D/Fail grading. [2*-0-4]
Prerequisite: APSC 201 and fourth-year standing.

CIVL 446 (2) Engineering Design and Analysis II
Integration and application of previously acquired knowledge and skills to find design solutions. Extends the conceptual design of CIVL 445 into detailed design projects. This course is not eligible for Credit/D/Fail grading. [2*-0-2]
Prerequisite: CIVL 445.

CIVL 447 (2) Environmental Engineering Design and Analysis
Integration and application of previously acquired knowledge and skills to find design solutions. Extends the conceptual design of CIVL 445 into detailed environmental design projects. This course is not eligible for Credit/D/Fail grading. [2*-0-2]
Prerequisite: CIVL 445.

CIVL 475 (3) Environmental Stewardship in Civil Engineering
Co-evolution of human and natural environments, approaches to the design, construction and operations of interacting built, social, and ecological systems, the integrative design process and related strategies. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 261, APSC 262, APSC 263, CIVL 250, CIVL 203. Third-year standing in BASc program.
CIVL 478 (3) Building Science
Building science concepts associated with the design of modern buildings, focusing particularly on the building envelope’s role in environmental separation, controlling the movement of heat, air, and water in liquid and vapour states. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing.

CIVL 492 (1-6) Directed Studies in Civil Engineering
Independent studies on a special topic. This course is not eligible for Credit/D/Fail grading.

CIVL 498 (1-6) Directed Studies in Civil Engineering
Seminar or lecture. Registration will take place on the first day of class by the Instructor. This course is not eligible for Credit/D/Fail grading.

CIVL 504 (2) Seismicity and Seismic Design Parameters
Causes of earthquakes. Fault mechanisms. Wave motions. Magnitudes and intensities. Regional seismicity and risk analysis. Attenuation of ground motion parameters with distance. Development of site specific ground motions. Selection of earthquake records and construction of design spectra. This course is not eligible for Credit/D/Fail grading.

CIVL 505 (3) Seismic Response of Structures
Response of structures to earthquakes; concept of ductility; development of seismic design codes. Hierarchy of analytical tools; quasi-static, modal, and nonlinear analyses. Modelling of structures. Soil-structure interaction. This course is not eligible for Credit/D/Fail grading.

CIVL 506 (2) Seismic Design of Concrete Structures
Application of seismic design principles to the design of concrete structures with particular emphasis on building structures. This course is not eligible for Credit/D/Fail grading.

CIVL 507 (3) Dynamics of Structures I
Fundamental analysis of simple structures subjected to dynamic loadings; vibration problems in structures; linear and nonlinear structural response of simple systems; numerical methods for practical vibration analysis. This course is not eligible for Credit/D/Fail grading.

CIVL 508 (3) Dynamics of Structures II
Dynamic response of discrete and continuous systems; structural property matrices and eigenvalue problem; introduction to random vibrations; wave propagation analysis; experimental techniques and computer modelling. This course is not eligible for Credit/D/Fail grading.

CIVL 509 (3) Nonlinear Structural Analysis
Nonlinear behaviour of structures and the formulation of elements to model such behaviour; solution strategies; nonlinear material and section response; nonlinear dynamic analysis; nonlinear geometry; application of nonlinear analysis in engineering practice. This course is not eligible for Credit/D/Fail grading.

CIVL 510 (3) Behaviour of Steel Structures
Elastic response; elastic limit; capacity design; non-elastic stability problems of members and frames; plastic design and analysis; connection design for ultimate loads. This course is not eligible for Credit/D/Fail grading.

CIVL 511 (3) Advanced Topics in Steel Structures
Seismic design of steel buildings; composite design; welding of steel; corrosion protection; application of CAD in steel design. This course is not eligible for Credit/D/Fail grading.

CIVL 513 (3) Concrete Structures
Response of prestressed and non-prestressed concrete elements and structures; comparison of analytical predictions and experimental results; simplified design procedures. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CIVL 516 (3) Behaviour of Timber Structures
Behaviour of timber structural elements using limit states design principles; joints and fasteners, sawn lumber and engineered wood products, light frame systems and shear walls. Credit will be granted for only one of CIVL 439 or CIVL 516. This course is not eligible for Credit/D/Fail grading.

CIVL 517 (3) Advanced Topics in Timber Structures
Design of timber structural systems using limit states design principles; non-standard connectors, timber-concrete composites, cross-laminated timber and hybrid systems. This course is not eligible for Credit/D/Fail grading.

CIVL 518 (3) Reliability and Structural Safety

CIVL 520 (3) Construction Planning and Control
Planning of civil engineering projects using networking techniques and time space methods. Treatment of resources and cash flow. Activity planning. Concepts of control at the project and activity levels. This course is not eligible for Credit/D/Fail grading.

CIVL 521 (3) Construction Methods and Performance
Case studies in construction methods and solutions to construction site operation problems. Construction productivity, performance measurement, safety, quality, and other production issues. Credit will be granted for only one of CIVL 425 or CIVL 521. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CIVL 522 (3) Project and Construction Economics
Application of the principles of engineering economics, economics and systems analysis techniques to the mathematical modeling of civil engineering projects. Topics treated: modeling of capital expenditures, revenues and operating expenditures, project financing, sensitivity analysis, risk analysis and management. This course is not eligible for Credit/D/Fail grading.

CIVL 523 (3) Project Management for Engineers
Perspectives of project management as it relates to civil engineering. Case studies are used to illustrate key issues. This course is not eligible for Credit/D/Fail grading.

CIVL 524 (3) Legal Aspects of Project and Construction Management
Legal issues of construction contracts, bidding processes, negligence, insurance, bonding, liens, and labour law. This course is not eligible for Credit/D/Fail grading.

CIVL 525 (3) Developing Computer Applications for Civil Engineering
Software analysis and design for civil engineers; overview of internet, databases, and programming languages. This course is not eligible for Credit/D/Fail grading.

CIVL 526 (3) Virtual Design and Construction
Creation and use of building information models (BIM) for managing the construction process. 3D parametric modeling. 4D modeling, design coordination, model-based cost estimating, BIM performance measurement, and integrated project delivery methods. This course is not eligible for Credit/D/Fail grading.

CIVL 527 (2) Specialized Concretes
Production, properties, durability and applications of various specialized concretes. This course is not eligible for Credit/D/Fail grading.

CIVL 528 (2) Advanced Concrete Technology
Pore structure, permeability and transport properties of concrete with and without mineral and chemical admixtures, damage modeling and application of linear and non-linear fracture mechanics, fiber reinforcement of concrete, strain-rate effects, fatigue and impact resistance, durability. This course is not eligible for Credit/D/Fail grading. Prerequisite: CIVL 420.

CIVL 529 (2) Condition Assessment and Rehabilitation of Civil Infrastructure
Non-destructive testing, repair, rehabilitation, strengthening, high performance plain and fiber reinforced concrete, shotcrete, fibre reinforced polymer laminates, analysis, case studies. This course is not eligible for Credit/D/Fail grading.

CIVL 535 (3) Elasticity

CIVL 536 (3) Plasticity
Elastic-plastic strains, yield criteria, flow rules, limit theorems. Plastic collapse in frames and plates. Applications to beam bending, and axisymmetric problems. Linear viscoelasticity and viscoplasticity. Credit given for only one of MECH 568 or CIVL 536. This course is not eligible for Credit/D/Fail grading.

CIVL 537 (3) Computational Mechanics I
Numerical techniques, weighted residual methods, finite differences, finite elements. Formulations using energy principles, shape functions, conformity, stiffness and mass matrices. Consistent load vectors. Applications to linear problems. Numerical integration and equation solvers. Dynamic problems. Introduction to nonlinear problems. This course is not eligible for Credit/D/Fail grading.
CIVL 538 (3) Computational Mechanics II
Prerequisite: CIVL 537.

CIVL 539 (3) Advanced Theory of Structures
Shearflow, shear deformation, St. Venant torsion, geometric stiffness and buckling of structural components and systems, lateral torsional buckling, beams on elastic foundation, theory of plates and shells, energy methods. Credit will be granted for only one of CIVL 435 or CIVL 539. This course is not eligible for Credit/D/Fail grading.

CIVL 540 (3) Advanced Coastal Engineering
Wave theories; wave shoaling, refraction, diffraction and reflection; tides and currents; random waves; wave generation; coastal structures; sedimentation; mixing processes; harbours design; coastal modeling. Credit will be granted for only one of CIVL 417 or CIVL 540. This course is not eligible for Credit/D/Fail grading.

CIVL 541 (3) Environmental Fluid Mechanics
Analysis of density stratified flows with application to water quality problems in inland and coastal waters. This course is not eligible for Credit/D/Fail grading.

CIVL 542 (3) Physical Limnology
Physical processes that affect the behaviour of lakes, including reservoirs, water filled mine pits, mine tailings ponds and other standing water bodies. Impacts of these processes on water quality, and methods used in the rehabilitation of lakes. This course is not eligible for Credit/D/Fail grading.

CIVL 543 (3) Turbulent Fluid Dynamics
Physical and mathematical models of turbulent flow suitable for engineering estimates and predictions. This course is not eligible for Credit/D/Fail grading.

CIVL 544 (3) Computational Open Channel Hydraulics
Overview of 1-D, 2-D, and 3-D fixed and mobile bed formulations. Application to flooding, river morphology, erosion and scour prediction. This course is not eligible for Credit/D/Fail grading. [3-0]

CIVL 545 (3) Methods in Environmental Fluid Mechanics
Data acquisition, pre- and post processing in the field, laboratory, and numerical modeling. Overview from experimental design to final presentation of results. This course is not eligible for Credit/D/Fail grading.

CIVL 546 (3) Fluvial Hydraulics
Hydraulics of flow in rivers. Sediment transport, flow resistance, river morphology, stable channel design, bank erosion and scour; effects of engineering works on river systems; river restoration. This course is not eligible for Credit/D/Fail grading.

CIVL 547 (2) Estuary Hydraulics
Estuary dynamics and estuary classification; the effect of engineering works on salinity intrusion; physics of estuary pollution and the use of computer and hydraulic models. This course is not eligible for Credit/D/Fail grading.

CIVL 548 (3) Numerical Modelling of Surface Water Quality
Development and application of water quality models for lakes, rivers, estuaries, and reservoirs. Derivation of differential equations of pollutant transport; kinetic relationships for physical and chemical transformation of substances; numerical and analytical solutions to transport equations; calibration and verification. This course is not eligible for Credit/D/Fail grading.

CIVL 551 (3) Advanced Hydrology
Modelling hydrologic processes. Flow forecasting models for watersheds. Hydrology in a global perspective. Hydrological measurement techniques. This course is not eligible for Credit/D/Fail grading.

CIVL 555 (3) Optimization and Heuristic Approaches for Civil Engineering Systems
Optimization and simulation and their use in civil engineering design, analysis, and operation. Problem formulation, classical solution techniques, and heuristic approaches, and their applications to the disciplines within civil engineering are addressed. This course is not eligible for Credit/D/Fail grading.

CIVL 556 (3) Modeling and Optimization of Civil Engineering Systems
Applications of practical simulation and optimization software systems and operations research methodologies in design, analysis, and operation of civil engineering systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CIVL 301.
CIVL 557 (2) Toxic and Hazardous Waste Treatment and Disposal
Environmental impact of disposal of toxic and hazardous wastes. Treatment technology for detoxification. Landfill disposal and self attenuation in landfills and underlying soils. Incineration of municipal wastes.

This course is not eligible for Credit/D/Fail grading.

CIVL 558 (2) Water Resources Infrastructure
Case history studies of local infrastructure used for controlling and utilizing water, including hydroelectric projects, developments on alluvial fans and floodplains and management of transportation corridors. Emphasis on engineering and environmental aspects.

This course is not eligible for Credit/D/Fail grading.

CIVL 559 (3) Advanced Water and Wastewater Treatment Technology
Processes for removing and mitigating impurities that are not effectively removed in conventional water and waste treatment practice; investigation of disposal practices that make use of the impurities as a resource.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CIVL 565, CIVL 569 and equivalent background experience.

CIVL 560 (3) Sanitary Engineering Design
Design problems in water and sewage treatment, with emphasis on the hydraulic and sanitary engineering considerations.

This course is not eligible for Credit/D/Fail grading.

CIVL 561 (3) Assessment and Control Strategies in the Geo-Environment
Sampling, investigations, fate and transport of chemicals in soil, water, sediment, biota and air; exposure pathways assessment and toxicological principles for receptors; risk-based approach to site remediation, treatment and control technologies.

This course is not eligible for Credit/D/Fail grading.

CIVL 562 (3) Environmental Contaminant Analysis Laboratory
An advanced laboratory course to familiarize the student with environmental engineering laboratory procedures, instrumental analysis, sampling techniques and data analysis.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of CIVL 407, CHBE 364.

CIVL 563 (3) Unit Operations and Unit Processes in Sanitary Engineering
Laboratory classroom and field assessments of sanitary engineering operations and processes.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: CIVL 569.

CIVL 564 (2) Engineering Management of Solid Wastes
Characteristics of solid wastes; introduction to solid waste collection, treatment and disposal. Evaluation of current practice and analysis of future potential of landfills, composting, combined treatment, recycle and re-use.

This course is not eligible for Credit/D/Fail grading.

CIVL 565 (3) Physical-Chemical Treatment Processes
Development of the principles of selected physical and chemical treatment unit operations. Applications in both water and wastewater treatment.

This course is not eligible for Credit/D/Fail grading.

CIVL 566 (2) Transport and Mixing of Pollutants in Aquatic Systems
Mixing and dispersion of pollutants in inland and coastal waters. Pollutants associated with pulp mills, waste treatment plants, mining operations and other sources. Natural processes (physical, chemical, and biological) affecting the ultimate fate and impact of these pollutants.

This course is not eligible for Credit/D/Fail grading.

Corequisite: CIVL 416.

CIVL 569 (4) Biological Wastewater Treatment
Development of the principles of secondary, biological treatment processes, with application to both municipal and industrial wastewater treatment. Discussion of different treatment methodology, incorporating both aerobic and anaerobic microbiological processes.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: MICB 300.

CIVL 570 (3) Advanced Soil Mechanics
Soil composition and geological factors affecting engineering properties, stress and strain at a point, principle of effective stress, stress-strain relations; theories of primary and secondary consolidation, settlement; shear testing equipment, stress-strain and strength behaviour of soil under static and dynamic loading.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: CIVL 311.

CIVL 572 (3) Environmental Geotechnique
Physical-chemical properties of clays, chemical effects on soils, site investigation for chemical sensitivity, contaminant fate and transport, environmental regulations, in-situ and laboratory tests; design of dewatering, containment, remediation systems including slurry/reactive walls, liners, covers. Case studies

This course is not eligible for Credit/D/Fail grading.

CIVL 573 (2) Numerical Methods in Soil Mechanics
Application to geotechnical problems including stress, seepage, consolidation, and risk. This course is not eligible for Credit/D/Fail grading.

CIVL 574 (3) Experimental Soil Mechanics
Field and laboratory experimental studies of advanced aspects of soil behaviour; compressibility; shear strength; pore water pressure; dynamic tests; advanced instrumentation and measurement techniques; research reports required. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CIVL 570.

CIVL 575 (2) Constitutive Models for Soil
Introduction to continuum mechanics; basics of elastoplasticity; stress-strain behavior of geomaterials; anisotropy; monotonic and cyclic loading; critical state soil mechanics; specific constitutive models for clays and sands. This course is not eligible for Credit/D/Fail grading.

CIVL 577 (3) Soil Exploration for Engineering Design
Advanced methods of subsurface investigation; determination of stratigraphy and engineering properties by in-situ testing. Emphasis on field work and interpretation of results. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CIVL 570.

CIVL 579 (2) Geosynthetics
Material properties; standard tests data; soil-geosynthetic interaction; design of reinforced soil structures (walls, slopes, embankments); design of filtration and drainage works; design of geomembrane-lined waste containment facilities; regulatory requirements; case history applications. This course is not eligible for Credit/D/Fail grading.

CIVL 580 (3) Geotechnical Earthquake Engineering
Local site effects, soil-structure-interaction, liquefaction, seismic slope stability, seismic design of retaining structures; advanced methods in geotechnical earthquake engineering. This course is not eligible for Credit/D/Fail grading.

CIVL 581 (3) Soil Dynamics for Design Practice
Seismic loading and its effect on earth structures; dynamic response of single, and multi-degree of freedom systems and continuous systems; behaviour of soil under dynamic loading; pore pressure generation and liquefaction effects; seismicity and seismic design parameters; dynamic analysis of earth structures; seismic design of soil-structure systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CIVL 570.

CIVL 582 (3) Transportation Engineering Impacts
Methods to measure, predict and evaluate impacts of transportation modes. Discussion of measures to reduce impacts. This course is not eligible for Credit/D/Fail grading.

CIVL 583 (3) Urban Engineering Methods and Models
The application of urban analysis methods and models to the design of municipal and transportation engineering systems. Credit will be granted for only one of CIVL 441, CIVL 583 or PLAN 555. This course is not eligible for Credit/D/Fail grading.

CIVL 584 (3) Applications of Advanced Computer Techniques in Civil Engineering
Applications of artificial intelligence, neural networks, fuzzy logic and computer simulation to civil engineering problems involving uncertainty. This course is not eligible for Credit/D/Fail grading.

CIVL 586 (3) Urban Transportation System Analysis
This course is not eligible for Credit/D/Fail grading.

CIVL 587 (3) Urban Transportation Economics and Policy
Fundamental principles of economics applied to transportation system analysis and policy evaluation: demand analysis, discrete choice modeling, congestion pricing, revenue forecast, transportation cost, project finance and evaluation, and regulation and organization of transportation services. This course is not eligible for Credit/D/Fail grading.

CIVL 589 (3) Traffic Flow Theory
A discussion of the various traffic flow distribution models, gap acceptance, queuing processes, traffic flow simulation with applications to intersection design, signal system design and control of urban freeways. This course is not eligible for Credit/D/Fail grading.
grading.[3-0]

CIVL 592 (1-6) c Directed Studies in Civil Engineering
Independent studies not related to thesis work. This course is not eligible for Credit/D/Fail grading.

CIVL 595 (0) Graduating Paper

CIVL 596 (2-6) d Project in Civil Engineering
For M.Eng. students only. This course is not eligible for Credit/D/Fail grading.

CIVL 597 (1) Seminar
Presentations and discussions of current research topics in various disciplines of Civil Engineering. This course is not eligible for Credit/D/Fail grading.

CIVL 598 (1-6) d Topics in Civil Engineering
Seminar or lecture. This course is not eligible for Credit/D/Fail grading.

CIVL 599 (12) M.A.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

CIVL 699 (0) Doctoral Dissertation

Asian Studies, Faculty of Arts

CLCH: Classical Chinese

CLCH 389 (3) Introduction to Classical Chinese I (Non-Heritage)
The basics of classical Chinese grammar, with short illustrations from texts of the Warring States and early Han Period. Credit will be granted for only one of CLCH 389 or ASIA 389.
Prerequisite: One of CHIN 107, CHIN 108, CHIN 233, CHIN 234, JAPN 103, JAPN 151, JAPN 201, JAPN 260, KORN 200. Or placement approval.

CLCH 399 (3) Introduction to Classical Chinese II (Non-Heritage)
Practice and expansion of the grammar skills learned in CLCH 389; reading of additional and longer passages from the classical canon. Credit will be granted for only one of CLCH 399 or ASIA 399.
Prerequisite: One of CLCH 389, ASIA 389.

CLCH 401 (3) Advanced Readings in Classical Chinese
Focus on reading longer texts in Classical Chinese, producing careful and polished translation, using appropriate reference works and appreciating nuances of style and genre. Transition from textbook-based study to independent reading and scholarly translation necessary for advanced study and research.

Classical, Near Eastern and Religious Studies, Faculty of Arts

CLST: Classical Studies

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

CLST 105 (3) Greek and Roman Mythology
Greek and Roman mythology and its interpretation. Emphasis on ancient texts read in English translation.

CLST 110 (3) Golden Age of Athens
The history and culture, values, and achievements of fifth-century Athens.

CLST 111 (3) Late Republican and Early Imperial Rome
The history and culture, values, and achievements of Late Republican and Early Imperial Rome.

CLST 204 (3) Gods, Graves, and Goods: The Archaeology of Ancient Greece and Rome
A survey of the material cultures of the pre-classical and classical civilizations of Greece and Rome, illustrating the principles and techniques used to illuminate the archaeological history of these civilizations.
CLST 211 (3) Greek Philosophy I
   The Pre-Socratics; Socrates; Sophists; Plato. Recommended as preparation for CLST/PHIL 212 and PHIL 310.
   Equivalency: PHIL 211.

CLST 212 (3) Greek Philosophy II
   Aristotle; selections from Hellenistic and Late Antique Philosophy. Recommended as preparation for PHIL 310 and PHIL 311.
   Equivalency: PHIL 212.

CLST 231 (3) Ancient Greece
   A survey of the ancient Greek world from the Minoan and Mycenaean (about 2000-1000 BCE) to the Hellenistic Period (323-30 BCE).

CLST 232 (3) Ancient Rome
   A survey of the ancient Roman world from the foundation of the city to the death of Constantine.

CLST 260 (3) Gladiators, Games, and Spectacle in the Greek and Roman World
   History, development, and social function of various forms of spectacle in ancient Greece and Rome, from the Olympic games to the Roman arena.

CLST 301 (3) The Technical Terms of Medicine and Biological Science
   Acquaints the student with the Greek and Latin elements from which most specialized terms of modern medicine are constructed. Intended primarily for students planning to enter the medical, pharmaceutical, or biological sciences.

CLST 306 (3) Applied Science and Technology in Classical Antiquity
   The origins and achievements of applied technology in the Greek and Roman world from the Bronze Age to late Antiquity, with special attention to archaeological evidence.

CLST 307 (3) Greek Law
   The study of Greek legal theory, practice, and institutions from their origin in self-help, through the early lawgivers and their codes, to the developed system of Athens in the fifth and fourth centuries. A variety of test cases from the works of the Greek orators will be explored.

CLST 308 (3) Roman Law
   The development of Roman private law during the classical period with special attention to family law, contract and delict.

CLST 311 (3) Women in the Bronze Age, Classical Greek and Hellenistic Cultures
   The images projected in mythology, literature, and art are compared with realities of women's lives insofar as they can be reconstructed from historical, legal, and archaeological records.

CLST 312 (3) Women in the Roman World of Republican and Imperial Times
   Women in the Roman world in the culture of the Republic and the Empire. Literary, artistic, and mythological sources are compared and contrasted to historical, legal, and archaeological records.

CLST 313 (3) Greek Epic
   Homer's Iliad and Odyssey, in translation.
   Prerequisite: CLST 105.

CLST 314 (3) Latin Epic
   The development of the epic genre in Latin, with detailed study of Vergil's Aeneid, Ovid's Metamorphoses, and Lucan's Civil War, in translation.
   Prerequisite: CLST 105.

CLST 317 (3) Classical Tragedy
   The plays of the Greek and Roman tragic dramatists, in translation.
   Prerequisite: CLST 105.

CLST 318 (3) Classical Comedy
   The plays of the Greek and Roman comic dramatists: Aristophanes, Menander, Plautus and Terence, in translation.
   Prerequisite: CLST 105.

CLST 319 (3) The Roman Army
   Rome's military from the early Republic to the Imperial period. Topics range from those of a military nature such as equipment and strategy to social topics such as policing and marriage of soldiers.

CLST 320 (3) Slavery in the Ancient Greek and Roman World
The study and history of slavery in the Greek and Roman worlds as a political, legal, economic, social, and cultural phenomenon.

Prerequisite: One of CLST 231, CLST 232, CLST 260.

CLST 331 (3) Greek Art and Architecture
An introduction to the visual culture of the ancient Greek world in the second and first millennia BCE, especially from c. 1000 to 30 BCE.

CLST 332 (3) Roman Art and Architecture
An introduction to the visual culture of the ancient Roman world from the 8th century BCE to the 4th century CE.

CLST 333 (3) Greek Religion
A survey of both traditional and exoteric religious practices from the Archaic to the Hellenistic period. Some knowledge of ancient Greece is recommended.

CLST 334 (3) Roman Religion
Roman religions between the ninth century BC and the second century AD, including mystery religions, love magic, emperor worship, and early Christianity, with particular attention devoted to the primary sources. Some knowledge of ancient Rome is recommended.

CLST 352 (3) The Roman Republic
Rome from the foundation to the Augustan settlement. Constitutional development; the workings and failure of the Republican political system; acquisition and growth of Empire; the political, social, and economic consequences of imperialism.

Prerequisite: CLST 232.

CLST 355 (3) The Athenians and their Empire
The sources (literary, epigraphical and other) for Athens’ emergence as one of the two leading city-states in late archaic and classical Greece and the stages by which her empire grew.

Prerequisite: CLST 231.

CLST 356 (3) Alexander the Great and his Empire
The rise of Macedon under Philip II leading to its domination of Greece and the overthrow of the Persian Empire by his son, Alexander; the subsequent spread of Greek civilization in the East.

Prerequisite: CLST 231.

CLST 360 (3-12) d Life and Society in Classical Antiquity
Topics in Greek and Roman life and society.

CLST 401 (3-12) d Seminar in Classical History
Selected topics in Greek or Roman history, with an emphasis on research. Restricted to majors and honours students in CLST, CLAS, CLAH, ARGR, GRNE, CNRS This course is not eligible for Credit/D/Fail grading.

CLST 402 (3-12) d Seminar in Classical Literature
Selected topics in Greek or Roman literature, with an emphasis on research. Restricted to majors and honours students in CLST, CLAS, CLAH, ARGR, GRNE, CNRS This course is not eligible for Credit/D/Fail grading.

CLST 403 (3-12) d Seminar in Classical Art and Archaeology
Selected topics in Greek or Roman art and archaeology, with an emphasis on research. Restricted to majors and honours students in CLST, CLAS, CLAH, ARGR, GRNE, CNRS This course is not eligible for Credit/D/Fail grading.

CLST 404 (3-12) d Seminar in the Reception of the Classical World
Selected topics in the reception of the classical world in its own time and in later eras, with an emphasis on research. Prerequisite: at least one 3-credit upper-level course of content appropriate for the topic of the seminar (to be established by individual instructors). Restricted to majors and honours students in CLST, CLAS, CLAH, ARGR, GRNE, CNRS This course is not eligible for Credit/D/Fail grading.

CLST 501 (3) Topography and Monuments of Athens
A study of the topography and monuments of ancient Athens from the Bronze Age to Late Antiquity. Offered in the first term of alternate years. This course is not eligible for Credit/D/Fail grading.

CLST 502 (3) Topography and Monuments of Rome
A study of the topography and monuments of ancient Rome from the Iron Age to Late Antiquity. Offered in the second term of alternate years. This course is not eligible for Credit/D/Fail grading.

**CLST 503 (3/6) d Studies in Greek Architecture**
Selected topics in Greek architecture, e.g., religious, secular, and military architecture. This course is not eligible for Credit/D/Fail grading.

**CLST 504 (3/6) d Studies in Roman Architecture**
Selected topics in Roman architecture, e.g., religious, military, domestic, and public secular architecture. This course is not eligible for Credit/D/Fail grading.

**CLST 505 (3/6) d Studies in Greek Town Planning**
The development of Greek town planning from the Bronze Age to the Hellenistic period. This course is not eligible for Credit/D/Fail grading.

**CLST 506 (3/6) d Studies in Roman Town Planning**
The origins of town planning in Italy and the development of cities in the Roman Empire. This course is not eligible for Credit/D/Fail grading.

**CLST 508 (3/6) d Studies in Roman Painting and Mosaics**
Selected topics in Roman painting and mosaics, e.g., Campanian wall painting, regional styles of mosaic decoration. This course is not eligible for Credit/D/Fail grading.

**CLST 509 (3/6) d Studies in Greek Sculpture**
Selected topics in Greek sculpture, e.g., development of kouro and kore, Hellenistic sculpture, sculpture of fifth-century Athens. This course is not eligible for Credit/D/Fail grading.

**CLST 510 (3/6) d Studies in Roman Sculpture**
Selected topics in Roman sculpture, e.g., imperial relief sculpture, portraiture, regional styles. This course is not eligible for Credit/D/Fail grading.

**CLST 511 (3/6) d Studies in Greek Regional Archaeology**
Study of a particular area, e.g., Ionia, Sicily, Southern Italy. This course is not eligible for Credit/D/Fail grading.

**CLST 512 (3/6) d Studies in Roman Provincial Archaeology**
Study of a particular area, e.g., Gaul, Britain, Asia Minor. This course is not eligible for Credit/D/Fail grading.

**CLST 513 (3/6) d The Archaeology of Greek and Roman Technology**
Material evidence for the technological achievements of the Greek and Roman world. This course is not eligible for Credit/D/Fail grading.

**CLST 514 (3/6) d Greek and Roman Minor Arts**
Minor arts of the Greek and Roman world, e.g., coins, jewelry, terracottas. This course is not eligible for Credit/D/Fail grading.

**CLST 516 (3) d Studies in Greek Black-Figure Vase-Painting**
Selected topics in Greek painting, e.g., Athenian vase painting, regional styles of vase painting, Hellenistic painting. This course is not eligible for Credit/D/Fail grading.

**CLST 517 (3) d Studies in Greek Red-Figure Vase-Painting**
Selected topics in Greek painting, e.g., Athenian vase painting, regional styles of vase painting, Hellenistic painting. This course is not eligible for Credit/D/Fail grading.

**CLST 518 (3/6) d Topics in Greek Archaeology**
This course is not eligible for Credit/D/Fail grading.

**CLST 519 (3/6) d Topics in Roman Archaeology**
This course is not eligible for Credit/D/Fail grading.

**CLST 520 (3/6) d Directed Studies in Greek Archaeology**
This course is not eligible for Credit/D/Fail grading.

**CLST 521 (3/6) d Directed Studies in Roman Archaeology**
This course is not eligible for Credit/D/Fail grading.
CNPS: Counselling Psychology

CNPS 312 (3) Career Education for Teachers
Introduction to career education practices and standards program content, and principles for the design of career education programs. [3-0]

CNPS 362 (3) Basic Interviewing Skills
Development of basic interviewing skills for counselling and guidance. [3-3]

CNPS 363 (3) Career Counselling
Critical survey of career counselling theory and practice. [3-0]

CNPS 364 (3) Family Education and Consultation
Examination of current theories and practices in family education and consultation. [3-0]

CNPS 365 (3) Introduction to Theories of Counselling
An overview of selected theories of counselling. [3-0]

CNPS 426 (6) The Role of the Teacher in Guidance
This course is designed to assist the teacher in understanding and using guidance techniques for day-to-day use in the classroom. The emphasis will be on techniques for working with people towards better self-understanding and better perspectives of alternatives. [2-1]

CNPS 427 (3) Guidance: Planning and Decision-making
The work of the beginning counsellor and guidance worker in assisting students with educational, vocational, and personal planning and decision-making. [3-0]

CNPS 433 (3) The Personal and Social Development of the Adult
Personal and social adjustment issues for professional counsellors; basic skills necessary for effective group counselling. [3-3]

CNPS 504 (3) School Counselling
Theory and practice of school counselling. This course is not eligible for Credit/D/Fail grading.

CNPS 508 (3-12) c Review of Research in Educational Methods
Studies are made of recent research bearing on educational practice. This course is not eligible for Credit/D/Fail grading. Prerequisite: Appropriate senior undergraduate introductory or methods course.

CNPS 514 (3) Counselling Adolescents
Theory, research, and practice of counselling adolescents. This course is not eligible for Credit/D/Fail grading.

CNPS 523 (3) Counselling Theory and the Education of Deaf and Hard of Hearing Students
The impact of hearing loss considered from a developmental and family systems perspective; counselling strategies. This course is not eligible for Credit/D/Fail grading. [3-0]

CNPS 524 (3) Counselling Adults
Major issues and problems of adult development. Selection of appropriate counselling interventions for use in education and other counselling settings. This course is not eligible for Credit/D/Fail grading.

CNPS 531 (3) Interview and Non-Standardized Measures in Counselling
Theoretical assumptions in the use of non-standardized appraisal techniques. This course is not eligible for Credit/D/Fail grading.

CNPS 532 (3/6) d Psychological Assessment in Counselling
The use of standardized measures of mental ability, achievement, aptitude, interest and personality. This course is not eligible for Credit/D/Fail grading.

CNPS 534 (3) Gender and Sex Role Issues in Counselling
Theory, research, and practice in the area of gender and sex role issues related to counselling. This course is not eligible for Credit/D/Fail grading.

CNPS 535 (3) Perspectives on Adult Psychopathology in Counselling
This course is not eligible for Credit/D/Fail grading.

CNPS 544 (3) Family Counselling I
Counselling approaches as applied to the family, in educational and other counselling settings. This course is not eligible for Credit/D/Fail grading.
Credit/D/Fail grading.

CNPS 545 (3) Family Counselling - Interventions and Research
Main theoretical and therapeutic approaches of contemporary family counselling with emphasis on intervention and critical research issues in educational and other counselling settings. This course is not eligible for Credit/D/Fail grading.

CNPS 551 (3-6) d School-Based Consultation
This course is not eligible for Credit/D/Fail grading. Equivalency: EPSE 551.

CNPS 561 (3-12) c Laboratory Practicum
This course is not eligible for Credit/D/Fail grading.

CNPS 564 (3) Group Counselling
Understanding, designing and knowledge of groups and how to conduct them for use in counselling and guidance services. This course is not eligible for Credit/D/Fail grading.

CNPS 565 (3/6) d Special Course in Subject Matter Field
Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field. This course is not eligible for Credit/D/Fail grading.

CNPS 566 (3) Advanced Study in Group Counselling
This course is not eligible for Credit/D/Fail grading. Prerequisite: CNPS 564.

CNPS 568 (3) Applied Developmental Neuropsychology
This course is not eligible for Credit/D/Fail grading. Equivalency: EPSE 568.

CNPS 569 (3) Social Psychological Foundations in Applied Psychology
This course is not eligible for Credit/D/Fail grading. Equivalency: EPSE 569.

CNPS 574 (3) Career Planning and Decision-Making Counselling
Theory, research, and practice of career planning and decision counselling. This course is not eligible for Credit/D/Fail grading. Prerequisite: CNPS 363.

CNPS 578 (3/6) c Individual and Family Counselling Theories and Interventions
Major counselling theories, interventions for change and corresponding skill development. This course is not eligible for Credit/D/Fail grading. Prerequisite: All of CNPS 362, CNPS 365.

CNPS 579 (3) Research in Counselling Psychology
Assumptions and methods of major research paradigms. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EDUC 500, EPSE 481 and one of EPSE 482, EPSE 483.

CNPS 580 (3-12) c Problems in Education
Investigation and report of a problem. This course is not eligible for Credit/D/Fail grading.

CNPS 584 (3) Program Development and Professional Practice in Counselling
Designing, implementing and assessing counselling programs in schools, colleges, universities, and other counselling settings. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EDUC 500, EPSE 481 and one of EPSE 482, EPSE 483.

CNPS 586 (3) Ethics in Counselling Psychology
Ethical decision-making and legal issues in counselling psychology research and practice. This course is not eligible for Credit/D/Fail grading.

CNPS 587 (1-3) d History and Systems of Psychology
This course is not eligible for Credit/D/Fail grading.

CNPS 588 (3-12) c Supervised Training in Counselling
Initial counselling experience under faculty supervision in department training centres. This course is not eligible for Credit/D/Fail grading.

CNPS 594 (3) Cross-Cultural Counselling
Critical analysis of cross-cultural counselling theory, research and practice. This course is not eligible for Credit/D/Fail grading.

CNPS 595 (3) Stress, Coping and Adaptation Related to Trauma and Addictions
Theories, research, and applications of psychosocial stress and coping processes, with a particular focus on counselling issues and contexts related to trauma and addictions. This course is not eligible for Credit/D/Fail grading.
CNPS 598 (3-12) c Field Experiences
For students in the master's program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

CNPS 599 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

CNPS 601 (6/12) c Doctoral Seminar
This course is not eligible for Credit/D/Fail grading.

CNPS 632 (3) Advanced Assessment
Counselling psychology research and practice in adult personality assessment, including ethics of testing and use with special populations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of PSYC 303, EPSE 528 and CNPS 532.

CNPS 669 (3/6) d Research Approaches in Counselling Psychology
This course is not eligible for Credit/D/Fail grading.

CNPS 677 (3) Theories of Vocational Development
Sociological and psychological aspects of career planning, theories of vocational development, vocational choice. This course is not eligible for Credit/D/Fail grading.

CNPS 678 (3/6) d Theoretical Perspectives in Counselling Psychology
Major theoretical traditions in Counselling Psychology and illustration of the links among theory, research and practices; perspectives on Counselling Psychology as a distinct field of specialization. This course is not eligible for Credit/D/Fail grading.

CNPS 679 (3) Information Systems in Guidance and Counselling
The application of automatic data processing to guidance and counselling in student accounting, job placement, information dissemination and in interviewing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A course in Computer Science.

CNPS 688 (6) Supervision of Counselling Practice
Supervision requires both knowledge of supervision models and practices, and skills to implement them. This course involves a seminar and practicum to integrate the two requirements of the subject. (For those on the Doctoral program.) Pass/Fail. This course is not eligible for Credit/D/Fail grading.

CNPS 698 (6) Pre-Doctoral Internship
A 1600-hour supervised internship in Counselling Psychology. Internship sites offer counselling services as detailed in the "Speciality Guidelines for the Delivery of Services by Counselling Psychologists" (APA). Pass/Fail. This course is not eligible for Credit/D/Fail grading.

CNPS 699 (0) Doctoral Dissertation
Pass/Fail.

Classical, Near Eastern and Religious Studies, Faculty of Arts

CNRS: Classical, Near Eastern and Religious Studies

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

CNRS 335 (3-6) d Practicum in Classical or Near Eastern Archaeology
Training in excavation techniques and interpretation through participation in the excavation of a Greek, Roman, or Near Eastern site in Europe or the Middle East. The minimum length of the course is three weeks; it may be repeated once.

CNRS 370 (3) Theories of Myth
Origins, nature, and transmission of myth in the Western tradition, with particular attention devoted to the interpretation of myth from ancient times up to the present. Some background in myth is recommended.

CNRS 410 (3) The Archaeology of Ancient Cyprus
An overview of the archaeology of ancient Cyprus from the island's initial colonization in the 10th millennium BCE through the period of its rule as part of the Roman Empire (4th century CE).
Prerequisite: One of NEST 101, NEST 319, CLST 204.
CNRS 449 (6) Honours Essay
This course is not eligible for Credit/D/Fail grading.

CNRS 500 (3-6) d Pro-Seminar in Ancient Mediterranean Studies: Selected Topics
This course is not eligible for Credit/D/Fail grading.

CNRS 502 (3-12) d Studies in Law and Society
This course is not eligible for Credit/D/Fail grading.

CNRS 503 (3-12) d Studies in Literature, Art and Society
This course is not eligible for Credit/D/Fail grading.

CNRS 504 (3-12) d Studies in Religion
This course is not eligible for Credit/D/Fail grading.

CNRS 505 (3-12) d Studies in Ethnicity
This course is not eligible for Credit/D/Fail grading.

CNRS 535 (3) Practicum in Classical or Near Eastern Archaeology
Training in excavation techniques and interpretation through participation in the excavation of a Greek, Roman, or Near Eastern site in Europe or the Middle East. The minimum length of the course is three weeks. This course is not eligible for Credit/D/Fail grading.

CNRS 549 (6) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

CNTO: Cantonese

All students who wish to take CNTO courses are required to complete an online questionnaire PRIOR to registration. To get your placement approval, please go to https://placement.asia.ubc.ca/

CNTO 301 (3) Basic Cantonese I
Elementary level (part I) course in Cantonese for non-heritage learners with no prior exposure to or background in Cantonese. Focus on training for basic listening and conversational skills in Cantonese. Heritage speakers of Mandarin are NOT eligible. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CHIN 107, CHIN 233, CHIN 108, CHIN 234. Or placement approval.

CNTO 303 (3) Basic Cantonese II
Elementary level (part II) Cantonese for non-heritage learners. Continuation of CNTO 301. Focus on training for basic listening, conversational, and reading skills. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CNTO 301. Or placement approval.

CNTO 311 (3) Basic Cantonese for Mandarin Speakers
Basic oral and presentation skills in Cantonese. This is an accelerated course that covers content and topics similar to CNTO 301 and CNTO 303, but is structured specifically for heritage speakers of Mandarin.
Prerequisite: One of CHIN 243, CHIN 244. Or placement approval.

CNTO 401 (3) Intermediate Cantonese I
Intermediate lower level (part I) Cantonese for non-heritage learners. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of CNTO 303, CNTO 311. Or placement approval.

CNTO 403 (3) Intermediate Cantonese II
Intermediate lower level (part II) Cantonese for non-heritage learners. Continuation of CNTO 401. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CNTO 401. Or placement approval.

CNTO 451 (3) Advanced Cantonese through Popular Culture
Popular culture in Hong Kong from media such as television, cinema, popular music, literature, social media, etc., through advanced authentic Cantonese listening and reading materials. Open to non-heritage and heritage speakers of Mandarin and/or
COEC: Commerce Economics

COEC 126 (3) Data: Description, Display, and Inference
Use of data and statistics to convey information on important issues of the world economy. Credit will be granted for only one of COEC 126 or COMM 126. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 126.

COEC 293 (3) Financial Accounting
Construction and interpretation of financial reports prepared primarily for external use. Credit will be granted for only one of COEC 293 or COMM 293. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 293.

COEC 294 (3) Managerial Accounting
Introduction to the development and use of accounting information for management planning and control and the development of cost information for financial reports. Credit will be granted for only one of COEC 294 or COMM 294. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COEC 293, COMM 293.
Equivalency: COMM 294.

COEC 298 (3) Introduction to Finance
Basic principles of financial valuation, including the time-value of money and the risk/return tradeoff. Develops tools for the quantitative analysis of corporate and/or individual financing and saving decisions, and of capital budgeting decisions. Credit will be granted for only one of COEC 293 or COMM 298. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COEC 293, ECON 204.
Equivalency: COMM 298.

COEC 365 (3) Market Research
The process of marketing research including problem/opportunity formulation, research objectives, data sources, research instrument design, sampling, data collection and processing and methods of data analysis. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ECON 308.
Equivalency: COMM 365.

COEC 370 (3) Corporate Finance
Corporate enterprise decisions including capital budgeting; capital structure choice; and financial policies, tools, and valuation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ECON 308.
Equivalency: COMM 370.

COEC 371 (3) Investment Theory
Basic concepts of finance, including security valuation, security markets, and financial decisions concerning risk and return. Credit will be granted for only one of COEC 371 or COMM 371. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COEC 298.
Equivalency: COMM 371.

COEC 377 (3) International Financial Markets and Institutions
Structure, nature and institutions of foreign exchange markets, including spot, forward, futures, options, and offshore currency markets. Factors affecting exchange rates are also discussed. Credit will be granted for only one of COEC 377 or COMM 377. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COEC 371.
Equivalency: COMM 377.

COEC 394 (3) Government and Business
Roles of government and business in the Canadian economy including effects of public policy on the business environment. Ethical foundations of government, business and personal decision-making. Credit will be granted for only one of COEC 394 or...
COMM 394 This course is not eligible for Credit/D/Fail grading. 
Prerequisite: ECON 204. 
Equivalency: COMM 394.

COEC 491 (3) Strategic Management
Concepts and processes for the strategic management of single- and multi-business unit private sector enterprises, analyzed using the case method. Integrates methodologies from economic and organizational theory to form the foundations for strategic analyses. This course is not eligible for Credit/D/Fail grading. 
Equivalency: COMM 491.

COEC 497 (3) New Enterprise Development
The particular problems and experiences encountered in starting, developing, and managing new enterprises. The course includes lectures, guest speakers, and case studies. This course is not eligible for Credit/D/Fail grading. 
Equivalency: COMM 497, COMR 497.

COEC 498 (3) International Business Management
Development of general environmental framework for international business studies by drawing on international and development economics, research into government-business relations and studies in comparative socio-cultural systems and political systems. Credit will be granted for only one of COEC 498 or COMM 498. This course is not eligible for Credit/D/Fail grading. 
Equivalency: COMM 498.

Cognitive Systems, Faculty of Science

COGS: Cognitive Systems Program

COGS 200 (3) Introduction to Cognitive Systems
Interdisciplinary examination of human mental processes and how these are mediated by the brain. Will draw on cognitive psychology, linguistics, cognitive neuroscience, philosophy, artificial intelligence. [3-0-0] 
Prerequisite: second-year standing in the Faculty of Arts or Science.

COGS 300 (3) Understanding and Designing Cognitive Systems
Theory and methods for integrating diverse disciplinary content in cognitive systems. [2-3-0] 
Prerequisite: COGS 200.

COGS 303 (3) Research Methods in Cognitive Systems
Examination and comparison of the research methodologies of different disciplines relevant to cognitive systems. [3-0-0] 
Prerequisite: COGS 200.

COGS 401 (3) Seminar in Cognitive Systems
Interdisciplinary seminar integrating theory, methods, and current research topics. [1-0-4] 
Prerequisite: COGS 300.

COGS 402 (3) Research in Cognitive Systems
Supervised research project in a Cognitive Systems-related laboratory. [0-9-0] 
Prerequisite: COGS 300. COGS 401 is recommended.

Commerce, Faculty of Commerce & Business Administration

COHR: Commerce Human Resources

COHR 301 (1.5) Business and Management Values
Balancing organizational, personal, and community interests in a global economy. In addition to standard management textbooks and readings, the class will draw from the work of poets, fiction writers, essayists, and social critics. This course is not eligible for Credit/D/Fail grading. [3-0] 
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 302 (1.5) Critical Evaluation of Information, Evidence, and Arguments
Strategies to critically evaluate information relevant to Human Resource Managers. This course will examine common errors in
logic, decision biases, and cause and effect relationships. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: All of COMM 291, COMM 292 and one of COMM 203, COMM 392.

COHR 303 (3) Strategic Staffing
Processes of workforce recruitment, selection, retention, and renewal. Includes human resources planning, development of an effective staffing strategy and employer brand, job analysis and descriptions, cost-benefit analysis of various recruiting methods, analysis and evaluation of selection methods. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 304 (3) Training, Development, and Performance Management
Employee training, development and performance management in a variety of employment settings. Application of various training methods to performance enhancement, performance appraisal, feedback, and empirical evaluation of training investments. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 305 (3) Strategic Compensation
Employee compensation, including pay systems, benefits systems, and rewards and recognition programs. Examination of the motivational underpinnings of compensation administration and the application of compensation principles to the achievement of employer strategic objectives. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 307 (1.5) Introduction to Organizational Consulting
Frameworks from the social sciences useful for understanding organizational processes and how to apply these frameworks to particular organizational consulting challenges. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 308 (3) Labour Relations
Integrated coverage of union-management relations including labour law, collective bargaining, and collective agreement administration. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 310 (1.5) Industrial Relations in an Era of Globalization
Comprehensive examination of the Canadian industrial relations system, and its legal foundations, in the context of a global economy. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 311 (1.5) Organizational Analysis
An analysis of organizational structures and intraorganizational processes; effects of organizational factors on individual behaviour. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 401 (1.5) Organizational Change
The tactics and strategies for implementing constructive modifications in organizations. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 402 (1.5) Leadership
Explores the characteristics of effective leadership and examines how to be a better leader. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 403 (1.5) Managing Diversity
Explores the business and legal cases for diversity in the workplace. Examines how to effectively manage a diverse work force. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 404 (1.5) Power and Politics
Examines the sources and consequences of power in the context of different corporate and national cultures. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: COMM 292 and one of COMM 203, COMM 392.

COHR 405 (3) Managing the Family Business
Managing and working in a family business presents unique challenges: family issues can conflict with business issues. This
course examines governance structures and tools to manage the interface between the family and the business. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 406 (1.5) International Human Resource Management**
Application of human resource management practices to multinational enterprises. Comparative analysis of national human resource management systems. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 407 (1.5) Advanced Organizational Consulting**
Methods and techniques to diagnose and solve a broad range of organizational problems from the perspective of an organizational consultant. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: All of COMM 292, COHR 307 and one of COMM 203, COMM 392.

**COHR 408 (1.5) Organizational Design**
Techniques and approaches for evaluating and adjusting the structures of organization. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 409 (1.5) Creativity and Innovation**
Techniques and approaches to managing creativity and innovation in organizations. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 410 (1.5) Knowledge Management**
Techniques and approaches to managing knowledge and learning in organizations. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 411 (1.5) Managing and Building Teams**
Techniques and approaches for building effective teams, handling decision-making in teams, creating reward structures, and developing appropriate leadership models. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 412 (1.5) Advanced Topics in Organizational Behaviour**
Understanding, critiquing, and analyzing behaviour and social processes in organizations. This course focuses on provocative and current topics that could not be covered in depth in the introductory course. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: COMM 292 and one of COMM 203, COMM 392.

**COHR 433 (3) Employment Law**
Introduction to legislation and application of legal principles that govern the employment relationship. *This course is not eligible for Credit/D/Fail grading.* [3-0]

Prerequisite: All of COMM 292, COMM 393 and one of COMM 203, COMM 392.

**COHR 486 (1.5-6) Special Topics in Organizational Behaviour and Human Resources**
This course is not eligible for Credit/D/Fail grading.

### Linguistics, Faculty of Arts

**COLX: Computational Linguistics**

**COLX 521 (1) Corpus Linguistics**
Description, compare, and apply the main theories used in corpus linguistics, using qualitative and quantitative corpora, to perform diachronic and synchronic analyses. *This course is not eligible for Credit/D/Fail grading.*

**COLX 523 (1) Advanced Corpus Linguistics**
Advanced computational techniques in multilingual corpora. Language change and linguistic variation; best practices for data collection, annotation and analysis. *This course is not eligible for Credit/D/Fail grading.*

Prerequisite: All of DSCI 511, COLX 521.

**COLX 525 (1) Computational Morphology**

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Identify and differentiate morphological processes occurring in natural language for implementation in computational linguistics applications. This course is not eligible for Credit/D/Fail grading.

**COLX 527 (1) Advanced Computational Morphology**
Morphological parsing tools to analyze and understand multiple languages, including majority and low-resource languages, and to demonstrate computational implementation of fragments. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 525.

**COLX 531 (1) Machine Translation**
Machine translation (MT), including an ability to implement lexical translation models, discriminative training models, and syntactic models in MT. Includes noisy channel translation, phrase-based machine translation, and how to evaluate models. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 571.

**COLX 533 (1) Advanced Machine Translation**
Machine translation (MT) for diverse groups of languages. Tools covered will include syntax decoding, synchronous parsing, large-scale language modeling, system combination, morphology in MT, topics in modeling, example-based MT, mining parallel data, and quality estimation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 531.

**COLX 535 (1) Parsing for Computational Linguistics**
Methods of natural language parsing: finite state approaches, class-based language models, part-of-speech tagging, NP chunking, shallow parsing, and context-free syntactic parsing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 511, DSCI 551, COLX 521.

**COLX 561 (1) Computational Semantics**
Language processing to analyze lexical semantics. WordNet, FrameNet, and the semantic web, applied to word-sense disambiguation, entailment, question-answering, and knowledge base populations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 535.

**COLX 563 (1) Advanced Computational Semantics**
Statistical and neural approaches to natural-language meaning in computational semantics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 561.

**COLX 565 (1) Sentiment Analysis**
Data crawling, annotation, evaluation, and modeling lexical information. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 563.

**COLX 581 (1) Natural Language Processing for Low-Resource Languages**
Computational tools in relation to low-resource and other under-documented and very-low-resource language. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COLX 535.

**COLX 585 (1) Trends in Computational Linguistics**
Techniques for identifying, analyzing, and synthesizing primary sources for the most current research in computational linguistics. This course is not eligible for Credit/D/Fail grading.

**COLX 595 (6) Capstone Project**
Techniques for identifying, analyzing, and synthesizing primary sources for the most current research in computational linguistics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: 24 credits of DSCI and COLX courses.

**Commerce, Faculty of Commerce & Business Administration**

**COMM: Commerce**

In general, not all of the prerequisites for Commerce courses are listed. Students must be registered in the same year level as the course they intend to register in. For example, eligibility for Commerce 400-level courses requires a student to have completed second and third-year Commerce, and to be registered in fourth year. Students should refer to the Commerce website or contact...
the Undergraduate Office regarding course prerequisites and variations from standard program sequences. Additional fees are charged for some courses.

COMM 100 (3) Introduction to Business
An overview of all functional areas of business. Students will be introduced to the computer and internet tools commonly used in business. For non-Commerce students only.
Equivalency: COMR 100.

COMM 101 (3) Business Fundamentals
The different disciplines of business and their combination in management planning and decision-making. This course is not eligible for Credit/D/Fail grading.

COMM 120 (3) Business Immersion
A broad introduction to the field of business and how the different disciplines within business interact and combine in business decision-making. For Master of Management - Dual Degree Option students only. This course is not eligible for Credit/D/Fail grading.

COMM 126 (3) Data: Description, Display, and Inference
Introduction to the use of data and statistics to convey information on important issues of the world economy. Credit will be granted for only one of COMM 126 or COEC 126. This course is not eligible for Credit/D/Fail grading.
Equivalency: COEC 126.

COMM 186 (1.5-12) d Topics in Business I
This course is not eligible for Credit/D/Fail grading.

COMM 201 (3-36) d Study Abroad, Non-Commerce
A study abroad program developed in cooperation between UBC Faculty of Commerce and another institution offering a set of courses tailored to a particular field of study. This course is not eligible for Credit/D/Fail grading.

COMM 202 (1) Career Fundamentals
Fundamentals of career management including effective resume and cover letter writing, performing well in interviews and learning about the recruiting cycles, networking and resources available at the Hari B. Varshney Business Career Centre. This course is not eligible for Credit/D/Fail grading.

COMM 203 (3) Managing the Employment Relationship
The role of employment relations in enterprise performance. Managing employees under statutory law, collective bargaining, and progressive human resource management. Key issues in forming, developing, and maintaining a work force. Credit will be granted for only one of COMM 203 or COMM 392. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 292 and either (a) all of ECON 101, ECON 102 or (b) ECON 100.
Equivalency: COMM 392.

COMM 204 (3) Logistics and Operations Management
The design and management of systems to make products, provide services and deliver them to the end user. Credit will be granted for only one of COMM 204 or COMM 399. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 290, COMM 291.
Equivalency: COMM 399.

COMM 205 (3) Introduction to Management Information Systems
Overview of computer technology and terminology; use of computers as managerial and administrative tools; the management of computer resources and the influence of information technology within the organization. Credit will be granted for only one of COMM 205 or COMM 391. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMM 391.

COMM 220 (3) Business Communications
An experiential course covering a broad range of business writing and communications. For Master of Management - Dual Degree Option students only. This course is not eligible for Credit/D/Fail grading.

COMM 280 (3) Entrepreneurship
Entrepreneurial essentials from creating viable opportunities through building a founding team, strategic planning, going to market, fleshing out an organization and planning the future of the business.
Equivalency: COMR 280.

COMM 286 (1.5-12) d Topics in Business II
This course is not eligible for Credit/D/Fail grading.

**COMM 290 (3)** Introduction to Quantitative Decision Making  
Introduction to decision models in business, including basic optimization, linear programming, probability, decision analysis, random variables, simulation, and solving decision problems using spreadsheet tools. This course is not eligible for Credit/D/Fail grading.  
*Corequisite:* One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.  
*Equivalency:* BUSI 290.

**COMM 291 (3)** Application of Statistics in Business  
Methods and applications of statistics in business; data analysis, descriptive regression; data generation; sampling distributions; hypothesis testing; confidence intervals; two sample problems; inference in regression. This course is not eligible for Credit/D/Fail grading.  
*Prerequisite:* COMM 290.  
*Equivalency:* BUSI 291.

**COMM 292 (3)** Management and Organizational Behaviour  
Behaviour in organizations as it affects people as individuals, their relationships with others, their performance in groups and their effectiveness at work. This course is not eligible for Credit/D/Fail grading.

**COMM 293 (3)** Financial Accounting  
Introduction to the construction and interpretation of financial reports prepared primarily for external use. Credit will be granted for only one of COMM 293 or COEC 293. This course is not eligible for Credit/D/Fail grading.  
*Equivalency:* COEC 293.

**COMM 294 (3)** Managerial Accounting  
Introduction to the development and use of accounting information for management planning and control and the development of cost information for financial reports. Credit will be granted for only one of COMM 294 or COEC 294. This course is not eligible for Credit/D/Fail grading.  
*Prerequisite:* One of COEC 293, COMM 293.  
*Equivalency:* COEC 294.

**COMM 295 (3)** Managerial Economics  
Economic foundations of managerial decision-making. Demand theory, cost and production, market structure, competitive strategy, organization of the firm, welfare-economic foundations of business regulation. Credit will be granted for only one of ECON 201, ECON 206, ECON 301, ECON 304, FRE 295 or COMM 295. This course is not eligible for Credit/D/Fail grading.  
*Prerequisite:* Either (a) ECON 100 or (b) all of ECON 101, ECON 102.

**COMM 296 (3)** Introduction to Marketing  
Basic considerations affecting the domestic and international marketing of goods and services. This course is not eligible for Credit/D/Fail grading.  
*Corequisite:* COMM 293 and one of COMM 295, ECON 201, ECON 301.

**COMM 298 (3)** Introduction to Finance  
Introduces the basic principles of financial valuation, including the time-value of money and the risk/return tradeoff. Develops tools for the quantitative analysis of corporate and/or individual financing and saving decisions, and of capital budgeting decisions. Credit will be granted for only one of COMM 298 or COEC 298. This course is not eligible for Credit/D/Fail grading.  
[3-0-0]  
*Prerequisite:* All of COMM 290, COMM 293 and one of COMM 295, ECON 201, ECON 301.  
*Equivalency:* COEC 298.

**COMM 300 (3-36) d** Study Abroad, Commerce  
A study abroad program developed in cooperation between UBC Faculty of Commerce and another institution offering a set of courses tailored to a particular field of study. This course is not eligible for Credit/D/Fail grading.

**COMM 301 (3-36) d** Study Abroad, Commerce  
A study abroad program developed in cooperation between the Sauder School of Business and another institution offering a set of courses tailored to a particular field of study. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**COMM 302 (3-36) d** Study Abroad, Non-Commerce  
A study abroad program developed in cooperation between UBC Faculty of Commerce and another institution offering a set of courses tailored to a particular field of study. This course is not eligible for Credit/D/Fail grading.
COMM 303 (3-36) Study Abroad, Non-Commerce
A study abroad program developed in cooperation between the Sauder School of Business and another institution offering a set of courses tailored to a particular field of study. Pass/FailThis course is not eligible for Credit/D/Fail grading.

COMM 306 (3) Urban Land Economics
Examines economic factors affecting the urban land market, with an emphasis on determinants of urban land values, the housing market, urban transportation, and land use policies.This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.

COMM 307 (3) Real Estate Investment
Evaluation of investment in real estate assets; proforma analysis, property and asset management, equity securitization, appraisal, and international real estate investment.This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301 and one of COMM 297, COMM 298.

COMM 310 (3) Simulation Models in Business Decision-Making
Computer simulation, simulation languages. Typical business applications in financial planning, waiting line problems and other operating problems.
Prerequisite: COMM 291.

COMM 311 (3) Research Theory for Commerce Scholars
Social science research: theory, research design, methods, and criticism. For students in the Commerce Scholars Program only. This course is not eligible for Credit/D/Fail grading.

COMM 320 (1.5) Foundations in Accounting I
Preparation of financial statements and use of financial information contained in financial statements to make better decisions. For Master of Management - Dual Degree Option students onlyThis course is not eligible for Credit/D/Fail grading.

COMM 321 (1.5) Organizational Behaviour
Effects of individual and group behaviour on organizational processes and outcomes. Application of relevant frameworks from the social sciences to particular organizational situations. For Master of Management - Dual Degree Option students only.This course is not eligible for Credit/D/Fail grading.

COMM 329 (3) Principles of Organizational Behaviour
An introductory examination of work organizations and the behaviour of individuals within them. Phenomena to be studied include organizational structure, environments, group processes, motivation and leadership (for non-Commerce students only).This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 329.

COMM 335 (3) Information Systems Technology and Development
Introduction to information technology related to business use. Design, implementation and application of Information Systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 205, COMM 391, CPSC 210.

COMM 336 (3) Introduction to Digital Business
Business fundamentals in the digital economy: leveraging digitization and automation; data and analytics; platforms; crowdsourcing; understanding the impact of digital technologies on firms, markets, economies as well as individuals and society.This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 205, COMM 391.

COMM 337 (3) Business Programming and Analytics
Introduction to object-oriented computer programming; computational thinking; program design; scripting; documentation techniques; file handling; database access; and web crawling techniques. Students will apply data structures and programming constructs to the development of business analytics and other related applicationsThis course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 205.

COMM 342 (3) Global Supply Chain & Logistics Management I - Study Abroad
This course is not eligible for Credit/D/Fail grading.

COMM 343 (3) Global Supply Chain & Logistics Management II - Study Abroad
This course is not eligible for Credit/D/Fail grading.

COMM 344 (3) Global Supply Chain & Logistics Management III - Study Abroad
This course is not eligible for Credit/D/Fail grading.
COMM 345 (3) Global Supply Chain & Logistics Management IV - Study Abroad
This course is not eligible for Credit/D/Fail grading.

COMM 349 (3) Logistics Services Management
Overview of the characteristics and commercial environment of logistics and transportation services; service operations planning and design, costing, pricing and quality management. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of COMM 204, COMM 296, COMM 396, COMM 399.

COMM 353 (3) Financial Accounting: Intermediate I
An examination of accounting as a means of measurement and as an information system for external reporting purposes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 293, COMM 294.
Corequisite: Either (a) all of COMM 297, COMM 397 or (b) COMM 298.

COMM 354 (3) Cost Accounting
The provision and analysis of cost accounting information that will assist management in making operating decisions and in evaluating operational performance. The utilization of statistical analysis and linear models is included. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 290, COMM 291, COMM 293, COMM 294.

COMM 355 (3) Income Taxation
A study of income tax from the standpoint of the individual and of business enterprise. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 293, COMM 457.

COMM 362 (3) Consumer Behaviour
The use of consumer research and theory in marketing and policy decisions. Psychological, sociological and economic theory and research relevant to consumer behaviour are considered. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 296, COMM 396.

COMM 363 (3) Marketing Analysis
Analytical methods applicable to marketing management decision making; attention to strategic considerations linking analysis of consumer data, corporate data, environmental factors, and competitive response. The course makes extensive use of micro computers. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 296, COMM 396.

COMM 365 (3) Market Research
The process of marketing research including topics such as problem/opportunity formulation, research objectives, data sources, research instrument design, sampling, data collection and processing and methods of data analysis. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 290, COMM 291 and either (a) COMM 296 or (b) COMM 396; and one of COMM 295, ECON 201, ECON 301.
Corequisite: One of COMM 205, COMM 391.

COMM 370 (3) Corporate Finance
Examination of corporate enterprise decisions including capital budgeting; capital structure choice, and financial policies, tools, and valuation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 298.
Equivalency: COEC 370.

COMM 371 (3) Investment Theory
Basic concepts of finance, including security valuation, security markets, and financial decisions concerning risk and return. Credit will be granted for only one of COMM 371 or COEC 371. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 298.
Equivalency: COEC 371.

COMM 374 (3) Applied Financial Markets
Introduction to methodologies and evidence concerning the structure and operation of security markets and the valuation of financial securities including stocks, bonds, options and futures contracts; portfolio management, corporate finance and investment decisions. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 370, COMM 371.
COMM 376 (3) Financial Institutions I
The financial systems in Canada; the practices of the major financial institutions; and theories of financial processes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 297, COMM 298.

COMM 377 (3) International Financial Markets and Institutions
Structure, nature and institutions of foreign exchange markets, including spot, forward, futures, options, and offshore currency markets. Factors affecting exchange rates are also discussed. Credit will be granted for only one of COMM 377 or COEC 377. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 370, COMM 371.
Equivalency: COEC 377.

COMM 379 (3) Introduction to Pensions and Insurance
Financial dimensions and institutional structure of the pension and insurance industry; calculation of annuities and other aspects of actuarial science based on probability distributions and asset returns. Suitable for students in mathematics who have taken basic finance and for commerce students in finance, accounting and related areas. This course is not eligible for Credit/D/Fail grading.

COMM 380 (3) Co-operative Work Placement I
Approved and supervised work experience for a minimum of 3.5 months. Normally taken during the winter term of the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Commerce. Option-specific prerequisites apply. This course is not eligible for Credit/D/Fail grading.

COMM 381 (3) Co-operative Work Placement II
Approved and supervised work experience for a minimum of 3.5 months. Normally taken during the summer term of the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Commerce. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 380.

COMM 382 (3) Economics of Entrepreneurship and Innovation
Fundamental economic issues faced by entrepreneurs who want to commercialize innovations within start-ups and established firms. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 382.

COMM 386 (1.5-12) d Topics in Business III
This course is not eligible for Credit/D/Fail grading. Equivalency: COM 386.

COMM 387 (3) Entrepreneurial Finance
Financial issues encountered by those active on the investing side of entrepreneurship, such as working for banks, venture capital firms, or corporate venture organizations, or anyone interacting with entrepreneurs and private equity investors. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 387.

COMM 388 (3) Design Methods for Business Innovation
Studio-based experience in thinking strategies and design processes applied to business innovation in the private, public, and social sectors. Emphasis on problem solving, co-creation, and innovation for external clients in a collaborative environment. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 388.

COMM 389 (3) Creativity in Business
The role and importance of creativity in developing successful business solutions. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 389.

COMM 390 (3) Business Writing
An activity-focused course providing the opportunity to study and practice forms of writing needed in business. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of ENGL 112, ASTU 150, WRDS 150, ENGL 100, ENGL 120, ENGL 121. ENGL 1st, Arts One, a minimum of 18 cr. of Coordinated Arts Program.

COMM 393 (3) Commercial Law
Introduction to the law of contracts, with particular reference to contracts for sale of goods and related law of personal property; principles of agency, partnerships and company law. This course is not eligible for Credit/D/Fail grading.
COMM 394 (3) Government and Business
Roles of government and business in the Canadian economy including effects of public policy on the business environment. Ethical foundations of government, business and personal decision-making. Credit will be granted for only one of COEC 394 or COMM 394 This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.
Equivalency: COEC 394.

COMM 395 (3) Business Communications
Understanding non-written communications in day-to-day business. This course is not eligible for Credit/D/Fail grading.

COMM 398 (3) Introduction to Business Processes and Operations
The design and management of systems that efficiently and effectively supply products and services to the end-user. The concepts apply to a variety of settings such as manufacturing, logistics, healthcare, and others (For non-Commerce students only) This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 398.

COMM 405 (3) Real Estate Finance
The role of mortgage markets, mathematical analysis of return and valuation issue and methods of dealing with lender and borrower risk exposure This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 297, COMM 298.

COMM 407 (3) Real Estate Economics
The economics of real estate markets. Topics include real estate cycles and bubbles, search models and vacancy, the relationship between real estate and the economy, housing demand, and models of housing supply This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.

COMM 408 (3) Real Estate Development
The development process from theories of development, market analysis, site selection, project design, land use regulation and financial analysis This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 297, COMM 298 and one of COMM 295, ECON 201, ECON 301.

COMM 411 (3) Intermediate Business Statistics
Statistical techniques useful in business environments. Includes regression analysis, analysis of variance, forecasting, and logit and probit analysis. Credit may be obtained for only one of STAT 300, 306, and COMM 411.
Prerequisite: COMM 291.
Equivalency: STAT 300.

COMM 412 (3) Negotiation
Negotiation simulations to provide experience and confidence in the negotiation process and to develop effective skills for achieving objectives This course is not eligible for Credit/D/Fail grading.

COMM 414 (3) Data Visualization and Business Analytics
Descriptive analytics including data analysis and visualization. Predictive analytics including forecasting and various statistical techniques. Predictive analytics including optimization, Monte Carlo simulation, decision trees, and discrete event simulation This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 204, COMM 399.

COMM 415 (3) Quantitative Policy Analysis
Quantitative evaluation of public policies using statistical evaluation methods, cost benefit, and effectiveness analyses. Public policies affecting service provision and infrastructure investment in air, rail, marine, public transit, and pipelines evaluated on pricing, operating costs, productivity, safety, security, and the environment This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.

COMM 420 (1.5) Marketing
Basic considerations affecting the domestic and international marketing of goods and services. Analytical frameworks and techniques that are used to guide marketing strategy decisions. For Master of Management - Dual Degree Option students only. This course is not eligible for Credit/D/Fail grading.

COMM 421 (1.5) Introductory Finance
Introduces the basic principles of financial valuation, including the time-value of money and the risk/return tradeoff. Develops tools for the quantitative analysis of corporate and/or individual financing and saving decisions, and of capital budgeting.
COMM 425 (3) Research Methods for Human Resource Management
Techniques for collection and analysis of data in organizations to support adoption and administration of human resource management. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 291, COMM 292, COMM 327.

COMM 428 (3) Selected Topics in Human Resource Management
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of COMM 327, COMM 425.

COMM 431 (3) Law of Business Associations
The application of various statutes to business entities including corporations, partnerships, societies, co-operatives, credit unions, trust companies and banks; the consequences of bankruptcy on legal entities.
Prerequisite: COMM 393.

COMM 434 (3) Land Law
Legal principles and concepts relating to real estate and land development. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 393.

COMM 436 (3) Information Systems Analysis and Design
The process of information systems development; modern techniques and tools for systems analysis and design. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 335, CPSC 310.

COMM 437 (3) Database Technology
Theory and technology of database management from an applications perspective; database design; database administration. Credit will not be granted for both COMM 437 and CPSC 304. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 335.

COMM 438 (3) Management of Information Systems
Managerial issues in the administration of computerized information systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 205, COMM 391.

COMM 439 (3) Business Telecommunications
Basic data communications concepts and technology; local area, wide area, and enterprise networks; the Internet; wireless networking; network development life cycle; network security and management. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 335.

COMM 441 (3) Advanced Business Logistics
Analysis of logistics systems within firms and across supply chains. The formulation of corporate logistics strategies. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of COMM 204, COMM 399.

COMM 443 (3) Service Operations
This primarily case-based course will cover service operations in general (50%), health care operations (25%), and revenue management (25%). Applications of queuing models will be included in both services in general and healthcare. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 204, COMM 399.

COMM 444 (3) Air Transportation
An integrative treatment of air transport management including: demand analysis, sales and marketing, globalization trends, aircraft selection and fleet planning; airport economics and management. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.

COMM 445 (3) Maritime and International Transportation
The characteristics of shipping services and the role of shipping services in the design and management of international logistics systems. This course is not eligible for Credit/D/Fail grading.

COMM 446 (3) Transportation Economics
Economic characteristics of passenger and freight transportation services; market structure of the transportation industry; economic impact of public regulation and promotion and the role of economic analysis in resolving problems of Canadian policy. Credit may be obtained for only one of COMM 446, ECON 480. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301, ECON 206.
Equivalency: ECON 480.

COMM 447 (3) Applied Project Management
Evaluation of transport projects in the private and public sector; cost benefit analysis and related framework; project management, financing transport infrastructure. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 295, ECON 201, ECON 301.

COMM 448 (3) Business Logistics and Logistics Services Management
General services management including warehousing, transportation, intermodal, order-fulfillment, dispatching, and more. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 204, COMM 399.

COMM 449 (3) Supply-Chain Management
Integrated management of production and logistics systems; management of inter-organizational relationships in the supply chain, including vendor selection, bidding and negotiation processes, partnering and performance measurement. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 204, COMM 399.

COMM 450 (3) Financial Accounting - Intermediate II
Intermediate II. Continuation of the examination of accounting as a means of measurement and as an information system for external reporting purposes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 353.

COMM 452 (3) Taxes and Decision Making
Analysis of business and financial decisions in the presence of taxes. This course is not eligible for Credit/D/Fail grading.
Equivalency: BUSI 485.

COMM 453 (3) Financial Accounting-Advanced
An examination of advanced financial accounting. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 353, COMM 450.

COMM 454 (3) Accounting for Management Control and Incentives
Design of accounting systems for facilitating and influencing management decisions, with emphasis on performance evaluation in organizations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 294.

COMM 455 (3) Principles of Auditing
Principles of internal control, audit evidence, sampling and testing; audit reports; standards; responsibilities of the external auditor. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 353.
Corequisite: COMM 450.

COMM 456 (3) Information Technology Risks, Protection and Audit
Business risks associated with the use of information technology. Controls for integrity, security safety, and privacy of hardware, software, data and communications. Methods for auditing information systems and their controls. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 335.

COMM 457 (3) Fundamentals of Financial Accounting
Financial accounting for business organizations; principles and problems of accounting measurements; forms of business organizations; financing of businesses. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 457.

COMM 458 (3) Fundamentals of Managerial Accounting
Use of accounting data in decision making by businesses; financial statement analysis; cash flows; cost behaviour patterns; methods of accounting for costs. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 458.

COMM 459 (3) Financial Statement Analysis
An examination of financial statement information from the perspective of decision makers external to the firm, e.g., investors and financial institutions. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 293 and one of COMM 297, COMM 298 and one of COMM 370, COMM 397.
COMM 460 (3) Social and Nonprofit Marketing
Examines the role, use, and application of marketing in government agencies and nonprofit institutions. This course is not eligible for Credit/D/Fail grading.

COMM 461 (3) Business Development
Principles and practice of personal selling and leadership of teams: strategy, tactics, and implementation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 296.

COMM 462 (3) Integrated Marketing Communication
Marketing communication campaign strategy, conceptual framework, and practical application for integrated marketing communications, including advertising. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 362.

COMM 463 (3) Special Topics in Marketing
An investigation of current developments in both retailing and wholesaling fields and their application to marketing institutions. This course is not eligible for Credit/D/Fail grading.

COMM 464 (3) Digital Marketing
Investigation of Internet-based marketing, emphasizing customer-focused perspectives, competitive situations and analysis of the effectiveness of business websites using marketing principles and practices. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 296, COMM 396.

COMM 465 (3) Marketing Management
Basic considerations affecting the domestic and international marketing of goods and services. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of ECON 101, ECON 102 or (b) ECON 100 or (c) all of ECON 310, ECON 311 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310.
Equivalency: COMR 465.

COMM 466 (6) New Venture Design
Teams comprising students in COMM 466 and APSC 486 propose a new product, produce a viable prototype, and develop a business plan for the marketplace. Credit may only be obtained for one of COMM 466 and APSC 486. This course is not eligible for Credit/D/Fail grading.

COMM 467 (3) Brand Management
Issues and challenges commonly faced by brand managers, including: assessing brand meaning, evaluating brand health, assessing a brand's leverage potential, evaluating brand extensions, managing brands through a crisis, and assessing brand value. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 296.

COMM 468 (3) Marketing Applications
Applied marketing planning with emphasis on a major industrial analysis and the subsequent development of a detailed marketing plan for an operating organization. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 362, COMM 363, COMM 365.

COMM 469 (3) International Marketing
An analysis of the scope and significance of contemporary international business operations with particular reference to the marketing management problems encountered by firms with multinational branches and subsidiaries. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 296, COMM 396.

COMM 471 (3) Mergers and Acquisitions
Mergers and acquisitions as a focal point in making important corporate decisions deduced from careful study of relevant business cases. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 370.

COMM 473 (3) Business Finance
Introduction to managerial finance, including the role and functioning of financial markets, procurement of funds and financing strategies, dividend policy, capital budgeting and financial analysis and planning. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of ECON 101, ECON 102 or (b) ECON 100 or (c) all of ECON 310, ECON 311 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310; and one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120,
MATH 180, MATH 184.
Corequisite: One of COMM 293, COMM 457, COMR 457.
Equivalency: COMR 473.

COMM 474 (3) Fixed Income Markets and Management
Fixed income instruments and derivatives. Risk profiles and their use in establishing fixed income investment portfolios. Performance attribution techniques. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 374.

COMM 475 (3) Investment Policy
The management of security portfolios for individual and institutional investors; relation of investment policy to money markets and business fluctuations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 371.

COMM 477 (3) Risk Management and Financial Engineering
Principles of financial engineering and risk management. Use of derivatives in risk management. Valuation and hedging models for contingent claims. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 374.

COMM 480 (3) Co-operative Work Placement III
Approved and supervised work experience for a minimum of 35 months. Normally taken during the summer term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Commerce. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 381.

COMM 481 (3) Co-operative Work Placement IV
Approved and supervised work experience for a minimum of 35 months. Normally taken during the fall term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Commerce. This course is not eligible for Credit/D/Fail grading.
Prerequisite: COMM 480.

COMM 482 (3) New Product Development
How new products are developed and the factors that influence success and failure throughout the various stages of development. This course is not eligible for Credit/D/Fail grading.
Equivalency: COMR 482.

COMM 483 (6) Leadership and General Management
Integration and application of business knowledge to make business decisions across disciplines; development of personal leadership ability and style. Case-based with guest speakers. This course is not eligible for Credit/D/Fail grading.

COMM 484 (3) Sustainability Marketing
Role of marketing in creating social value. Integration of marketing fundamentals with core social, environmental, and economic principles of sustainability. Analysis of current sustainability trends. Development of strategic and practical marketing recommendations for for-profit enterprises. Potential and pitfalls of sustainability marketing. This course is not eligible for Credit/D/Fail grading.

COMM 485 (3) Social Entrepreneurship
An applied course that examines the innovative, growing, and rapidly evolving field of social entrepreneurship, which tackles social and environmental challenges through business perspectives and methods.

COMM 486 (1.5-12) d Special Topics in Business
This course is not eligible for Credit/D/Fail grading. Equivalency: COMR 486.

COMM 487 (3) Environmental Management
Explores corporate environmental strategy by introducing economic principles underlying environmental policy, law, and technologies for pollution prevention and abatement, environmental management systems, ISO-14001, energy systems, eco-marketing, and life-cycle analysis. Credit will be granted for only one of COMM 487 or COMM 597.

COMM 488 (3) Public Sector Management
This course focuses on some of the distinctive aspects of managing in the public sector. This course is not eligible for Credit/D/Fail grading.

COMM 490 (3/6) d Directed Studies in Commerce
An investigation and report on a topic to be agreed upon by a member of the faculty and a senior student. This course is not
COMM 491 (3) Strategic Management
Concepts and processes for the strategic management of private sector, single and multi-business unit enterprises are analysed using the case method. Methodologies which draw on economic and organizational theory are integrated to form the foundations for strategic analyses. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 390, COMM 395. Fourth-year standing.
Equivalency: COEC 491.

COMM 492 (3) Management Simulation
Student teams manage hypothetical firms in a complex simulation, coordinating production, finance, marketing and strategic planning in competition with other teams. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 390, COMM 395. Fourth-year standing.

COMM 493 (3) Strategic Management in Business
A conceptual and practical introduction to the major areas of business strategy with an integrative perspective on managing a business. Includes the analysis of a business and its environment, the development and evaluation of strategic alternatives, and implementation of change (For non-Commerce students only in fourth year). This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of COMM 293, COMM 457, COMR 457 and either (a) all of ECON 101, ECON 102 or (b) all of ECON 310, ECON 311 or (c) ECON 100 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310.
Corequisite: One of COMM 329, COMR 329 and one of COMM 465, COMR 465 and one of COMM 473, COMR 473.
Equivalency: BUSI 493, COMR 493.

COMM 495 (3) Business and Sustainable Development
An overview of environmental issues, focusing on corporate strategy, government policy and interactions between these two sectors of the economy. This course is not eligible for Credit/D/Fail grading.

COMM 497 (3) New Enterprise Development
The particular problems and experiences encountered in starting, developing and managing new enterprises. The course includes lectures, guest speakers, and case studies. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 390, COMM 395. Fourth-year standing.
Equivalency: COEC 497, COMR 497.

COMM 498 (3) International Business Management
Development of general environmental framework for international business studies by drawing on international and development economics, research into government-business relations and studies in comparative socio-cultural systems and political systems. Credit will be granted for only one of COMM 498 or COEC 498. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of COMM 390, COMM 395. Fourth-year standing.
Equivalency: COEC 498.

COMM 499 (3/6) d Internship
This course is not eligible for Credit/D/Fail grading.

COMM 505 (3) Seminar in Urban Land Economics
This course is not eligible for Credit/D/Fail grading.

COMM 520 (3) Advanced Topics in Organizational Behaviour
This course is not eligible for Credit/D/Fail grading.

COMM 525 (3) Introduction to Behavioural Research Methods for Business
This course is not eligible for Credit/D/Fail grading.

COMM 528 (3) Advanced Topics in Human Resource Management
This course is not eligible for Credit/D/Fail grading.

COMM 544 (3) Seminar in Transportation Economics
This course is not eligible for Credit/D/Fail grading.

COMM 547 (3-6) d Major Essay/Industry Project
This course is not eligible for Credit/D/Fail grading.

COMM 548 (3) Directed Study in Business Administration
This course is not eligible for Credit/D/Fail grading.
COMM 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

COMM 581 (3) Statistical Methodology I
This course is not eligible for Credit/D/Fail grading.

COMM 582 (3) Statistical Methodology II
This course is not eligible for Credit/D/Fail grading.

COMM 583 (3) Forecasting and Time Series Analysis in Business Environments
This course is not eligible for Credit/D/Fail grading.

COMM 589 (3) Consulting Practices: Applications
This course is not eligible for Credit/D/Fail grading.

COMM 590 (3-9) d Topics in Business Administration
This course is not eligible for Credit/D/Fail grading.

COMM 592 (3) Management Simulation
This course is not eligible for Credit/D/Fail grading.

COMM 597 (3) Environmental Management
Credit will be granted for only one of COMM 487 or COMM 597. This course is not eligible for Credit/D/Fail grading.

COMM 604 (3) Advanced Topics in Urban Land Economics I
This course is not eligible for Credit/D/Fail grading.

COMM 605 (3) Advanced Topics in Urban Land Economics II
This course is not eligible for Credit/D/Fail grading.

COMM 609 (3) Seminar in Urban Land Economics
This course is not eligible for Credit/D/Fail grading.

COMM 611 (3) Seminar on Theoretical Developments in Management
This course is not eligible for Credit/D/Fail grading.

COMM 612 (3) Advanced Topics in Optimization
This course is not eligible for Credit/D/Fail grading.

COMM 616 (3) Optimization Theory and Applications
This course is not eligible for Credit/D/Fail grading.

COMM 618 (3) Discrete Optimization II
This course is not eligible for Credit/D/Fail grading.

COMM 621 (3) Seminar in Human Resource Management
This course is not eligible for Credit/D/Fail grading.

COMM 622 (3) Seminar in Classics and Theory Construction in Organizational Behaviour
This course is not eligible for Credit/D/Fail grading.

COMM 623 (3) Qualitative Research Methods in Organizational Behaviour
This course is not eligible for Credit/D/Fail grading.

COMM 625 (3) Advanced Topics in Organizational Behaviour
This course is not eligible for Credit/D/Fail grading.

COMM 626 (3) Advanced Topics in Organizational Theory
This course is not eligible for Credit/D/Fail grading.

COMM 627 (3) Advanced Behavioural Research Methods
This course is not eligible for Credit/D/Fail grading.

COMM 628 (3) Organizational Studies Research Seminar
This course is not eligible for Credit/D/Fail grading.

COMM 633 (3) Modelling Methods in the Research and Practice of Information Systems
This course is not eligible for Credit/D/Fail grading. Prerequisite: At least nine graduate course credits in information system topics.
COMM 634 (3) Empirical Research Methods in Information Systems
This course is not eligible for Credit/D/Fail grading.

COMM 635 (3) Advanced Topics in Management Information Systems
This course is not eligible for Credit/D/Fail grading.

COMM 636 (3) Workshop in Management Information Systems
This course is not eligible for Credit/D/Fail grading.

COMM 644 (3) Advanced Topics in Transportation
This course is not eligible for Credit/D/Fail grading.

COMM 649 (0) Ph.D. Thesis

COMM 651 (3) Analysis of Accounting Information in Markets
This course is not eligible for Credit/D/Fail grading.

COMM 654 (3) Analysis of Accounting Information in Organizations
This course is not eligible for Credit/D/Fail grading.

COMM 655 (3) Stock Market Inefficiencies
This course is not eligible for Credit/D/Fail grading.

COMM 657 (3) Empirical Methods in Accounting Research
This course is not eligible for Credit/D/Fail grading.

COMM 658 (3) Research Seminar in Accounting
This course is not eligible for Credit/D/Fail grading.

COMM 659 (3) Advanced Topics in Empirical Accounting Research
This course is not eligible for Credit/D/Fail grading.

COMM 660 (3) Research Seminar in Marketing
This course is not eligible for Credit/D/Fail grading.

COMM 661 (3) Analytical Methods and Models in Marketing
This course is not eligible for Credit/D/Fail grading.

COMM 662 (3) Buyer Behaviour
This course is not eligible for Credit/D/Fail grading.

COMM 663 (3) Consumer Judgment and Decision Making
This course is not eligible for Credit/D/Fail grading.

COMM 671 (3) Theory of Finance
This course is not eligible for Credit/D/Fail grading.

COMM 672 (3) Advanced Topics in Theoretical Corporate Finance
This course is not eligible for Credit/D/Fail grading.

COMM 673 (3) Advanced Topics in Theoretical Asset Pricing
This course is not eligible for Credit/D/Fail grading.

COMM 674 (3) Advanced Topics in Empirical Asset Pricing
This course is not eligible for Credit/D/Fail grading.

COMM 675 (3) Research Seminar in Finance Workshop
This course is not eligible for Credit/D/Fail grading.

COMM 682 (3) Advanced Topics in Stochastic Models
This course is not eligible for Credit/D/Fail grading.

COMM 691 (3) Advanced Topics in Policy Analysis
This course is not eligible for Credit/D/Fail grading.

COMM 692 (3) Research Seminar in Policy Analysis
This course is not eligible for Credit/D/Fail grading.

COMM 693 (3) Seminar in Research Methodology I
This course is not eligible for Credit/D/Fail grading.

COMM 695 (3) Advanced Topics in Empirical Corporate Finance  
This course is not eligible for Credit/D/Fail grading.

COMM 696 (3) Applied Research in Policy Analysis and Strategy  
This course is not eligible for Credit/D/Fail grading.

Professor, Faculty of Commerce & Business Administration

COMR: Commerce Minor

COMR 100 (3) Introduction to Business
An overview of all functional areas of business. Students will be introduced to the computer and internet tools commonly used in business. For non-Commerce students only.  
Equivalency: COMM 100.

COMR 280 (3) Entrepreneurship
Entrepreneurial essentials from creating viable opportunities through building a founding team, strategic planning, going to market, fleshing out an organization and planning the future of the business. This course is not eligible for Credit/D/Fail grading.  
Equivalency: COMM 280.

COMR 329 (3) Principles of Organizational Behaviour
An introductory examination of work organizations and the behaviour of individuals within them. Phenomena to be studied include organizational structure, environments, group processes, motivation and leadership (for non-Commerce students only). This course is not eligible for Credit/D/Fail grading.  
Equivalency: COMM 329.

COMR 382 (3) Economics of Entrepreneurship and Innovation
Fundamental economic issues faced by entrepreneurs who want to commercialize innovations within start-ups and established firms. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of ECON 101, ECON 310.  
Corequisite: One of COMM 280, COMR 280.  
Equivalency: COMM 382.

COMR 386 (1.5-12) Topics in Business III
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 280, COMR 280.  
Equivalency: COMM 386.

COMR 387 (3) Entrepreneurial Finance
Financial issues encountered by those active on the investing side of entrepreneurship, such as working for banks, venture capital firms, or corporate venture organizations, or anyone interacting with entrepreneurs and private equity investors. This course is not eligible for Credit/D/Fail grading.  
Corequisite: One of COMM 280, COMR 280.  
Equivalency: COMM 387.

COMR 388 (3) Design Methods for Business Innovation
Studio-based experience in thinking strategies and design processes applied to business innovation in the private, public, and social sectors. Emphasis on problem solving, co-creation, and innovation for external clients in a collaborative environment. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of COMM 280, COMR 280.  
Equivalency: COMM 388.

COMR 389 (3) Creativity in Business
The role and importance of creativity in developing successful business solutions. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of COMM 280, COMR 280.  
Equivalency: COMM 389.

COMR 398 (3) Introduction to Business Processes and Operations
The design and management of systems that efficiently and effectively supply products and services to the end-user. The
**COMR 457 (3) Fundamentals of Financial Accounting**
Financial accounting for business organizations; principles and problems of accounting measurements; forms of business organizations; financing of businesses. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading. Equivalency: COMM 457.

**COMR 458 (3) Fundamentals of Managerial Accounting**
Use of accounting data in decision making by businesses; financial statement analysis; cash flows; cost behaviour patterns; methods of accounting for costs. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 293, COMM 457, COMR 457. Equivalency: COMM 458.

**COMR 465 (3) Marketing Management**
Basic considerations affecting the domestic and international marketing of goods and services. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) all of ECON 101, ECON 102 or (b) ECON 100 or (c) all of ECON 310, ECON 311 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310. Equivalency: COMM 465.

**COMR 473 (3) Business Finance**
Introduction to managerial finance, including the role and functioning of financial markets, procurement of funds and financing strategies, dividend policy, capital budgeting and financial analysis and planning. (For non-Commerce students only). This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) all of ECON 101, ECON 102 or (b) ECON 100 or (c) all of ECON 310, ECON 311 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310; and one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184. Corequisite: One of COMM 293, COMM 457, COMR 457. Equivalency: COMM 473.

**COMR 482 (3) New Product Development**
How new products are developed and the factors that influence success and failure throughout the various stages of development. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 280, COMR 280. Equivalency: COMM 482.

**COMR 486 (1.5-12) d Special Topics in Business**
How new products are developed and the factors that influence success and failure throughout the various stages of development. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 280, COMR 280. Equivalency: COMM 486.

**COMR 493 (3) Strategic Management in Business**
A conceptual and practical introduction to the major areas of business strategy with an integrative perspective on managing a business. Includes the analysis of a business and its environment, the development and evaluation of strategic alternatives, and implementation of change. (For non-Commerce students only in fourth year). This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 293, COMM 457 and either (a) all of ECON 101, ECON 102 or (b) all of ECON 310, ECON 311 or (c) ECON 100 or (d) all of ECON 101, ECON 311 or (e) all of ECON 102, ECON 310. Corequisite: One of COMM 329, COMR 329 and one of COMM 465, COMR 465 and one of COMM 473, COMR 473. Equivalency: BUSI 493, COMM 93.

**COMR 497 (3) New Enterprise Development**
The particular problems and experiences encountered in starting, developing, and managing new enterprises. The course includes lectures, guest speakers, and case studies. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of COMM 280, COMR 280. Corequisite: One of COMM 382, COMR 382 and one of COMM 387, COMR 387. Equivalency: COEC 497, COMM 497.
Faculty of Forestry

CONS: Natural Resources Conservation

CONS 101 (3) Introduction to Conservation
Seminars on current natural resources conservation and forest sciences topics. [3-0-0]

CONS 127 (3) Observing the Earth from Space
Exploration of innovative Earth observation and other geospatial technologies and how they allow us to better understand the changing Earth. [3-0-0]

CONS 200 (3) Foundations of Conservation
Conceptual foundations of conservation; means of conserving nature and natural resources. [3-0-0]

CONS 210 (3) Visualizing Climate Change
Introduction to climate change through the lens of local landscapes and future scenarios, using visual media to communicate the underlying science & psychology, and engage communities in local climate change solutions.

CONS 302 (3) Issues in Genomics and the Environment
Current and topical issues, including genetic determinism, environmental DNA, genomics and climate change, revival of extinct species, and applications of genomics in natural environments.
Prerequisite: One of BIOL 11, BIOL 12.

CONS 330 (3) Conservation Science and Sustainability
Fundamental concepts in conservation science. Different philosophies, perspectives, and disciplines used in setting priorities for managing biodiversity at all scales. [3-2-0]
Prerequisite: One of BIOL 121, GEOB 102, GEOB 103.

CONS 340 (3) Introduction to Geographic Information Systems for Forestry and Conservation
Introduction to principles, practice and context of Geographic Information Systems (GIS) applied to forest management and natural resource conservation issues. Priority enrolment to students in the Faculty of Forestry. [2-2-0]
Prerequisite: Third- or fourth-year standing.

CONS 370 (3) Aboriginal Forestry
Issues the may be encountered in professional natural resources work with or for Aboriginal communities and organization, including contemporary issues of Aboriginal rights and title, traditional uses, and self-government. [3-0-0]

CONS 412 (3) Belowground Ecosystems
Current concepts, methods, and applications of belowground ecology with emphasis on biotic interactions in soil; to understand the roles that aboveground and belowground communities play in regulating the structure and function of terrestrial ecosystems and their responses to global change. [3-0-0]
Prerequisite: Fourth year standing in the Faculty of Forestry or a Bachelor of Science Program awarded by any Faculty. Permission is required for registration.
Equivalency: APBI 412.

CONS 415 (3) Land, Trees, and Property Institutions
Exploration of the forces that gave rise to the global variety of systems of property for trees and forestlands; evolution in the governance of property. [3-0-0]
Prerequisite: Third-year standing.

CONS 425 (3) Sustainable Energy: Policy and Governance
Energy as a global policy problem; current energy challenges; energy systems and energy analysis; the politics and policy of energy alternatives. [3-0-0]
Prerequisite: Third- or fourth-year standing; 100-level MATH course.

CONS 440 (3) Conservation Policy
Contemporary issues are used to examine conservation policies designed to achieve conservation objectives. [3-0]
Prerequisite: CONS 200.

CONS 449 (1-6) Directed Studies in Natural Resources Conservation
In special cases and with the approval of the instructor concerned, a student may carry out directed studies of specific problems in natural resources conservation.
CONS 451 (15) Integrated Field School
Field methods, research and analysis, community oriented projects, and the interactions between biological and social aspects of conservation research. Students may not take any other courses in conjunction with CONS 451. Restricted to B.Sc.N. students in the fourth year of the Science and Management Major. This course is not eligible for Credit/D/Fail grading. [10-10-10]

CONS 452 (12) Global Perspectives Capstone
Examination of global resources and sustainability via scenario evaluation, modelling, and prescription. This course is not eligible for Credit/D/Fail grading. [10-10-10]
Prerequisite: One of CONS 340, GEOB 270 and fourth year standing in the Global Perspectives Major.
Corequisite: FRST 443.

CONS 453 (6) International Conservation and Forest Ecosystem Management Field School
International, experiential learning in conservation and forest ecosystem management. A 300-level ecology course such as CONS 330 is strongly recommended as a prerequisite. Fee will be assessed for living and traveling expenses. Pre-registration is required. This course is not eligible for Credit/D/Fail grading. [10-10-10]
Prerequisite: One of FRST 231, BIOL 300 and all of FRST 210, FRST 211. Or 6 credits of ecology based courses (e.g. BIOL 230, BIOL 306, APBI 260, APBI 360). Third-year standing and permission of the instructor are required.

CONS 481 (3) Conservation Planning and Wildland Recreation
Theory and tools needed for the selection and design of protected areas, the designation of land use types, and the management and conservation of wildland recreation resources. [2-2-0]

CONS 486 (3) Fish Conservation and Management
Principles of fish biology, population and community ecology necessary to understand conservation and management; overview of current issues, tactics and institutions involved with fisheries conservation and management. [2-3-0]
Prerequisite: FRST 386.

CONS 491 (3) Recreation and Tourism Planning
Principles and methods for planning urban and rural recreation and related tourism resources including analyzing recreation resources, applying policies and standards, developing park/recreation area management plans, and understanding benefits to human and community wellbeing and biodiversity. [3-0-0]
Prerequisite: One of UFOR 200, CONS 481.

CONS 495 (3) Principles of Managing Problem Wildlife in Forests and Agricultural Environments
Impacts of wildlife on crop productivity in temperate and tropical environments, the resiliency of wildlife populations to conventional control methodology, adoption of innovative methods to reduce crop damage, and the impact of introduced species on native fauna. [2-1-0]
Prerequisite: One of BIOL 230, BIOL 306, APBI 444, APBI 460, FRST 201, FRST 202, FRST 395, FRST 444, FRST 495 and one of FRST 231, BIOL 300.
Equivalency: APBI 495.

CONS 498 (3) Thesis or Special Project
An independent study or research project of a subject of special interest to the student under the supervision of a staff member.

CONS 500 (3) Seminar in Biological Conservation
Topics in conservation biology with application to current issues and particular reference to (but not limited to) forested ecosystems. This course is not eligible for Credit/D/Fail grading. [2-0-1]

CONS 501 (3) Topics in Conservation Genetics
The genetics of small populations, inbreeding, extinction risks due to genetic versus demography factors, adaptation and climate change, and methods for assessing genetic diversity for conservation planning. This course is not eligible for Credit/D/Fail grading.
Equivalency: ZOOL 524.

CONS 503 (1-6) d Topics in Conservation
This course is not eligible for Credit/D/Fail grading.

CONS 504 (1-6) c Directed Studies in Conservation
This course is not eligible for Credit/D/Fail grading.

CONS 520 (3) Conservation Policy
Examination of international and Canadian conservation agreements and policies as instruments of distributive justice. Application of contemporary theories of justice to conservation policy issues. This course is not eligible for Credit/D/Fail grading.

CONS 528 (3) Social Science Research Methods and Design for Natural Resource Management
Electrical & Computer Engineering, Faculty of Applied Science

CPEN: Computer Engineering

CPEN 211 (5) Introduction to Microcomputers
Boolean algebra; combinational and sequential circuits; organization and operation of microcomputers, memory addressing modes, representation of information, instruction sets, machine and assembly language programming, systems programs, I/O structures, I/O interfacing and I/O programming, introduction to digital system design using microcomputers. Credit will be granted for only one of CPEN 211, CPEN 312, EECE 256, EECE 259 or EECE 355. This course is not eligible for Credit/D/Fail grading. [4-2-2*]
Prerequisite: APSC 160.

CPEN 221 (4) Principles of Software Construction
Design, implementation, reasoning about software systems: abstraction and specification of software, testing, verification, abstract data types, object-oriented design, type hierarchies, concurrent software design. This course is not eligible for Credit/D/Fail grading. [3-2-2*]
Prerequisite: APSC 160.

CPEN 281 (3) Technical Communication
Written and oral communication in engineering. Technical description, report preparation, business correspondence, and oral presentation of technical material. Restricted to students in second year of Electrical and Computer Engineering programs. Credit will be granted for only one of ELEC 281, CPEN 281, BMEG 201 or APSC 201. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.

CPEN 291 (6) Computer Engineering Design Studio I
Design projects involving hardware (electronic devices and circuits, microcomputers) and software. This course is not eligible for Credit/D/Fail grading. [2-6-0]
Prerequisite: One of EECE 259, CPEN 211.
Corequisite: One of EECE 251, ELEC 201.

CPEN 311 (4) Digital Systems Design
Advanced combinational and sequential electronic system design. Hardware specification, modeling, and simulation using hardware description languages (HDLs) and CAD tools. Design with programmable logic including FPGA's. Applications include complex state machines, microcontrollers, arithmetic circuits, and interface units. Credit will be granted for only one of EECE 353, CPEN 311 and EECE 379. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: One of EECE 259, CPEN 211, EECE 355, CPEN 312.

CPEN 312 (3) Digital Systems and Microcomputers
Data representation in digital computers; boolean algebra; the design and optimization and implementation of combinatorial and sequential circuits; modern digital circuit technologies; memory and programmable logic devices; organization and operation of microcomputers; data/address bus organization; input-output interfacing. Credit will be granted for only one of EECE 355, CPEN 312, EECE 259, CPEN 211, and EECE 259. This course is not eligible for Credit/D/Fail grading. [3-2*-0]
Prerequisite: One of EECE 251, ELEC 201, EECE 252, ELEC 204, EECE 263, ELEC 203, MECH 221.

CPEN 321 (4) Software Engineering
Engineering practices for the development of non-trivial software-intensive systems including requirements specification, software architecture, implementation, verification, and maintenance. Iterative development. Recognized standards, guidelines, and models. Credit will only be granted for only one of CPSC 310, EECE 310, or CPEN 321. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: One of EECE 210, CPEN 221, CPSC 210, EECE 309.

CPEN 331 (4) Operating Systems
Operating systems, their design and their implementation. Process concurrency, synchronization, communication and scheduling. Device drivers, memory management, virtual memory, file systems, networking and security. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: CPSC 261 and one of EECE 210, CPEN 221, EECE 309.
CPEN 333 (3) System Software Engineering
Operating systems principles, real-time systems, principles of concurrent and multi-threaded programming, information
structures, introduction to object oriented analysis, design, and modeling using UML, testing of software systems. This course is
not eligible for Credit/D/Fail grading. [2-1-1]
Prerequisite: One of CPSC 259, CPSC 260 and one of EECE 259, CPEN 211, EECE 355, CPEN 312.

CPEN 391 (6) Computer Engineering Design Studio II
Design and implementation of a hardware platform and software design and implementation at the operating system and
application layers. Project management skills. Effective presentations. This course is not eligible for Credit/D/Fail grading. [2-6-0]
Prerequisite: One of CPEN 291, ELEC 291, ELEC 292, EECE 281 and one of EECE 353, CPEN 311.
Corequisite: One of EECE 315, CPEN 331.

CPEN 400 (1-8) Topics in Computer Engineering
Lectures or projects on subjects of current interest.

CPEN 411 (4) Computer Architecture
Modern processors, GPUs, and memory hierarchies; quantitative principles and instruction set design; pipelining, superscalar
issue, out-of-order execution, branch prediction and speculation; memory hierarchies, caches, virtual addressing, prefetching,
coherence, and consistency; multicores, VLIW, on-chip networks, and other advanced architectures. Credit will be granted for
only one of CPSC 313 or EECE 476 or CPEN 411. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: Either (a) one of EECE 353, CPEN 311 or (b) one of EECE 355, CPEN 312.

CPEN 412 (4) Microcomputer Systems Design
Microprocessor and system buses; advanced I/O methods; priority interrupts; event/exception handling; serial I/O; computer
networking; memory system design; interaction of hardware and software, microprocessor comparison, testability issues, safety
critical systems. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: One of EECE 353, CPEN 311 and one of EECE 259, CPEN 211, EECE 355, CPEN 312.

CPEN 421 (4) Software Project Management
Advanced project planning, cost estimation and scheduling. Project management tools. Factors influencing productivity and
success. Productivity metrics. Analysis of options and risk. Tools. Case studies. This course is not eligible for Credit/D/Fail
grading. [3-0-2]
Prerequisite: One of EECE 310, CPEN 321, CPSC 310.

CPEN 422 (4) Software Testing and Analysis
Different levels of testing including unit, integration, system, performance and regression levels. Requirements flowdown.
Problem tracking. Coverage criteria. Static methods. Tools support. Specialized techniques. Assessment of correctness,
reliability, safety. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: One of EECE 210, CPEN 221, EECE 309, EECE 310, CPEN 321, CPSC 210, CPSC 310.

CPEN 423 (4) Software Architecture
Software architecture as a bridge from requirements to implementation. Architectural description and patterns. Iterative
development. Use of commercial off-the-shelf products. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: One of EECE 210, CPEN 221, EECE 309, EECE 310, CPEN 321, CPSC 310.

CPEN 431 (4) Design of Distributed Software Applications
Communications, processes, naming, synchronization, consistency and replication, fault tolerance, object-based middleware,
and security technologies for distributed applications. [3-2-0]
Prerequisite: One of EECE 315, CPEN 331, CPSC 313 and one of EECE 210, CPEN 221, EECE 309, CPSC 210.
Corequisite: One of EECE 358, ELEC 331, CPSC 317.

CPEN 432 (4) Real-time System Design
Multi-tasking; interrupt-driven systems; task scheduling; schedulability analysis; inter-process communication and
synchronization; resource management; performance measurement; hardware/software integration; hardware/software tradeoffs;
system reliability. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of EECE 314, CPEN 333, EECE 315, CPEN 331, CPSC 313.

CPEN 441 (4) Human Computer Interfaces in Engineering Design
Practical issues for interfaces for modern software. Task analysis, user modeling, usability engineering, representations,
metaphors, prototyping tools. Applications: interactive multimedia systems, engineering, scientific visualization, engineering
design. This course is not eligible for Credit/D/Fail grading. [3-1-2*]
Prerequisite: One of CPSC 260, CPSC 221 and one of EECE 210, CPEN 221, EECE 309, CPSC 210, EECE 314, CPEN 333.
CPEN 442 (4) Introduction to Computer Security
Security risks, threats, and vulnerabilities from technical perspectives; confidentiality, integrity, and hybrid policies; cryptography, access control, assurance, accountability, and engineering of secure systems. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: One of EECE 314, CPEN 333, EECE 315, CPEN 331, CPSC 313.

CPEN 481 (3) Economic Analysis of Engineering Projects
Time-money relationships; economic analysis of alternatives including the effects of interest rates, inflation, depreciation, taxation and uncertainty; cost estimation and budgeting; financial analysis of engineering operations. This course is not eligible for Credit/D/Fail grading. [3-0-0]

CPEN 491 (10) Computer Engineering Capstone Design Project
Design, analysis, and implementation of solutions in response to a real world computer engineering problem, provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. This course is not eligible for Credit/D/Fail grading. [2-6-0; 2-6-0]
Prerequisite: One of CPEN 391, EECE 381.

CPEN 492 (10) Software Engineering Capstone Design Project
Design, analysis, and implementation of solutions in response to a real world software engineering problem. Projects are provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. This course is not eligible for Credit/D/Fail grading. [2-6-0; 2-6-0]
Prerequisite: One of CPEN 391, EECE 381.

CPEN 499 (3/6) Undergraduate Thesis
Project in electrical engineering or computer engineering involving design, experimental and/or computer simulation work as selected from topics supplied by faculty members. An individual project thesis is to be prepared according to specifications available from the departmental office. This course is not eligible for Credit/D/Fail grading. [0-6-0] or [0-12-0]

Computer Science, Faculty of Science

CPSC: Computer Science

The Department of Computer Science offers several options in first year: CPSC 110 is for students pursuing Computer Science specializations or who plan to take CPSC 210. CPSC 103 targets students desiring an introduction to computing and programming, but with no plans to take further Computer Science courses. CPSC 100 targets students desiring a general introduction to computational thinking with little programming. Consult https://www.cs.ubc.ca/students/undergrad/courses/choose-your-first-course for more information. Students who have credit for or exemption from APSC 160 or CPSC 110 may not take CPSC 100 or CPSC 103. Students with other computer science transfer credit must consult the department. Students currently registered in CPSC 110 or with Computer Science credit from another institution may not take APSC 160 for credit. Students with sufficient background in the concepts presented in CPSC 110 and an advisor's approval are encouraged to challenge CPSC 110 for credit by taking an examination. Additional fees are charged for some courses. For more information students are advised to contact the Department of Computer Science or visit the Computer Science undergraduate website: http://www.cs.ubc.ca/students/undergrad. For information on credit exclusion between CPSC and other courses, please consult the Faculty of Science Credit Exclusion List.

CPSC 100 (3) Computational Thinking
Meaning and impact of computational thinking. Solving problems using computational thinking, testing, debugging. How computers work. No prior computing experience required. Not for students with existing credit for or exemption from CPSC 110 or APSC 160. [3-1-0]

CPSC 101 (4) Connecting with Computer Science
Fundamentals of computer science and their connections with the arts, psychology, and biology. Historical, cultural, and gender perspectives of important contributions to the field will be discussed. No prior computing background required. [3-3-0]
Equivalency: GRSJ 201, WMST 201.

CPSC 103 (3) Introduction to Systematic Program Design
Computation as a tool for systematic problem solving in non-computer-science disciplines. Introductory programming skills. Not for credit for students who have credit for, or exemption from, or are concurrently taking CPSC 110 or APSC 160. No programming experience expected. [3-0-1]
CPSC 110 (4) Computation, Programs, and Programming
Fundamental program and computation structures. Introductory programming skills. Computation as a tool for information processing, simulation and modeling, and interacting with the world. [3-3-0]

CPSC 121 (4) Models of Computation
Physical and mathematical structures of computation. Boolean algebra and combinations logic circuits; proof techniques; functions and sequential circuits; sets and relations; finite state machines; sequential instruction execution. [3-2-1]
Prerequisite: Principles of Mathematics 12 or Pre-calculus 12.
Corequisite: CPSC 110.

CPSC 189 (1) Systematic Program Design in Python
Systematic design of small programs using the Python programming language. [1-1-0]
Prerequisite: CPSC 110 and one of Principles of Mathematics 12 or Pre-calculus 12.

CPSC 210 (4) Software Construction
Design, development, and analysis of robust software components. Topics such as software design, computational models, data structures, debugging, and testing. [3-2-0]
Prerequisite: One of CPSC 110, CPSC 260.

CPSC 213 (4) Introduction to Computer Systems
Software architecture, operating systems, and I/O architectures. Relationships between application software, operating systems, and computing hardware; critical sections, deadlock avoidance, and performance; principles and operation of disks and networks. [3-3-0]
Prerequisite: All of CPSC 121, CPSC 210.

CPSC 221 (4) Basic Algorithms and Data Structures
Design and analysis of basic algorithms and data structures; algorithm analysis methods, searching and sorting algorithms, basic data structures, graphs and concurrency. [3-2-0]
Prerequisite: One of CPSC 210, EECE 210, CPEN 221 and one of CPSC 121, MATH 220.

CPSC 259 (4) Data Structures and Algorithms for Electrical Engineers
Advanced procedural programming. Fundamental algorithms for sorting and searching. Data structures including lists, trees, and hash tables. Introduction to scripting languages and file input/output. [3-2-0]
Prerequisite: APSC 160.

CPSC 260 (3) Data Structures and Algorithms for Computer Engineers
Design and analysis of object-oriented programs, emphasizing data structures. Topics include: classes, interfaces, fundamental data structures, algorithmic complexity, basic debugging and testing techniques. [3-1-0]
Prerequisite: APSC 160.

CPSC 261 (4) Basics of Computer Systems
Software architecture, operating systems, and I/O architectures. Relationships between application software, operating systems, and computing hardware; critical sections, deadlock avoidance, and performance; principles and operation of disks and networks. [3-2-1]
Prerequisite: One of EECE 259, CPEN 211 and one of CPSC 260, EECE 210, CPEN 221.

CPSC 298 (3) Co-operative Work Placement I
Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during Winter Session of second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. This course is not eligible for Credit/D/Fail grading.

CPSC 299 (3) Co-operative Work Placement II
Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the summer following the second year. Technical report required. Restricted to students admitted to the Co-operative Education. This course is not eligible for Credit/D/Fail grading.
Prerequisite: CPSC 298.

CPSC 301 (3) Computing in the Life Sciences
Basic concepts, tools, and techniques for working with scientific data at larger scales, higher speeds, and lower costs that would otherwise be impossible. Applications and examples drawn from the life sciences. No prior computing background is required. Not for credit for students who have credit for any of the following: APSC 160, Computer Science AP, IB Computer Science, EOSC 211, or 3 credits of CPSC beyond CPSC 101. [3-2-0]
Prerequisite: Third-year standing or higher.

CPSC 302 (3) Numerical Computation for Algebraic Problems
Numerical techniques for basic mathematical processes involving no discretization, and their analysis. Solution of linear systems, including analysis of round-off errors; norms and condition number; introduction to iterative techniques in linear algebra, including eigenvalue problems; solution to nonlinear equations. [3-0-0]
Prerequisite: One of CPSC 103, CPSC 110, CPSC 260, EOSC 211, PHYS 210 and one of MATH 101, MATH 103, MATH 105, MATH 121 and one of MATH 152, MATH 221, MATH 223.

CPSC 303 (3) Numerical Approximation and Discretization
Numerical techniques for basic mathematical processes involving discretization, and their analysis. Interpolation and approximation, including splines and least squares data fitting; numerical differentiation and integration; introduction to numerical initial value ordinary differential equations. [3-0-0]
Prerequisite: One of CPSC 103, CPSC 110, CPSC 260, EOSC 211, PHYS 210 and one of MATH 101, MATH 103, MATH 105, MATH 121 and one of MATH 152, MATH 221, MATH 223.

CPSC 304 (3) Introduction to Relational Databases
Overview of database systems, ER models, logical database design and normalization, formal relational query languages, SQL and other commercial languages, data warehouses, special topics. [3-0-0]
Prerequisite: Either (a) CPSC 221 or (b) all of CPSC 260, EECE 320 and one of CPSC 210, EECE 210, EECE 309.

CPSC 310 (4) Introduction to Software Engineering
Specification, design, implementation and maintenance of large, multi-module software systems. Principles, techniques, methodologies and tools for computer aided software engineering (CASE); human-computer interfaces, reactive systems, hardware-software interfaces and distributed applications. [3-2-0]
Prerequisite: CPSC 210.

CPSC 311 (3) Definition of Programming Languages
Comparative study of advanced programming language features. Statement types, data types, variable binding, parameter passing mechanisms. Methods for syntactic and semantic description of programming languages. [3-0-1]
Prerequisite: CPSC 210.

CPSC 312 (3) Functional and Logic Programming
Principles of symbolic computing, using languages based upon first-order logic and the lambda calculus. Algorithms for implementing such languages. Applications to artificial intelligence and knowledge representation. [3-0-0]
Prerequisite: One of CPSC 210, EECE 210, EECE 309, CPEN 221.

CPSC 313 (3) Computer Hardware and Operating Systems
Instruction sets, pipelining, code optimization, caching, virtual memory management, dynamically linked libraries, exception processing, execution time of programs. [3-0-1]
Prerequisite: Either (a) all of CPSC 213, CPSC 221 or (b) all of CPSC 210, CPSC 213, CPSC 260, EECE 320.

CPSC 314 (3) Computer Graphics
Human vision and colour; geometric transformations; algorithms for 2-D and 3-D graphics; hardware and system architectures; shading and lighting; animation. [3-1-0]
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253 and one of MATH 152, MATH 221, MATH 223 and either (a) CPSC 221 or (b) all of CPSC 260, EECE 320.

CPSC 317 (3) Internet Computing
Computer networking, basic communication protocols, network infrastructure and routing. Common application-level protocols and principles associated with developing distributed applications. [3-0-1]
Prerequisite: All of CPSC 213, CPSC 221.

CPSC 319 (4) Software Engineering Project
The design, implementation, and test of a large software system, using a team approach. [3-0-2]
Prerequisite: CPSC 310.

CPSC 320 (3) Intermediate Algorithm Design and Analysis
Systematic study of basic concepts and techniques in the design and analysis of algorithms, illustrated from various problem areas. Topics include: models of computation; choice of data structures; graph-theoretic, algebraic, and text processing algorithms. [3-0-1]
Prerequisite: Either (a) CPSC 221 or (b) all of CPSC 260, EECE 320. In addition to above pre-requisites, at least 3 credits from COMM 291, BIOL 300, MATH or STAT at 200 level or above.
Equivalency: EECE 320.

**CPSC 322 (3) Introduction to Artificial Intelligence**
Problem-solving and planning; state/action models and graph searching. Natural language understanding Computational vision. Applications of artificial intelligence. [3-0-0]
*Prerequisite:* Either (a) CPSC 221 or (b) all of CPSC 260, EECE 320 and one of CPSC 210, EECE 210, EECE 309.

**CPSC 340 (3) Machine Learning and Data Mining**
Models of algorithms for dimensionality reduction, nonlinear regression, classification, clustering and unsupervised learning; applications to computer graphics, computer games, bio-informatics, information retrieval, e-commerce, databases, computer vision and artificial intelligence. [3-0-1]
*Prerequisite:* One of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263 and one of STAT 200, STAT 203, STAT 241, STAT 251, COMM 291, ECON 325, ECON 327, PSYC 218, PSYC 278, PSYC 366, MATH 302, STAT 302, MATH 318, BIOL 300; and either (a) CPSC 221 or (b) all of CPSC 260, EECE 320 and one of CPSC 210, EECE 210, EECE 309.

**CPSC 344 (3) Introduction to Human Computer Interaction Methods**
Basic tools and techniques, teaching a systematic approach to interface design, task analysis, analytic and empirical evaluation methods. [2-2-2]
*Prerequisite:* One of CPSC 210, EECE 210, EECE 309, CPEN 221.

**CPSC 349 (0) Honours Research Seminar**
Students will attend a series of research seminars presented by faculty members, produce a thesis proposal, and choose their honours thesis supervisor. Available to Honours students. Majors students with satisfactory standing may also be permitted to enrol. [1-0-0]

**CPSC 398 (3) Co-operative Work Placement III**
Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the summer following the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. This course is not eligible for Credit/D/Fail grading.

**CPSC 399 (3) Co-operative Work Placement IV**
Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the fall term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. This course is not eligible for Credit/D/Fail grading.

**CPSC 402 (3) Numerical Linear Algebra**
Investigation of the practical techniques of computational linear algebra. Orthogonal transformations and their application to the solution of linear equations, the eigenproblem, and linear least squares. Complete solution of the symmetric eigenproblem, including bisection and the QR method. Refinements of these techniques for sparse matrices. [3-0-0]
*Prerequisite:* One of CPSC 302, CPSC 303, MATH 307.

**CPSC 404 (3) Advanced Relational Databases**
Physical database design, indexing, relational query processing and optimization, transaction processing, concurrency control, crash recovery, data warehouses, data cubes, views, special topics. [3-0-0]
*Prerequisite:* CPSC 304 and one of CPSC 213, CPSC 261.

**CPSC 406 (3) Computational Optimization**
Formulation and analysis of algorithms for continuous and discrete optimization problems; linear, nonlinear, network, dynamic, and integer optimization; large-scale problems; software packages and their implementation; duality theory and sensitivity. [3-0] 0
*Prerequisite:* One of CPSC 302, CPSC 303, MATH 307.

**CPSC 410 (3) Advanced Software Engineering**
Specification, design, construction and validation of multi-version software systems. [3-0-0]
*Prerequisite:* Either (a) CPSC 310 or (b) one of EECE 310, CPEN 321 and one of EECE 315, CPEN 331.

**CPSC 411 (3) Introduction to Compiler Construction**
A practical introduction to lexical analysis, syntactic analysis, type-checking, code generation and optimization. This will be used to design and implement a compiler for a small language. [3-0-0]
*Prerequisite:* All of CPSC 213, CPSC 221, CPSC 311.

**CPSC 415 (3) Advanced Operating Systems**
Process synchronization and communication schemes, including message-passing and concepts of monitor and serializer.
Virtual memory systems management and the problem of information sharing in such systems. The working set principle. Traps and interrupt handling. Elementary queuing theory and its application such as process scheduling, system balancing and load control. File systems and operating system design methodologies. [3-0-0]
Prerequisite: One of CPSC 313, EECE 315, CPEN 331.

CPSC 416 (3) Distributed Systems
Concepts and design of distributed systems. Communication architecture and models for interprocess communication. Process migration, naming, distributed file systems, fault tolerance, and concurrency control. [3-0-0]
Prerequisite: One of CPSC 313, EECE 315, CPEN 331 and one of CPSC 317, EECE 358, ELEC 331.

CPSC 417 (3) Computer Networking
Network protocols and architecture including internetworking, the Internet, layered communication protocols, routing, flow and congestion control, network performance, wired and wireless data communication. [3-0]
Prerequisite: All of CPSC 313, CPSC 317 and one of STAT 200, STAT 241.

CPSC 418 (3) Parallel Computation
Algorithms, architectures, and programming paradigms for parallel computation. Shared memory, message passing, and data parallel architectures and programming models. Parallel algorithms including reduce, scan, and sorting networks. Reasoning about the correctness of parallel programs. Performance analysis and measurement for parallel programs. [3-0-0]
Prerequisite: One of CPSC 261, CPSC 313, EECE 476, CPEN 411 and one of CPSC 320, EECE 320.

CPSC 420 (3) Advanced Algorithms Design and Analysis
The study of advanced topics in the design and analysis of algorithms and associated data structures. Topics include algorithms for graph-theoretic; algebraic and geometric problems; algorithms on nonsequential models; complexity issues; approximation algorithms. [3-0-0]
Prerequisite: CPSC 320.

CPSC 421 (3) Introduction to Theory of Computing
Characterizations of computability (using machines, languages and functions). Universality, equivalence and Church's thesis. Unsolvable problems. Restricted models of computation. Finite automata, grammars and formal languages. [3-0-0]
Prerequisite: Either (a) CPSC 221 or (b) all of CPSC 260, EECE 320. CPSC 320 is recommended.

CPSC 422 (3) Intelligent Systems
Principles and techniques underlying the design, implementation and evaluation of intelligent computational systems. Applications of artificial intelligence to natural language understanding, image understanding and computer-based expert and advisor systems. Advanced symbolic programming methodology. [3-0-0]
Prerequisite: CPSC 322.

CPSC 424 (3) Geometric Modeling
Digital representation of curves and surfaces, including splines, subdivision surfaces and meshes. Principles, algorithms and mathematical foundations for geometry representation in computer graphics, computer vision, fabrication, CAD/CAM, and medical imaging. Algorithms for acquisition, creation, representation, and processing of 3D shapes. [3-0-1]
Prerequisite: CPSC 320 and one of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 217, MATH 226, MATH 253.

CPSC 425 (3) Computer Vision
Introduction to the processing and interpretation of images. Image sensing, sampling, and filtering. Algorithms for colour analysis, texture description, stereo imaging, motion interpretation, 3D shape recovery, and recognition. [3-0-0]
Prerequisite: All of MATH 200, MATH 221 and either (a) CPSC 221 or (b) all of CPSC 260, EECE 320.

CPSC 426 (3) Computer Animation
Motion in computer graphics for characters and their environments. Keyframing, inverse kinematics, particle systems, rigid body dynamics, contact and collision, controller-based active motion, motion capture. [3-0-0]
Prerequisite: CPSC 314.

CPSC 430 (3) Computers and Society
Impact of computer technology on society; historical perspectives; social and economic consequences of large-scale information processing systems and automatic control; legal and ethical problems in computer applications. Computers and the individual: machine versus human capabilities, fact and fancy; problematic interface between man and machine. [3-0-0]
Prerequisite: 3 credits of Computer Science and at least third-year standing.

CPSC 436 (1-6) d Topics in Computer Science
Selected topics in a specific area within Computer Science. May be taken more than once for credit with permission of the
department.
Prerequisite: Third-year standing in a Computer Science or Computer Engineering specialization, and permission of the department.

CPSC 444 (3) Advanced Methods for Human Computer Interaction
Design and evaluation methodologies and theories; formal models of the user including visual, motor, and information processing; advanced evaluation methods including laboratory experiments and field studies; HCI research frontiers. [2-2-2]
Prerequisite: All of CPSC 310, CPSC 344 and one of STAT 200, STAT 241.

CPSC 445 (3) Algorithms in Bioinformatics
Sequence alignment, phylogenetic tree reconstruction, prediction of RNA and protein structure, gene finding and sequence annotation, gene expression, and biomolecular computing. [3-0-0]
Prerequisite: CPSC 320 and six credits of BIOL beyond BIOL 111.

CPSC 448 (3/6) c Directed Studies in Computer Science
Open ordinarily to students in Computer Science with at least a 72% average and the permission of the head of the department or designate. The course may consist of supervised reading, participation in a seminar, and one or more programming projects.

CPSC 449 (6) Honours Thesis
Under supervision of a faculty member, students investigate a research topic and prepare a thesis.
Prerequisite: CPSC 349.

CPSC 490 (3) Student Directed Seminars
Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment and delivery methods will comply with the "Handbook for Student Directed Seminars". [3-0-0]

CPSC 499 (3) Co-operative Work Placement V
Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the summer following the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. This course is not eligible for Credit/D/Fail grading.

CPSC 500 (3) Fundamentals of Algorithm Design and Analysis
This course is not eligible for Credit/D/Fail grading.

CPSC 501 (3) Theory of Automata, Formal Languages and Computability
This course is not eligible for Credit/D/Fail grading.

CPSC 502 (3) Artificial Intelligence I
This course is not eligible for Credit/D/Fail grading.

CPSC 503 (3) Computational Linguistics I
This course is not eligible for Credit/D/Fail grading.

CPSC 504 (3) Data Management
This course is not eligible for Credit/D/Fail grading.

CPSC 505 (3) Image Understanding I: Image Analysis
This course is not eligible for Credit/D/Fail grading.

CPSC 506 (3) Complexity of Computation
This course is not eligible for Credit/D/Fail grading.

CPSC 507 (3) Software Engineering
This course is not eligible for Credit/D/Fail grading.

CPSC 508 (3) Operating Systems
This course is not eligible for Credit/D/Fail grading.

CPSC 509 (3) Programming Language Principles
This course is not eligible for Credit/D/Fail grading.

CPSC 511 (3) Implementation of Programming Languages
This course is not eligible for Credit/D/Fail grading.

CPSC 513 (3) Introduction to Formal Verification and Analysis
This course is not eligible for Credit/D/Fail grading.
CPSC 514 (3) Computer Graphics: Rendering
   This course is not eligible for Credit/D/Fail grading.

CPSC 515 (3) Computational Robotics
   This course is not eligible for Credit/D/Fail grading.

CPSC 516 (3) Computational Geometry
   This course is not eligible for Credit/D/Fail grading.

CPSC 517 (3) Sparse Matrix Computation
   This course is not eligible for Credit/D/Fail grading.

CPSC 519 (3) Logic Programming and Functional Programming
   This course is not eligible for Credit/D/Fail grading.

CPSC 520 (3) Numerical Solution of Differential Equations
   This course is not eligible for Credit/D/Fail grading.

CPSC 521 (3) Parallel Algorithms and Architectures
   This course is not eligible for Credit/D/Fail grading.

CPSC 522 (3) Artificial Intelligence II
   This course is not eligible for Credit/D/Fail grading.

CPSC 524 (3) Computer Graphics: Modeling
   This course is not eligible for Credit/D/Fail grading.

CPSC 525 (3) Image Understanding II: Scene Analysis
   This course is not eligible for Credit/D/Fail grading.

CPSC 526 (3) Computer Animation
   This course is not eligible for Credit/D/Fail grading.

CPSC 527 (3) Computer Communication Protocols
   This course is not eligible for Credit/D/Fail grading.

CPSC 529 (3) Definition of Programming Languages
   This course is not eligible for Credit/D/Fail grading.

CPSC 530 (2-6) c Topics in Information Processing
   This course is not eligible for Credit/D/Fail grading.

CPSC 531 (3-6) d Topics in Theory of Computation
   This course is not eligible for Credit/D/Fail grading.

CPSC 532 (2-6) d Topics in Artificial Intelligence
   This course is not eligible for Credit/D/Fail grading.

CPSC 533 (2-6) d Topics in Computer Graphics
   This course is not eligible for Credit/D/Fail grading.

CPSC 534 (2-6) d Topics in Data Management
   This course is not eligible for Credit/D/Fail grading.

CPSC 535 (2-6) d Topics in Simulation and Optimization
   This course is not eligible for Credit/D/Fail grading.

CPSC 536 (2-6) d Topics in Algorithms and Complexity
   This course is not eligible for Credit/D/Fail grading.

CPSC 537 (2-6) d Topics in Coding and Information Theory
   This course is not eligible for Credit/D/Fail grading.

CPSC 538 (2-6) d Topics in Computer Systems
   This course is not eligible for Credit/D/Fail grading.

CPSC 539 (2-6) d Topics in Programming Languages
   This course is not eligible for Credit/D/Fail grading.
CPSC 540 (3) Machine Learning  
This course is not eligible for Credit/D/Fail grading.

CPSC 542 (2-6) d Topics in Numerical Computation  
This course is not eligible for Credit/D/Fail grading.

CPSC 543 (3) Physical User Interface Design and Evaluation  
This course is not eligible for Credit/D/Fail grading.

CPSC 544 (3) Human Computer Interaction  
This course is not eligible for Credit/D/Fail grading.

CPSC 545 (3) Algorithms for Bioinformatics  
This course is not eligible for Credit/D/Fail grading.

CPSC 546 (3) Numerical Optimization  
This course is not eligible for Credit/D/Fail grading.

CPSC 547 (3) Information Visualization  
This course is not eligible for Credit/D/Fail grading.

CPSC 548 (3) Directed Study  
This course is not eligible for Credit/D/Fail grading.

CPSC 549 (6/12) c Master's Thesis  
This course is not eligible for Credit/D/Fail grading.

CPSC 550 (3) Machine Learning II  
This course is not eligible for Credit/D/Fail grading.

CPSC 554 (2-6) d Topics in Human-Computer Interaction  
This course is not eligible for Credit/D/Fail grading.

CPSC 564 (3) Data Mining  
This course is not eligible for Credit/D/Fail grading.

CPSC 589 (3) M.Sc. Major Essay  
This course is not eligible for Credit/D/Fail grading.

CPSC 590 (3) Research Methods in Computer Science  
This course is not eligible for Credit/D/Fail grading.

CPSC 649 (0) Doctoral Dissertation

Creative Writing Program, Faculty of Arts

CRWR: Creative Writing

For admission requirements for all courses see Creative Writing entry under Arts.

CRWR 200 (3) Introduction to Creative Writing  
Techniques of and practice in multiple genres of writing, including fiction, poetry, creative nonfiction, screenplay, stageplay, graphic forms, lyric forms, children's literature, and writing for new media. Manuscript submission is not required for admission.

CRWR 201 (3) Introduction to Writing Poetry  
An exploration of and practice in the writing of poetry, focusing on how a writer employs the technical elements of the craft of poetry. Manuscript submission not required for admission.

CRWR 203 (3) Introduction to Writing for Children and Young Adults  
Techniques of and practice in creating, developing and writing for children and young adults. Manuscript submission is not required for admission.

CRWR 205 (3) Introduction to Writing Creative Nonfiction  
An exploration of and practice in the writing of creative nonfiction, focusing on how a writer employs the technical elements of the
craft of creative nonfiction. Manuscript submission not required for admission.

**CRWR 206 (3) Introduction to Writing for the Screen**
Techniques of and practice in creating, developing, and writing a screenplay. Manuscript submission is not required for admission.

**CRWR 208 (3) Introduction to Writing for Graphic Forms**
Techniques of and practice in creating, developing, and writing the graphic novel, manga, and other forms of illustrated writing. The ability to draw is not required. Manuscript submission is not required for admission.

**CRWR 209 (3) Introduction to Writing Fiction**
An exploration of the writing of fiction, focusing on how a writer employs the technical elements of the craft of fiction. Manuscript submission not required for admission.

**CRWR 213 (3) Introduction to Writing for the New Media**
An exploration of and practice in writing for new media, including podcasting, blogging, and writing for websites, games, and online environments. Manuscript submission is not required for admission.

**CRWR 216 (3) Short Screenplay Workshop**
Restricted to B.F.A. Film Production students.

**CRWR 220 (3/6) d Introduction to Creative Writing with an Indigenous Focus**
Covers three genres from fiction, poetry, creative nonfiction, radio drama, radio feature, or stageplay.

**CRWR 230 (3) Introduction to Writing for Comedic Forms**
An examination of and practice in creative writing in comedic forms, including stand-up, sketch, film, new media, and text. Manuscript submission not required for admission.

**CRWR 301 (3) Intermediate Writing Poetry**
The writing of poetry in various forms using a combination of workshopping and online modules. Manuscript submission not required for admission.
Prerequisite: CRWR 201.

**CRWR 302 (3) Writing for Podcast**
Exploration of and practice in writing for podcast.
Prerequisite: CRWR 213.

**CRWR 303 (3) Intermediate Writing for Children and Young Adults**
The writing of work for children and young adults in various forms using a combination of workshopping and online modules. Manuscript submission not required for admission.
Prerequisite: CRWR 203.

**CRWR 305 (3) Intermediate Writing of Creative Nonfiction**
An exploration of and practice in the writing of creative non-fiction, covering four of the more basic forms of this genre: memoir, profile, commentary, and exposition. Manuscript submission is not required for admission.
Prerequisite: CRWR 205.

**CRWR 306 (3) Intermediate Writing for the Screen**
An exploration of and practice in writing for the screen, focusing on how a writer employs the technical elements of the craft of screenwriting. Manuscript submission is not required for admission.
Prerequisite: CRWR 206.

**CRWR 307 (3) Intermediate Writing for the Stage and Radio**
An exploration of practice in the writing of the one-act stage play and short radio drama, focusing on how a writer employs the technical elements of the craft of these dramatic genres. Manuscript submission is not required for admission.
Prerequisite: One of CRWR 200, CRWR 202.

**CRWR 308 (3) Intermediate Writing for Graphic Forms**
The writing of graphica (comics, manga and graphic novels), using a combination of workshopping and online modules. Manuscript submission not required for admission.
Prerequisite: CRWR 208.

**CRWR 309 (3) Intermediate Writing Fiction**
An exploration of the writing of fiction, focusing on how a writer employs the technical elements of the craft of fiction. Manuscript submission not required for admission.
Prerequisite: CRWR 209.

CRWR 310 (3) Video Game Writing and Narrative
Narrative design and writing for video games.
Prerequisite: CRWR 200.

CRWR 311 (3) Intermediate Writing for Lyric Forms
Techniques of and practice in writing for lyric forms, including song lyrics, lyrical narratives, and libretti. Manuscript submission is not required for admission.
Prerequisite: One of CRWR 200, CRWR 202.

CRWR 351 (3/9) d Intermediate Poetry Workshop
An intermediate level workshop class in writing poetry. Manuscript submission is not required for admission.
Prerequisite: CRWR 301.

CRWR 353 (3/9) d Intermediate Children and Young Adult Writing Workshop
An intermediate level workshop class in writing for children and young adults. Manuscript submission is not required for admission.
Prerequisite: CRWR 303.

CRWR 355 (3/9) d Intermediate Creative Nonfiction Workshop
An intermediate level workshop class in writing of creative nonfiction. Manuscript submission is not required for admission.
Prerequisite: CRWR 305.

CRWR 356 (3/9) d Intermediate Screenplay Workshop
An intermediate level workshop class in writing for the screen. Manuscript submission is not required for admission.
Prerequisite: CRWR 306.

CRWR 358 (3/9) d Intermediate Graphic Forms Workshop
An intermediate level workshop class in writing for graphic forms. The ability to draw is not required. Manuscript submission is not required for admission.
Prerequisite: CRWR 308.

CRWR 359 (3/9) d Intermediate Fiction Workshop
An intermediate level workshop class in writing of fiction. Manuscript submission is not required for admission.
Prerequisite: CRWR 309.

CRWR 401 (3-12) d Writing Poetry I
A workshop class in the writing of poetry.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 402 (3-12) d Writing for New Media I
An advanced workshop class in writing for new media. Restricted to Majors in Creative Writing.

CRWR 403 (3-12) d Writing for Children and Young Adults I
A workshop class in writing for Children and Young Adults.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 404 (3-12) d Writing for Radio I
A workshop class in writing for the radio.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 405 (3-12) d Writing Creative Nonfiction I
A workshop class in writing creative nonfiction, focused on some of the more popular forms of creative nonfiction: autobiography, rhetoric (commentary), literary journalism, and the personal essay.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 406 (3-12) d Writing for the Screen I
A workshop class in writing for the screen.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 407 (3-12) d Writing of Drama for the Stage I
A workshop class in writing of drama for the stage. Studio work is required, and some plays may be given a live stage production in Brave New Play Rites (adjudication process involved).
Prerequisite: Restricted to Majors in Creative Writing.
CRWR 408 (3-12) d Writing for Graphic Forms I
A workshop class in the writing of graphic novel, manga, and other forms of illustrated writing. The ability to draw is not required.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 409 (3-12) Writing Fiction I
A workshop class in the writing of fiction.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 411 (3-12) d Writing for Lyric Forms I
A workshop class exploring the words that accompany music in varied forms including pop, art, musical theatre, and opera.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 415 (3/6) d Workshop in Literary Translation I
Where a language department is regularly consulted on a project, the language adviser may assign marks equal to 3 credits of the course.
Prerequisite: Proficiency in a language other than English.

CRWR 416 (3-12) d Writing for Television I
A workshop class in writing for television.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 417 (3-12) d Play Development Workshop
An interdisciplinary course, in cooperation with the Theatre program, emphasizing script development through scene work, character development and stagecraft.
Prerequisite: Manuscript submission or equivalent theatre experience.

CRWR 430 (3) Preparation for a Career in Writing
Credit will be granted for only one of CRWR 430 or CRWR 530.

CRWR 440 (3/6) d Interdisciplinary Projects
Group projects and workshops with students majoring in other creative arts.
Prerequisite: Permission of instructor.
Equivalency: THTR 469, VISA 469, MUSC 469.

CRWR 441 (3-12) d Writing Poetry II
An advanced workshop class in writing poetry. Assumes a greater level of experience in writing poetry than CRWR 401.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 451 (3-12) d Writing for New Media II
An advanced workshop class in writing for new media. Assumes a greater level of experience in writing for new media than CRWR 402.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 452 (3-12) d Writing for Children and Young Adults II
An advanced workshop class in writing for children and young adults. Assumes a greater level of experience in this form than CRWR 403.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 453 (3-12) d Writing for Radio II
An advanced workshop class in writing for the radio. Assumes a greater level of experience in writing for the radio than CRWR 404.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 454 (3-12) d Writing Creative Nonfiction II
An advanced workshop class focusing on memoir, biography, rhetoric, literary journalism, the personal essay, and some hybrid forms of creative nonfiction. Includes instruction in researching and interviewing techniques. Assumes more writing experience than CRWR 405.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 455 (3-12) d Writing for the Screen II
An advanced workshop class in writing for the screen. Assumes more experience in this form that CRWR 406. Admission is restricted to B.F.A.
Prerequisite: Restricted to Majors in Creative Writing.
CRWR 457 (3-12) d Writing of Drama for the Stage II
An advanced workshop class in writing drama for the stage. Studio work is required. Assumes a greater level of experience in writing drama for the stage than CRWR 407.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 458 (3-12) d Writing for Graphic Forms II
An advanced workshop class in writing for graphic forms. The ability to draw is not required. Assumes a greater level of experience in writing graphic forms than CRWR 408.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 459 (3-12) d Writing Fiction II
An advanced workshop class in writing fiction. Assumes a greater level of experience in writing fiction than CRWR 409.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 460 (3-12) d Workshop in Literary Translation II
Prerequisite: CRWR 415.

CRWR 461 (3-12) d Writing for Lyric Forms II
An advanced workshop class in writing for lyric forms. Assumes a greater level of experience in writing lyrics than CRWR 411.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 466 (3-12) d Writing for Television II
An advanced workshop class in writing for television. Assumes a greater level of experience in writing fiction than CRWR 416.
Prerequisite: Restricted to Majors in Creative Writing.

CRWR 470 (3-12) c Special Projects in Creative Writing
For students who receive permission to do advanced work on a specific project. Admission is restricted to B.F.A. Majors in Creative Writing.

CRWR 471 (3-12) c Special Projects in Writing Poetry
For students who receive departmental permission to do advanced work in this genre.

CRWR 473 (3-12) c Special Projects in Writing for Children
For students who receive departmental permission to do advanced work in this genre.

CRWR 474 (3-12) c Special Projects in Writing Drama for Radio
For students who receive departmental permission to do advanced work in this genre.

CRWR 475 (3-12) c Special Projects in Writing Non-Fiction
For students who receive departmental permission to do advanced work in this genre.

CRWR 476 (3-12) c Special Projects in Writing for Screen and Television
For students who receive departmental permission to do advanced work in this genre.

CRWR 477 (3-12) c Special Projects in Writing Drama for the Stage
For students who receive departmental permission to do advanced work in this genre.

CRWR 479 (3-12) c Special Projects in Writing Fiction
For students who receive departmental permission to do advanced work in this genre.

CRWR 480 (3-12) c Special Projects in Literary Translation
For students who receive departmental permission to do advanced work in translation.

CRWR 490 (3-12) c Directed Reading
The course will emphasize current trends and techniques rather than critical evaluation. Not offered every year.

CRWR 501 (3-12) d Advanced Writing of Poetry I
This course is not eligible for Credit/D/Fail grading.

CRWR 502 (3-12) d Advanced Writing for New Media I
This course is not eligible for Credit/D/Fail grading.

CRWR 503 (3-12) d Advanced Writing for Children I
This course is not eligible for Credit/D/Fail grading.

CRWR 504 (3-12) d Advanced Writing for Radio I
This course is not eligible for Credit/D/Fail grading.
CRWR 505 (3-12) d Advanced Writing of Creative Non-Fiction I
This course is not eligible for Credit/D/Fail grading.

CRWR 506 (3-12) d Advanced Writing of Drama for Screen I
This course is not eligible for Credit/D/Fail grading.

CRWR 507 (3-12) d Advanced Writing of Drama for the Stage I
This course is not eligible for Credit/D/Fail grading.

CRWR 508 (3-12) d Advanced Writing for Graphic Forms I
This course is not eligible for Credit/D/Fail grading.

CRWR 509 (3-12) d Advanced Writing of Fiction I
This course is not eligible for Credit/D/Fail grading.

CRWR 511 (3-12) d Advanced Writing for Lyric Forms I
This course is not eligible for Credit/D/Fail grading.

CRWR 514 (3-12) d Advanced Writing for Television I
This course is not eligible for Credit/D/Fail grading.

CRWR 515 (3/6) d Advanced Workshop in Literary Translation I
This course is not eligible for Credit/D/Fail grading. Prerequisite: Proficiency in a language other than English.

CRWR 517 (3-12) d Advanced Play Development Workshop
An interdisciplinary course, in co-operation with the Acting and the M.F.A. Directing programs in Theatre, emphasizing script development through scenework, character development, and stagecraft. This course is not eligible for Credit/D/Fail grading. Prerequisite: Manuscript submission or equivalent theatre experience.

CRWR 520 (3-12) d Editing and Managing a Literary Magazine
This course is not eligible for Credit/D/Fail grading. Prerequisite: Permission of the instructor is required.

CRWR 530 (3) Preparation for a Career in Writing
Credit will be granted for only one of CRWR 430 or CRWR 530. This course is not eligible for Credit/D/Fail grading.

CRWR 550 (3-12) d Teaching Creative Writing
This course is not eligible for Credit/D/Fail grading.

CRWR 551 (3-12) d Advanced Writing Poetry II
This course is not eligible for Credit/D/Fail grading.

CRWR 552 (3-12) d Advanced Writing for New Media II
This course is not eligible for Credit/D/Fail grading.

CRWR 553 (3-12) d Advanced Writing for Children II
This course is not eligible for Credit/D/Fail grading. Prerequisite: CRWR 503.

CRWR 554 (3-12) d Advanced Writing for Radio II
This course is not eligible for Credit/D/Fail grading. Prerequisite: CRWR 504.

CRWR 555 (3-12) d Advanced Writing of Non-Fiction II
This course is not eligible for Credit/D/Fail grading. Prerequisite: CRWR 505.

CRWR 556 (3-12) d Advanced Writing for the Screen II
This course is not eligible for Credit/D/Fail grading.

CRWR 557 (3-12) d Advanced Writing of Drama for the Stage II
This course is not eligible for Credit/D/Fail grading.

CRWR 558 (3-12) d Advanced Writing for Graphic Forms II
This course is not eligible for Credit/D/Fail grading.

CRWR 559 (3-12) d Advanced Writing Fiction II
This course is not eligible for Credit/D/Fail grading.

CRWR 560 (3-12) d Advanced Workshop in Literary Translation II
This course is not eligible for Credit/D/Fail grading. Prerequisite: CRWR 515.

CRWR 561 (3-12) d Advanced Writing for Lyric Forms II
This course is not eligible for Credit/D/Fail grading.

CRWR 566 (3-12) d Advanced Writing for Television II
This course is not eligible for Credit/D/Fail grading. Prerequisite: CRWR 514.

CRWR 570 (3-12) d Advanced Special Projects in Creative Writing
This course is not eligible for Credit/D/Fail grading.

CRWR 590 (3-12) c Directed Reading
This course is not eligible for Credit/D/Fail grading.

CRWR 599 (6) Thesis
This course is not eligible for Credit/D/Fail grading.

Gender, Race, Sexuality and Social Justice, Faculty of Arts

CSIS: Critical Studies in Sexuality

CSIS 200 (3) Critical Engagements in Sexuality Studies
Introductory survey to sexuality studies that emphasizes how sexuality intersects with race, gender, class, ability, and geography.
Prerequisite: GRSJ 101.

CSIS 300 (3/6) d Introduction to Critical Studies in Sexuality
A multidisciplinary, team-taught course which provides an introduction to the study of sexuality, including lesbian, gay, bisexual, heterosexual, and transgender issues and related topics.

CSIS 301 (3) Introduction to Trans* Studies
How race, citizenship, gender, sexuality, culture and dis/ability are materially and socially constructed together to give meaning to the category trans*. (Trans*: transgender, transsexual, gender variant and other articulations.)
Prerequisite: GRSJ 101.

CSIS 450 (3-6) d Topics in Critical Studies in Sexuality
A thematic course, which explores current questions and issues in relation to the study of sexuality. Topics may vary from year to year.

CSIS 490 (3/6) d Directed Topics
Designed to allow a student to develop an individual course of study in a specific area as approved by a faculty member affiliated with the CSIS program.

CSIS 500 (3/6) d Critical Studies in Sexuality: Multidisciplinary Approaches
This course is not eligible for Credit/D/Fail grading.

Coordinated Science Program, Faculty of Science

CSPW: Coordinated Science Program Workshop

CSPW 100 (1) Coordinated Science Program Workshop
Students participate in activities related to their CSP courses, including hands-on work, discussion and analysis of scientific topics. Graded Pass/Fail. This course is not eligible for Credit/D/Fail grading. [0-0-2]
Prerequisite: Registration in Coordinated Science Program

French, Hispanic and Italian Studies, Faculty of Arts

CTLN: Catalan

CTLN 301 (3) Catalan Language and Culture
Introduction to the Catalan language and important aspects of the culture of Catalonia. Languages of instruction: English and Catalan.
Prerequisite: Familiarity with another Romance language.

Central, Eastern and Northern European Studies, Faculty of Arts

**DANI: Danish**

DANI 100 (3) Elementary Danish I
DANI 110 (3) Elementary Danish II
DANI 200 (3) Intermediate Danish I
DANI 210 (3) Intermediate Danish II

Faculty of Dentistry

**DENT: Dentistry**

DENT 407 (6) Special Oral Care in the Community
Provision of special oral health services in community settings.
Prerequisite: All of DHYG 405, DHYG 435. Prerequisites may be waived for non-program dental hygienists and others.

DENT 410 (35) Dentistry I: Foundations of Clinical Dentistry
Fundamentals of human biology, body systems, diseases, and supporting basic oral health sciences. Learning in small groups, classroom, laboratory, and clinical settings utilizing technology. Professionalism, ethics, inter-professional education and the social contract, communication skills, and critical evaluation of the literature. Begin to apply foundation knowledge and skills to patient assessment and care. This course is not eligible for Credit/D/Fail grading.

DENT 420 (38) Dentistry II: Basic Clinical Dentistry
Continued exposure to body systems and the supporting biomedical sciences with applications in dental clinical sciences, integrated into small group learning, classroom, laboratory, and community settings utilizing technology; continued engagement in professionalism, ethics and communication skills. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DENT 410.

DENT 430 (36) Dentistry III: Intermediate Clinical Dentistry
A multi-disciplinary course integrating didactic, simulation, clinical, and community service learning. Students function as team members in clinical group practices with individual progression through the Clinical Clerkships.
Prerequisite: DENT 420.

DENT 440 (32) Dentistry IV: Complex Clinical Dentistry
A continuing integrated, multi-disciplinary course with ongoing participation in clinical group practices and individual progression through the Clinical Clerkships and community service learning. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DENT 430.

DENT 504 (1) Endodontic Microsurgery
Treatment planning, instruments, techniques, materials, prognosis, and evaluation of results. Lectures, seminars, and simulation training.
This course is not eligible for Credit/D/Fail grading. [1-1-0]

DENT 505 (1) Dental Traumatology
Dental trauma and tooth resorptions: etiology, pathogenesis, epidemiology, diagnosis, and treatment. Lectures, seminars, and simulation training.
This course is not eligible for Credit/D/Fail grading. [1-1-0]

DENT 506 (6) Topics in Dental Public Health I (Critical Literature Review)
This course is not eligible for Credit/D/Fail grading.

DENT 507 (6) Topics in Dental Public Health II (Critical Literature Review)
This course is not eligible for Credit/D/Fail grading. Prerequisite: DENT 506.

DENT 508 (6) Public Health Rotations I
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of DENT 506, DENT 507.

DENT 509 (6) Public Health Rotations II
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of DENT 506, DENT 507, DENT 508.

DENT 510 (6) Pediatric Dentistry Literature Review I
Continues in year 2. This course is not eligible for Credit/D/Fail grading.

DENT 511 (6) Pediatric Dentistry Literature Review II
Continues in year 3. This course is not eligible for Credit/D/Fail grading.

DENT 512 (6) Pediatric Dentistry Literature Review III
Continues in year 3. This course is not eligible for Credit/D/Fail grading.

DENT 513 (6) The Pediatric Patient I
Continues in year 2. This course is not eligible for Credit/D/Fail grading.

DENT 514 (6) The Pediatric Patient II
Continues in year 3. This course is not eligible for Credit/D/Fail grading.

DENT 515 (6) The Pediatric Patient III
This course is not eligible for Credit/D/Fail grading.

DENT 516 (3) Pediatric Dentistry Case Review and Treatment Planning I
Continues in year 2. This course is not eligible for Credit/D/Fail grading.

DENT 517 (3) Pediatric Dentistry Case Review and Treatment Planning II
Continues in year 3. This course is not eligible for Credit/D/Fail grading.

DENT 518 (3) Pediatric Dentistry Case Review and Treatment Planning III
This course is not eligible for Credit/D/Fail grading.

DENT 523 (6) Oral Medicine II
This course is not eligible for Credit/D/Fail grading. [0-6-3]

DENT 524 (6) Craniofacial Growth and Development
This course is not eligible for Credit/D/Fail grading.

DENT 525 (6) Prosthodontic Literature Review I
This course is not eligible for Credit/D/Fail grading.

DENT 526 (6) Prosthodontic Literature Review II
This course is not eligible for Credit/D/Fail grading.

DENT 527 (6) Prosthodontic Treatment Planning and Outcomes Seminars I
This course is not eligible for Credit/D/Fail grading.

DENT 528 (6) Prosthodontic Treatment Planning and Outcomes Seminars II
This course is not eligible for Credit/D/Fail grading.

DENT 529 (6) Prosthodontic Treatment Planning and Outcomes Seminars III
This course is not eligible for Credit/D/Fail grading.

DENT 530 (3) Maxillofacial Prosthodontics
This course is not eligible for Credit/D/Fail grading.

DENT 531 (6) Biomaterials
This course is not eligible for Credit/D/Fail grading.

DENT 532 (6) Prosthodontics I
This course is not eligible for Credit/D/Fail grading.

DENT 533 (6) Prosthodontics II
This course is not eligible for Credit/D/Fail grading.

DENT 539 (3) Statistical Methods
This course is not eligible for Credit/D/Fail grading.

DENT 540 (3) Research Methods
This course is not eligible for Credit/D/Fail grading.

DENT 541 (6) Craniofacial Biology
This course is not eligible for Credit/D/Fail grading. [3-0]

DENT 542 (1.5) Oral Cell Biology and Biochemistry
This course is not eligible for Credit/D/Fail grading.

DENT 543 (3) Advanced Occlusion and Articulation
This course is not eligible for Credit/D/Fail grading. [3-0]

DENT 544 (1.5) Oral Microbiology and Immunology
This course is not eligible for Credit/D/Fail grading.

DENT 553 (3) Oral Medicine I
This course is not eligible for Credit/D/Fail grading. [0-6-3]

DENT 555 (2) Oral Pathology
This course is not eligible for Credit/D/Fail grading.

DENT 556 (2) Oral Radiology
This course is not eligible for Credit/D/Fail grading.

DENT 557 (6) Advanced Oral Radiology
This course is not eligible for Credit/D/Fail grading. [0-6-3]

DENT 561 (2-6) Directed Studies in Dental Sciences
This course is not eligible for Credit/D/Fail grading.

DENT 565 (8) Biomechanics of Craniofacial Orthopedics and Orthodontics I
Continues in second year. This course is not eligible for Credit/D/Fail grading.

DENT 566 (8) Biomechanics of Craniofacial Orthopedics and Orthodontics II
This course is not eligible for Credit/D/Fail grading.

DENT 567 (8) Orthodontic and Craniofacial Orthopedic Patient Care I
Continues in second year. This course is not eligible for Credit/D/Fail grading.

DENT 568 (8) Orthodontic and Craniofacial Orthopedic Patient Care II
Continues in third year. This course is not eligible for Credit/D/Fail grading.

DENT 569 (8) Orthodontic and Craniofacial Orthopedic Patient Care III
This course is not eligible for Credit/D/Fail grading.

DENT 570 (2) Periodontal Case Management
This course is not eligible for Credit/D/Fail grading.

DENT 572 (3/6) Literature Review in Periodontics
This course is not eligible for Credit/D/Fail grading.

DENT 573 (3/6) Literature Review in Periodontics II
This course is not eligible for Credit/D/Fail grading.

DENT 574 (1) Periodontic Treatment Planning Seminars
This course is not eligible for Credit/D/Fail grading.

DENT 575 (3) Implant Therapy
This course is not eligible for Credit/D/Fail grading.

DENT 576 (2) Guided Tissue Regeneration
This course is not eligible for Credit/D/Fail grading.

DENT 577 (3-6) Advanced Topics in Restorative Therapy
This course is not eligible for Credit/D/Fail grading.

DENT 578 (6) Endodontic Literature Review I
Dental anatomy, morphology, endodontic instruments, diagnosis and differential diagnosis, etiology and pathogenesis of endodontic infections, and strategies of infection control. This course is not eligible for Credit/D/Fail grading. [2-0-0]

DENT 584 (6) Endodontic Literature Review II
Endodontic epidemiology, materials, prognosis of treatment, geriatric endodontics, complications, treatment resistant infections, and endo-perio lesions. This course is not eligible for Credit/D/Fail grading. [2-0-0]
DENT 591 (1) Endodontic Case Management I
Modern endodontic technology and clinical endodontics. Lectures, seminars, and simulation training. This course is not eligible for Credit/D/Fail grading. [1-1-0]

DENT 592 (1) Endodontic Case Management II
Modern endodontic technology and clinical endodontics. Lectures, seminars, and simulation training. This course is not eligible for Credit/D/Fail grading. [1-1-0]

DENT 594 (5) Endodontic Case Review and Treatment Planning I
Student case presentations, treatment choice, and evaluation of prognosis. This course is not eligible for Credit/D/Fail grading. [0-0-2]

DENT 595 (5) Endodontic Case Review and Treatment Planning II
Student case presentations, treatment choice, and evaluation of prognosis. This course is not eligible for Credit/D/Fail grading. [0-0-2]

DENT 596 (5) Endodontic Case Review and Treatment Planning III
Student case presentations, treatment choice, and evaluation of prognosis. This course is not eligible for Credit/D/Fail grading. [0-0-2]

DENT 599 (18) M.Sc. Thesis
Enrolment restricted to graduate students in Dental Science. This course is not eligible for Credit/D/Fail grading.

DENT 649 (0) Doctoral Dissertation

DENT 700 (0) Directed Studies in Orthodontics

DENT 703 (0) Inter-relationship of Dental and Medical Specialties with Imaging Procedures

DENT 706 (0) Forensic Odontodontology

DENT 711 (12) Clinical Periodontics and Implant Surgery I
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 712 (12) Clinical Periodontics and Implant Surgery II
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 713 (12) Clinical Periodontics and Implant Surgery III
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 715 (0) Periodontal Therapy Seminars

DENT 720 (0) Review of Oral Radiology Literature

DENT 721 (8) Clinical Endodontics, Year 1
Endodontic treatment of patients in the clinic under the supervision of specialist instructors. Supervised endodontic treatment clinic. This course is not eligible for Credit/D/Fail grading. [0-0-18]

DENT 722 (8) Clinical Endodontics, Year 2
Endodontic treatment of patients in the clinic under the supervision of specialist instructors. Supervised endodontic treatment clinic. This course is not eligible for Credit/D/Fail grading. [0-0-18]

DENT 723 (0) Prescription Periodontal Surgery

DENT 724 (6) Clinical Endodontics, Year 3
Endodontic treatment of patients in the clinic under the supervision of specialist instructors. Supervised endodontic treatment clinic. This course is not eligible for Credit/D/Fail grading. [0-0-15]

DENT 725 (12) Clinical Prosthodontics I
This course is not eligible for Credit/D/Fail grading.

DENT 726 (12) Clinical Prosthodontics II
This course is not eligible for Credit/D/Fail grading.

DENT 727 (12) Clinical Prosthodontics III
This course is not eligible for Credit/D/Fail grading.

DENT 729 (0) Hospital Dentistry and Anaesthesiology
DENT 734 (0) Clinico-Pathological Conferences
DENT 740 (0) Clinical Dentistry
DENT 741 (0) Specialty Rotations
DENT 742 (0) Emergency Patient Management
DENT 743 (0) Seminars on Hospital Dentistry
DENT 744 (0) Directed Studies in Hospital Dentistry
DENT 750 (0) Head and Neck Oncology
DENT 752 (0) Oral Surgical Pathology
DENT 753 (0) Clinical Oral Medicine
DENT 755 (0) Oral Radiographic Techniques
DENT 756 (0) Oral Radiology
DENT 757 (0) Oral Radiological Interpretation
DENT 760 (0) Oral Cytology
DENT 769 (3) Foundation of Teaching and Learning for Dental Graduate Student Instructors (GSIs)
Preparation of dental graduate instructors to be effective teachers in dentistry. Spans from August of year 1 to August of year 2 for first year dental graduate students. This course is not eligible for Credit/D/Fail grading.

DENT 770 (0) Advanced Clinical Orthodontics

DENT 771 (8) Orthodontic and Dentofacial Orthopedic Clinics I
Continues in second year. This course is not eligible for Credit/D/Fail grading.

DENT 772 (12) Orthodontic and Dentofacial Orthopedic Clinics II
Continues in third year. This course is not eligible for Credit/D/Fail grading.

DENT 773 (8) Orthodontic and Dentofacial Orthopedic Clinics III
This course is not eligible for Credit/D/Fail grading.

DENT 775 (2/4) d Interdisciplinary Care in Orthodontics and Dentofacial Orthopedics
This course is not eligible for Credit/D/Fail grading.

DENT 777 (1) Interdisciplinary Graduate Seminars: Interdisciplinary Treatment Planning I
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 778 (1) Interdisciplinary Graduate Seminars: Interdisciplinary Treatment Planning II
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 779 (2) Interdisciplinary Graduate Seminars: Interdisciplinary Treatment Planning III
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DENT 780 (12) Clinical Pediatric Dentistry I
Continues in year 5. This course is not eligible for Credit/D/Fail grading.

DENT 781 (12) Clinical Pediatric Dentistry II
Continues in year 6. This course is not eligible for Credit/D/Fail grading.

DENT 782 (12) Clinical Pediatric Dentistry III
This course is not eligible for Credit/D/Fail grading.

DENT 783 (3) Hospital Clinical Pediatrics I
This course is not eligible for Credit/D/Fail grading.

DENT 784 (3) Hospital Clinical Pediatrics II
This course is not eligible for Credit/D/Fail grading.

DENT 785 (3) Hospital Clinical Pediatrics III
This course is not eligible for Credit/D/Fail grading.
School of Architecture and Landscape Architecture, Faculty of Applied Science

DES: Design

DES 101 (1) Introductory Workshop
Week long orientation to the School community, the City and the study of design one week prior to the start of Winter Session Term 1. Credit will be granted for only one of ENDS 101 or DES 101.

DES 110 (3) Measured Architectural Drawing
Techniques applicable to analytic and technical drawing used in architecture, landscape architecture, and urban design with focus primarily on analog drawing techniques. Open to all UBC students regardless of prior experience. Credit will be granted for only one of ENDS 110 or DES 110.

DES 200 (3) Design Thinking
Design thinking through the analysis of architecture, landscape architecture and urban design and through hands-on design projects. This course is open to all UBC students, regardless of prior experience. Credit will be granted for only one of ENDS 231 or DES 200. This course is not eligible for Credit/D/Fail grading.

DES 201 (6) Design Studio I - Context and Site
Design within the context of various analytical lenses including ecological, climatic, social, political, cultural and historical influences. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of DES 110, VISA 281.

DES 202 (6) Design Studio II - Form
Essential processes and methods for thinking in three-dimensional spatial terms. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A score of 60% or higher in DES 201.

DES 211 (3) Design Media I
Techniques in architectural drawing, two-dimensional representation, three-dimensional representation and general visual literacy. Credit will be granted for only one of ENDS 320, ARCH 515 or DES 211. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of DES 110, VISA 180.

DES 212 (3) Design Media II
Advanced techniques in architectural representation and discourse in digital representation and digital making. Credit will be granted for only one of ARCH 437, ARCH 517 or DES 212. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DES 211.

DES 220 (3) Architecture in Context: Vancouver and its Region
The unfolding architecture and urbanism of Metro Vancouver. Using Vancouver as a laboratory to examine the historical transformation of the built environment, and how this has affected particular activities, land uses, and social groups within the region. This course is open to all UBC students, regardless of prior experience. Credit will be granted for only one of ENDS 220 or DES 220.

DES 230 (3) Sustainability by Design
Interactions between human and natural urban systems using local and international examples of successful sustainable community designs. This course is open to all UBC students, regardless of prior experience. Credit will be granted for only one of ENDS 221 or DES 230. This course is not eligible for Credit/D/Fail grading.

DES 231 (3) Site Analysis and Planning
Analysis and planning of relatively complex sites, emphasizing storm water management design. Credit will be given for only one of DES 231, LARC 440, or LARC 540. This course is not eligible for Credit/D/Fail grading.

DES 232 (3) Material Culture
An investigation of building materials and associated design objectives, environmental conditions, historical context, regulatory controls, and economic constraints. Credit will be granted for only one of DES 232 or ARCH 411. This course is not eligible for Credit/D/Fail grading.

DES 301 (9) Design Studio III - Building Scale Synthesis
Design at the architectural scale through the medium of program and site. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A score of 60% or higher in DES 202.
DES 302 (9) Design Studio IV - Vancouver
Vancouver as a laboratory for design at the architectural and urban scale with a focused view into how design is implicated in the social, political, and environmental transformation of the city. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A score of 60% or higher in DES 301.

DES 321 (3) Architectural History I
A global history of architecture pre-20th century. Credit will be granted for only one of DES 321, ARCH 404 or ARCH 505. This course is not eligible for Credit/D/Fail grading.

DES 322 (3) Architectural History II
A global history of architecture, 20th and 21st century. Credit will be granted for only one of DES 322, ARCH 405, or ARCH 505. This course is not eligible for Credit/D/Fail grading.

DES 323 (3) Histories in Landscape Architecture
Landscapes from medieval times to the present studied synchronically across design elements as well as chronologically with the development of several key historical concepts. This course is not eligible for Credit/D/Fail grading.

DES 330 (3) Structural Systems and Supports
Basic structural systems in the built world including wood, steel, concrete, composite systems and essential structural logics of soil retention systems and drainage. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DES 231, DES 232.

DES 341 (6) Co-operative Education I
Supervised, technical work experience in an established company or organization for a minimum of three months. Experiential Report required. Restricted to students meeting the requirements of the Bachelor of Design and the Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

DES 350 (3) Design Build
Direct hands-on confrontation with the realities of design and construction, engaging in both conventional and unconventional building processes.
Prerequisite: DES 302.

DES 401 (9) Design Studio V - Urban Systems Scale Synthesis
Relationships between communities and environment, urban infrastructure and ecological systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DES 302.

DES 402 (9) Design Studio VI - Away
A design project engaged with an international context and site. Emphasis placed on mapping, interpretation of the international context as well as methods of construction, notions of program, and policies, regulations and codes that relate to the site. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A score of 60% or higher in DES 401.

DES 403 (9) Senior Design Project
Final design project in the Honours Option with an independently conceived methodology allowing a student the opportunity to pursue his/her own set of interests and concerns. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A score of 80% or higher in DES 401.

DES 421 (3) Design Theory
Introduction to a broad range of theories in architecture and design as they relate to the built environment. This course is not eligible for Credit/D/Fail grading.

DES 422 (3) Urbanism by Design
A history of the planning, landscape architecture and urban design of cities, and of how ideas have influenced the design of the city. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Two of DES 321, DES 322, DES 323.

DES 430 (3) Environment, Urban Form, and Infrastructure
Relationships between, and integration of, the natural environment and the physical form, spatial structure, and infrastructure of livability of cities. This course is not eligible for Credit/D/Fail grading.

DES 442 (6) Co-operative Education II
Supervised, technical work experience in an established company or organization for a minimum of three months. Career Development Report required. Restricted to students meeting the requirements of the Bachelor of Design and the Co-operative
Education Program

This course is not eligible for Credit/D/Fail grading.

Prerequisite: DES 341.

**DES 443 (6) Co-operative Education III**

Supervised, technical work experience in an established company or organization for a minimum of three months. Oral Presentation required. Restricted to students meeting the requirements of the Bachelor of Design and the Co-operative Education Program

This course is not eligible for Credit/D/Fail grading.

Prerequisite: DES 442.

**DES 444 (6) Co-operative Education IV**

Supervised, technical work experience in an established company or organization for a minimum of three months. Oral Presentation required. Restricted to students meeting the requirements of the Bachelor of Design and the Co-operative Education Program

This course is not eligible for Credit/D/Fail grading.

Prerequisite: DES 443.

**DES 445 (3) Entrepreneurship and Ethics in Design**

Core business skills, building on students' design capabilities to pursue ethical and sustainable design-based business goals. This course is not eligible for Credit/D/Fail grading.

**DES 450 (1-9) d Special Topics**

This course is not eligible for Credit/D/Fail grading.

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**Faculty of Dentistry**

**DHYG: Dental Hygiene**

**DHYG 106 (3) Basics of Oral Microbiology**

Basic principles in the study of microorganisms and their relation to human health for dental hygiene students.

**DHYG 108 (3) Oral Health Sciences I**

An introduction to normal, healthy facial, oral, and dental structures; oral health records, and charting terminology and symbols.

**DHYG 110 (3) Dental Hygiene Theory & Practice I**

An introduction to the Dental Hygiene profession, practice roles and the process of care model.

**DHYG 206 (3) Head & Neck Anatomy**

Prerequisite: All of BIOL 153, DHYG 108.

**DHYG 208 (12) Oral Health Sciences II**

An introduction to disease-related concepts during the study of dental materials, general pathology, plaque biofilm, nutrition, radiology, periodontology, and oral pathology. This course is not eligible for Credit/D/Fail grading.

Prerequisite: DHYG 108.

**DHYG 210 (18) Dental Hygiene Theory and Practice II**

The study of dental hygiene theory and practice in clinical and community-based settings. This course is not eligible for Credit/D/Fail grading.

Prerequisite: DHYG 110.

**DHYG 308 (6) Oral Health Sciences III**

An introduction to concepts and principles of pharmacology and local anesthesia, and further study of oral medicine, oral pathology, and radiology.

Prerequisite: DHYG 208.

**DHYG 310 (18) Dental Hygiene Theory & Practice III**

The study of dental hygiene theory and practice with emphasis on diverse clients with oral health care needs. This course is not eligible for Credit/D/Fail grading.

Prerequisite: DHYG 210.

**DHYG 325 (3) Applied Pharmacology**

Applied pharmacology concepts and principles for the dental health professional.

**DHYG 400 (3/6) d Policy Analysis and Change**

Critical reviews of oral health care delivery, oral disease processes and dental hygiene. [3-0-0]
DHYG 401 (6) Oral Epidemiology  
Basic epidemiological and statistical concepts and tests relevant to evidence-based oral health practices.

DHYG 402 (6) Dental Hygiene Practice I  
Dental hygiene concepts, processes, and skills for individuals and communities. [3-0-0; 3-0-0]

DHYG 404 (6) Dental Hygiene Practice II  
Advanced dental hygiene concepts, processes and skills in community health, educational or institutional settings.

DHYG 405 (3) Oral Microbiology and Immunology  
Microbiology and immunological concepts relevant for dental hygiene practice.

DHYG 406 (6) Guided Study in Dental Hygiene  
Conduct an in-depth investigation of a health promotion issue. 
Prerequisite: All of DHYG 400, DHYG 401, DHYG 461. And Faculty approval.

DHYG 410 (18) Dental Hygiene Theory & Practice IV  
Critical analysis of dental hygiene theory and practice related to diverse clients with complex oral health care needs. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: DHYG 410.

DHYG 412 (6) Oral Health Care Trends & Topics  
Critical analysis of health care trends and oral health care delivery with emphasis on underserved diverse populations.

DHYG 433 (3) Assessment and Treatment Planning for Advanced Periodontal Diseases  
Available in online distance education format only.  
Corequisite: All of DHYG 401, DHYG 462.

DHYG 435 (3) Oral Medicine and Pathology  
Pathobiology of oral diseases. Available in online distance education format only.

DHYG 461 (4) Literature Review I  
[2-0-0]

DHYG 462 (4) Literature Review II  
A continuation of DHYG 461. [2-0-0]  
Corequisite: DHYG 401.

Digital Media, Faculty of Arts

DMED: Digital Media

DMED 500 (3) Foundations of Digital Entertainment  
Business, technological, social, and ethical issues of digital entertainment introduced and framed though historical exploration and critical analysis of economics, technical innovations, social demands, and ethical constraints involved. This course is not eligible for Credit/D/Fail grading.

DMED 501 (3) Visual Story  
The many facets of storytelling are explored, with an emphasis on development of narrative using shape, colour, line, texture, and composition, as well as text and sound. This course is not eligible for Credit/D/Fail grading.

DMED 502 (3) Improvising Story and Character  
Techniques of improvisational acting are used to develop collaborative and creative skills in building dramatic themes, narratives, and characters. This course is not eligible for Credit/D/Fail grading.

DMED 503 (3) Foundations of Game Design  
Analysis of games as rules, games as play, and games as culture. Students make both physical and electronic games as part of this course. This course is not eligible for Credit/D/Fail grading.

DMED 510 (3) Financing and Distribution of Digital Entertainment  
Methods of financing and distributing video games, mobile content, theatrical feature films, television projects, and series. Drafting and negotiating contracts and intellectual property law related to digital entertainment. This course is not eligible for Credit/D/Fail grading.
DMED 520 (6) Projects I: Building Virtual Worlds
Student teams design and implement an artifact in a virtual environment. Management and business aspects of team-based creation are studied. This course is not eligible for Credit/D/Fail grading.

DMED 521 (12) Projects II
This course is not eligible for Credit/D/Fail grading. Prerequisite: DMED 520.

DMED 522 (12) Projects III
Pre- or Co-requisite: DMED 521. This course is not eligible for Credit/D/Fail grading.

DMED 523 (12) Projects IV
Pre- or Co-requisite: DMED 522. This course is not eligible for Credit/D/Fail grading.

DMED 530 (6) Internship
Full-time work experience related to digital media or entertainment technology, outside the university. Students learn effective communication, collaboration, project management, and team cooperation. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

DMED 540 (3) Special Projects in Digital Media I
This course is not eligible for Credit/D/Fail grading.

DMED 541 (3) Special Projects in Digital Media II
This course is not eligible for Credit/D/Fail grading.

DMED 550 (3) Directed Studies in Digital Media
This course is not eligible for Credit/D/Fail grading.

Computer Science, Faculty of Science

DSCI: Data Science

DSCI 511 (1) Programming for Data Science
Pseudo-code. Program design and structure. Flow control. Iteration. Lists (arrays). Functions. File I/O. Classes, objects, methods, and libraries. This course is not eligible for Credit/D/Fail grading.

DSCI 512 (1) Algorithms and Data Structures
Basic algorithms. Recursion. Data structures including linked lists, queues, stacks, trees, graphs, and hash tables. Searching and sorting. Introduction to complexity including Big-O notation, efficiency, and scalability. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 513 (1) Databases and Data Retrieval
Relational schemas. SQL queries. Database programming using embedded SQL. XML and XQuery. This course is not eligible for Credit/D/Fail grading.

DSCI 521 (1) Computing Platforms for Data Science
Introduction to software, shells, tools, and file systems for use in the Data Science program. Installation, configuration, and use of statistical and programming software including Integrated Development Environments (IDEs). Problem resolution skills. This course is not eligible for Credit/D/Fail grading.

DSCI 522 (1) Data Science Workflows
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 523 (1) Data Wrangling
Manipulation of tabular and non-tabular data using software tools. Organizing, filtering, sorting, grouping, reformatting, converting, and cleaning data to prepare it for further analysis. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 524 (1) Collaborative Software Development
Software life cycle. Unit testing. Continuous integration. Submission to a relevant repository for distribution. Packaging for installation and use by others. Software licenses. Classes and abstraction. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 522.

DSCI 525 (1) Web and Cloud Computing
Networks and the Internet, scraping data, APIs, cloud computing, Web services for scalable computing, Web hosting, Web publication platforms, introduction to parallel computing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 522, DSCI 523.

DSCI 531 (1) Data Visualization I
Descriptive plots using statistical and programming software. Basics, mechanics, and principles of data visualization. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 532 (1) Data Visualization II
Interactive visualization, design choices, dynamic change over time, multiple views, data reduction, dealing with complexity. This course is not eligible for Credit/D/Fail grading.

DSCI 541 (1) Privacy, Ethics, and Security
Privacy and data. Ethics boards, legal issues, licensing. Physical and logical data security, social engineering. Encryption, data anonymization, privacy-preserving techniques. Case studies. This course is not eligible for Credit/D/Fail grading.

DSCI 542 (1) Communication and Argumentation
Claims, reasons, and evidence. Strengths and weaknesses of models. Effective oral and written presentation of scientific results, including interpretation of data and recognition of assumptions, bias, validity, and reliability. Citations, references, and peer-review. This course is not eligible for Credit/D/Fail grading.

DSCI 551 (1) Descriptive Statistics and Probability for Data Science
Descriptive statistics including measures of location and spread. Random variables, distributions, and parameters. Categorical variables. Uncertainty. Missing data. This course is not eligible for Credit/D/Fail grading.

DSCI 552 (1) Statistical Inference and Computation I
Random variables, parameters, observed data, statistics (distinctions and connections). Estimation: point and interval. Two-group comparisons, frequentist version. Simulation-based approaches. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 551.

DSCI 553 (1) Statistical Inference and Computation II
Multiple hypothesis testing, false discovery rate. Two-group comparisons, Bayesian paradigm. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 552.

DSCI 554 (1) Experimentation and Causal Inference
Prerequisite: All of DSCI 553, DSCI 561.

DSCI 561 (1) Regression I
Linear models: continuous response; one or more categorical covariates and/or one or more continuous covariates. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 552.

DSCI 562 (1) Regression II
Non-parametric regression and smoothing. Data-driven parameter selection. Robust regression. Mixed effects. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 561.

DSCI 563 (1) Unsupervised Learning
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 571 (1) Supervised Learning I
Decision trees. k-th nearest neighbour classifiers. Naive Bayes classifiers. Logistic regression. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 511, DSCI 521.

DSCI 572 (1) Supervised Learning II
Support Vector Machines. Random Forests. Ensemble Classifiers. Graphical models. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 571.

DSCI 573 (1) Feature and Model Selection
Prerequisite: DSCI 571.

DSCI 574 (1) Spatial and Temporal Models
Time series. State space and change point detection. Hidden Markov Models. Gaussian processes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 572.

DSCI 575 (1) Advanced Machine Learning
Neural networks trained with backpropagation. Deep learning. Overfitting and underfitting. Active data acquisition. Hyperparameter optimization. This course is not eligible for Credit/D/Fail grading.
Prerequisite: DSCI 572.

DSCI 591 (6) Capstone Project
A capstone design project designed to give students experience in leading complex multidisciplinary projects relevant to data science. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of DSCI 513, DSCI 524, DSCI 525, DSCI 532, DSCI 541, DSCI 542, DSCI 554, DSCI 563, DSCI 573, DSCI 574, DSCI 575.

Early Childhood Education, Faculty of Education

ECED: Early Childhood Education

ECED 380 (3-12) c Selected Topics in Infant Development and Supported Child Development
Formerly EPSE 380

ECED 400 (3) Introduction to Early Childhood Education and Care
This course is not eligible for Credit/D/Fail grading.

ECED 401 (3) Supporting Young Children's Health and Well-Being in Early Childhood Settings
This course is not eligible for Credit/D/Fail grading.

ECED 405 (1-3) d Foundations of Curriculum and Instruction in Early Childhood Education

ECED 406 (3) Early Learning Curriculum in the Pre-School Years
The development of pre-kindergarten programs with reference to recent research, theories of early learning, and curriculum trends and practices.

ECED 407 (3) Supporting Early Learning in the Pre-School Years
Planning and implementing pre-kindergarten learning experiences; resources, materials, curriculum integration, evaluation, scheduling, and classroom design.

ECED 415 (3) Supporting Learning in The Primary Years
Designing environments, experiences, activities, instruction, and assessment to foster children's learning in the primary years (grades 1-3).
Prerequisite: ECED 405 or teaching experience or successful completion of the extended practicum.

ECED 416 (3) Kindergarten Curriculum
The development of kindergarten programs with reference to recent research, theories of early learning, curriculum trends and practices, and the place of kindergarten in contemporary education.

ECED 417 (3) Supporting Learning in the Kindergarten Year
Designing environments, experiences, activities, instruction, and assessment to foster children's learning in the kindergarten...
year.
Prerequisite: One of ECED 405, ECED 416 or teaching experience, or successful completion of extended practicum.

ECED 420 (3) History of Early Childhood Education
Political and social factors which influenced movements and trends in early childhood education in North America, pre-kindergarten through primary.

ECED 421 (3) Supporting Young Children Through Home, School, and Community Relationships

ECED 425 (3/6) c Advanced Studies in Early Childhood Education
Prerequisite: One of ECED 405, or an introductory level early childhood education course, or teaching experience, or successful completion of extended practicum.

ECED 438 (3) Observation and Documentation in Early Childhood Settings

ECED 439 (3) Assessment of Infants and Young Children with Special Needs
(Formerly EPSE 420).

ECED 440 (3) Supporting Social and Communication Development in Infants and Young Children with Special Needs
(Formerly EPSE 440).

ECED 441 (3) Early Intervention for Infants and Young Children with Sensory Loss and Motor Impairments
(Formerly EPSE 441).

ECED 442 (3) Supporting Indigenous Infants and Young Children within the Context of Their Communities

ECED 480 (1-12) c Selected Topics in Early Childhood Education

ECED 482 (1-12) c Review of Research in Early Childhood Education
This course is not eligible for Credit/D/Fail grading.

ECED 508 (3-12) c Early Childhood Development, Intervention, and Inclusion in Early Childhood Programs
This course is not eligible for Credit/D/Fail grading.

ECED 531 (3) Supporting Young Children's Social Emotional Learning in Early Childhood Programs
This course is not eligible for Credit/D/Fail grading.

ECED 561 (3-12) c Laboratory Practicum
This course is not eligible for Credit/D/Fail grading.

ECED 565 (3/6) d Special Course in Early Childhood Education
This course is not eligible for Credit/D/Fail grading.

ECED 580 (3-12) c Problems in Early Childhood Education
Investigation and report of a problem. This course is not eligible for Credit/D/Fail grading.

ECED 585 (3-6) d Advanced Seminar on Research in Early Childhood Education
This course is not eligible for Credit/D/Fail grading.

ECED 590 (3) Graduating Project
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

ECED 598 (3-12) c Field Experiences
For those in master’s, doctoral, and diploma programs. This course is not eligible for Credit/D/Fail grading.

ECED 599 (6-12) d Master's Thesis
This course is not eligible for Credit/D/Fail grading.

Vancouver School of Economics, Faculty of Arts

ECON: Economics

For course prerequisites purposes. ECON 101 is equivalent to ECON 310 or HXEC 111; ECON 102 is equivalent to ECON 311 or HXEC 112. Many courses in Economics have a Mathematics prerequisite of MATH 104 (or equivalent) and/or MATH 105 (or equivalent). Courses equivalent to MATH 104 as a prerequisite are MATH 100, 102, 110, 111, 120, 140, 153, 180 and 184. For MATH 105 the equivalents are MATH 101, 103, 121, 141, and 154.
ECON 101 (3) Principles of Microeconomics
Elements of theory and of Canadian policy and institutions concerning the economics of markets and market behaviour, prices and costs, exchange and trade, competition and monopoly, distribution of income.

ECON 102 (3) Principles of Macroeconomics
Elements of theory and of Canadian policy and institutions concerning the economics of growth and business cycles, national income accounting, interest and exchange rates, money and banking, the balance of trade.

ECON 204 (6) Intermediate Microeconomic Analysis
Mathematical and graphical models of individual, household, and firm behavior with applications to issues in international economics. Registration restricted to students in the Bachelor of International Economics Program. Credit will be granted for only one of ECON 204, ECON 301, ECON 304, COMM 295 or FRE 295. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of ECON 101, ECON 102, MATH 105 and one of MATH 104, MATH 184.

ECON 210 (3) Microeconomic Policy
A survey of policy issues, such as regulation, taxation, environmental and resource policy, health care, education and income distribution. May not be taken for credit by students with fourth-year standing.
Prerequisite: All of ECON 101, ECON 102.

ECON 211 (3) Macroeconomic Policy
A survey of policy issues, such as the costs of inflation and unemployment, monetary and fiscal policy, the effects of government debt and exchange rate policy. May not be taken for credit by students with fourth-year standing.
Prerequisite: All of ECON 101, ECON 102.

ECON 221 (3) Introduction to Strategic Thinking
An introduction to how people interact in strategic situations drawn from political science, history, psychology, law, biology, military history, economics, business, and anthropology. The focus will be on developing intuition. May not be taken for credit by students with fourth-year standing.
Prerequisite: All of ECON 101, ECON 102.

ECON 226 (3) Making Sense of Economic Data
Formulation of a testable hypothesis, identification of relevant data, use of appropriate statistical tools. May not be taken for credit by students with fourth-year standing in ECON or COMM. Not available for credit to students already having credit for either of ECON 325 or ECON 326 (or equivalent).
Prerequisite: All of ECON 101, ECON 102.

ECON 234 (3) Wealth and Poverty of Nations
Historical approaches to long-run economic growth; international comparisons of income growth and inequality; colonialism; evolution of world capital markets; human migrations; rise of world trading empires; instability in the international economy. Credit will be granted for only one of ECON 234 or former ECON 334 (6). May not be taken for credit by students with fourth-year standing.
Prerequisite: All of ECON 101, ECON 102.

ECON 255 (3) Understanding Globalization
Social and economic implications for both rich and poor countries of lowered barriers to the international flows of information, capital, labour and goods. May not be taken for credit by students with fourth-year standing.
Prerequisite: All of ECON 101, ECON 102.

ECON 301 (3) Intermediate Microeconomic Analysis I
Consumer behaviour, producer theory, exchange, monopoly, oligopoly, externalities, public goods, general equilibrium and welfare economics. Credit will be granted for only one of ECON 201, ECON 204, ECON 301, ECON 304, COMM 295 or FRE 295.
Prerequisite: All of ECON 101, MATH 104, MATH 105.

ECON 302 (3) Intermediate Macroeconomic Analysis I
Income and employment theory, monetary theory, the open economy, economic fluctuations and growth. Credit will be granted for only one of ECON 302 or ECON 305.
Prerequisite: All of ECON 101, ECON 102, MATH 104, MATH 105.

ECON 303 (3) Intermediate Microeconomics II
Risk and uncertainty, some concepts in game theory, adverse selection, moral hazard, bargaining, auctions. Credit will be
granted for only one of ECON 303 or ECON 306.

**ECON 304 (3) Honours Intermediate Microeconomic Analysis I**

Consumer behaviour, producer theory, exchange, monopoly, oligopoly, externalities, public goods, general equilibrium and welfare economics. Credit will be granted for only one of ECON 204, ECON 301, ECON 304, COMM 295 or FRE 295.

*Prerequisite:* A score of 68% or higher in all of ECON 101, MATH 104, MATH 105.

**ECON 305 (3) Honours Intermediate Macroeconomic Analysis I**

Income and employment theory, monetary theory, the open economy, economic fluctuations and growth. Credit will be granted for only one of ECON 302 or ECON 305.

*Prerequisite:* A score of 68% or higher in all of ECON 101, ECON 102, MATH 104, MATH 105.

**ECON 306 (3) Honours Intermediate Microeconomics II**

Risk and uncertainty, some concepts in game theory, adverse selection, moral hazard, bargaining, auctions. Credit will be granted for only one of ECON 303 or ECON 306.

*Prerequisite:* A score of 68% or higher in ECON 304. Permission of the School is also acceptable.

**ECON 307 (3) Honours Intermediate Macroeconomics II**

Theories of economic growth and the business cycle. Intended primarily for prospective honours and other qualified students.

*Prerequisite:* A score of 68% or higher in ECON 305. Or permission of the School.

**ECON 308 (6) Intermediate Microeconomic Analysis**

Mathematical and graphical models of individual, household, and firm behavior with applications to issues in international economics. Registration restricted to students in the Bachelor of International Economics Program. Credit will be granted for only one of ECON 301, ECON 304 or ECON 308.

*This course is not eligible for Credit/D/Fail grading.*

*Prerequisite:* All of ECON 101, ECON 102, MATH 105 and one of MATH 104, MATH 184.

**ECON 309 (3) Intermediate Open Economy Macroeconomics**

The aggregate economy with emphasis on macroeconomic policy and international economic growth, money and inflation, unemployment, business cycles, and macroeconomic stabilization policy under fixed and flexible exchange rates. Registration restricted to students in the Bachelor of International Economics Program. Credit will be granted for only one of ECON 302, ECON 305 or ECON 309.

*This course is not eligible for Credit/D/Fail grading.*

*Prerequisite:* All of ECON 101, ECON 102, MATH 105 and one of MATH 104, MATH 184.

**ECON 310 (3) Principles of Microeconomics**

The scope of this course is approximately the same as that of ECON 101. The course is intended for upper-level students only.

*Credit will be granted for only one of ECON 310 or ECON 101.*

*Prerequisite:* Third-year, fourth-year or graduate standing.

**ECON 311 (3) Principles of Macroeconomics**

The scope of this course is approximately the same as that of ECON 102. The course is intended for upper-level students only.

*Credit will be granted for only one of ECON 311 or ECON 102.*

*Prerequisite:* Third-year, fourth-year or graduate standing.

**ECON 312 (3) Political Economy of Capitalism**

An intellectual history of the evolution of the capitalist system and its institutions; a selection of defences and criticisms of capitalism and its alternatives in the writings of leading social and political philosophers from the 18th to the 20th centuries.

*Prerequisite:* All of ECON 101, ECON 102.

**ECON 313 (3) Marxist Economics**

Marxist critiques of capitalist systems and Marxian alternatives. The origin of exploitation; feudalism and capitalism; exploitation and profits; the morality of exploitation; the emergence of class; historical materialism; Marxist theories of imperialism; and public ownership of the means of production.

*Prerequisite:* All of ECON 101, ECON 102.

**ECON 317 (3) Poverty and Inequality**

Economic inequality in Canada and other countries; measurement and causes. Inequality in the distribution of wealth; redistribution of income and wealth; notions of distributive justice.

*Prerequisite:* All of ECON 101, ECON 102.

**ECON 318 (3) History and Philosophy of Economics from Aristotle to Adam Smith**

The development of economic thought from Aristotle to Adam Smith, focusing on the conceptual foundations of economics,
particularly the problems of value, distribution, and economic growth.

Prerequisite: All of ECON 101, ECON 102.
Equivalency: PHIL 362.

ECON 319 (3) History and Philosophy of Economics from Ricardo to Keynes
The development of economic thought from David Ricardo up to the present including such figures as Malthus, Mill, Jevons, and Keynes, focusing on the conceptual foundations of economics, particularly the problems of value, distribution and growth.

Prerequisite: All of ECON 101, ECON 102.
Equivalency: PHIL 363.

ECON 320 (3) Introduction to Mathematical Economics
Application of single and multivariable calculus to economics. Includes comparative static analysis of household and firm behaviour as well as simple dynamic models. ECON 320 cannot be counted as satisfying ECON requirements for the Combined Major in Economics/Mathematics.

Prerequisite: All of ECON 101, ECON 102, MATH 104, MATH 105.

ECON 325 (3) Introduction to Empirical Economics
Essentials of probability and statistics for applied work in economics. Topics include descriptive statistics, probability, estimation, hypothesis testing, and analysis of variance. Please consult the Faculty of Science Credit Exclusion List:


Prerequisite: All of ECON 101, ECON 102, MATH 104, MATH 105.

ECON 326 (3) Methods of Empirical Research in Economics
Techniques of empirical economic research. Topics include simple and multiple regression, time series analysis, and simultaneous equation estimation. Students will be required to undertake applied work. Please consult the Faculty of Science Credit Exclusion List: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414.

Prerequisite: ECON 325.

ECON 327 (3) Introduction to Empirical Methods
Basic tools for the statistical analysis of economic data. Registration restricted to students in the Bachelor of International Economics Program. Credit will be granted for only one of ECON 325, ECON 327, or STAT 200. This course is not eligible for Credit/D/Fail grading.

Prerequisite: All of ECON 101, ECON 102, MATH 105 and one of MATH 104, MATH 184.

ECON 328 (3) Methods of Empirical Research
Empirical tools used in applied research, with emphasis on the linear regression model. Registration restricted to students in the Bachelor of International Economics program. Credit will be granted for only one of ECON 326, ECON 328, or STAT 306. This course is not eligible for Credit/D/Fail grading.

Prerequisite: ECON 327.

ECON 334 (3) Economic History of Modern Europe
Background, causes and effects of economic change in Europe from the 18th century to recent times. Evolution of social and economic institutions; analysis of growth, structural change, the distribution of income, and the spread of industrialization.

Prerequisite: All of ECON 101, ECON 102.

ECON 335 (3) Fertility, Families and Human Migration
Traditional fertility and mortality patterns, demographic transition, catastrophes, well-being and nutrition, international and internal migration, epidemics and growth spurts.

Prerequisite: All of ECON 101, ECON 102.

ECON 336 (3) Economic History of Canada
The growth of the Canadian economy in relation to development of natural resources, changing markets, industrialism, communications, and technology.

Prerequisite: All of ECON 101, ECON 102.

ECON 337 (3) Economic History of the United States
The growth of the United States from the Colonial Era to the present: British colonialism, development of slave-based agriculture, the western expansion, the 'American system' of manufacturing, cyclical instability and depression, and the distribution of income.

Prerequisite: All of ECON 101, ECON 102.

ECON 339 (3) Economics of Technological Change
Application of economic analysis to technological change; the impact of technological change on the growth and distribution of income; economic influences on the invention and diffusion of technology; the interaction between technology, work, skills, and
education; public policy toward technological change.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 341 (3) Economic Development of Asia**
Economic development under colonialism, the colonial legacy, population, trade and development, land reform, the Green Revolution, industrialization strategies, distribution of the gains from development. Each topic is discussed in the context of an Asian country.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 342 (3) The Economy of China since 1949**
The Maoist strategy of development, the commune system and rural development, the pace and pattern of industrialization, management and planning, incentive policy, economic lessons from China. Students who wish to contrast different approaches to development may find it useful to take ECON 341 and 342 as a sequence.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 343 (3) The Economic Development of Modern Japan**
An economic analysis of the growth and structural changes of the Japanese economy from the Meiji Restoration to the Second World War. Sources of growth, the development of new economic institutions, agricultural development, international trade and early industrialization, the emergence of a dual economic structure, war preparation, and the drive towards heavy industrialization.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 345 (3) Money and Banking**
Financial markets and financial institutions in theory and practice; structure and development of the Canadian financial system; development and theory of the regulation of the financial system; process of monetary control; theory and history of central banking and monetary policy.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 350 (3) Public Finance Policy Topics**
Examination of two or three selected policy problems from areas of taxation, income security, and public expenditures. Topics to be selected each year from areas of current or recent policy debate. Examples include public pension policy, privatization and public services, income tax or sales tax reform, federal-provincial cost sharing programs, tax incentives versus direct expenditures, welfare reform.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 351 (3) Women in the Economy**
Economic analysis of markets and policies particularly affecting women. Selected topics drawn from economic discrimination; educational, occupational, and work choices; pay and employment equity; allocation of work time and consumption within the household and in the market; economics of marriage and fertility; poverty; taxation; income security and pension policies; and historical perspectives.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 352 (3) Public Sector Economics**
Application of the tools of economic analysis to the study of important aspects of public policy in taxation, spending, borrowing, and regulation.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 355 (3) Introduction to International Trade**
The determinants of trade patterns, trade policy, tariff and non-tariff barriers to trade, political economy of protectionism, bilateral and multilateral trade disputes, trade liberalization, trade and development. Credit may be obtained for only one of ECON 355 and 455.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 356 (3) Introduction to International Finance**
Exchange rate policy regimes; international financial organizations; the interaction between monetary policy and exchange rate regimes; financial crises.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 360 (3) Labour Economics**
A study of the Canadian labour market. Labour supply, the allocation of the time among work and non-market activity, participation in the labour force, education and training. The demand for labour. The determination of wages and employment. The effect of unions on wages and employment. The wage structure, wage differentials by occupation, industry, race and sex.
Unemployment. Credit may be obtained for only one of ECON 360 and 460.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 361 (3)** Economics of Industrial Relations
Economic aspects of industrial relations in Canada. Why workers join unions. The theory of trade union behaviour. The labour movement in Canada. Wage determination under collective bargaining. The causes of strikes and lockouts. Unions and the wage structure. Credit may be obtained for only one of ECON 361 and 461.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 364 (3/6)** The Economics of Sustainable Development: Communities, Markets and Technology
Applied research and seminars on topics of concern to economists and communities located both locally and internationally. Environmental sustainability, sustainable livelihoods, development effectiveness, institutions, agency, ethics, and well-being. Theoretical approaches, case studies, and community-based learning.

**Prerequisite:** All of ECON 101, ECON 102. Restricted to BA students with at least 3rd year standing and BIE students with at least 2nd year standing. Students are expected to have completed at least 9 ECON credits prior to registration.

**ECON 365 (3)** Topics in Canadian Industrial Organization and Regulation Policy
Current topics in industrial organization and regulation with emphasis on Canadian federal and provincial policy. The content will differ from year to year. Possible subjects include the regulation of transportation and communications, environmental regulation, marketing boards and other forms of agricultural regulation, competition and anti-competes policy, industrial organization and trade policy, and issues in consumer protection.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 367 (3)** Economic Analysis of Law
The economics of market failure, equity and efficiency. Property rights, the economics of accident and contract law, economic theories of law enforcement.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 370 (3)** Benefit-Cost Analysis and the Economics of Project Evaluation
Techniques and problems in benefit-cost analysis of public projects. Examination of alternative approaches to public decision-making such as cost-effectiveness analysis and multiple-objective frameworks. Case studies of projects in the areas of natural resources, the environment, human resources, public services, and transportation.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 371 (3)** Economics of the Environment
Economic analysis applied to various environmental issues, including sustainable development, quality of life, and environmental impacts of specific industrial and consumption activities. The design and implementation of government policies. Global environmental effects of human economic activity.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 374 (3)** Land Economics

**Prerequisite:** All of ECON 101, ECON 102.

**Equivalency:** FRE 374.

**ECON 384 (3)** Economic Analysis of Health Services
Microeconomic theory of resource allocation with emphasis on the applications of optimizing models of health service markets. Analysis of Canadian problems in health service supply. Models of the consumer/patient, the physician/entrepreneur, the not-for-profit hospital/firm, and the third-party regulatory and payment agency.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 387 (3)** Economic Reform and Transition
Problems and processes of economic reform and of transition between different types of economic systems, with emphasis on reform and transition in Communist and post-Communist economies. Credit will be granted for only one of ECON 387 or ECON 487.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 390 (3)** Introduction to Economic Research
Selected topics in economic research. Application of research methods to economic data. Credit will be granted for only one of ECON 390, ECON 490, ECON 495, or ECON 499. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** All of ECON 101, ECON 102, MATH 104.
ECON 406 (3) Topics in Microeconomics
Selected topics in advanced microeconomic analysis.
Prerequisite: One of ECON 301, ECON 304 and one of ECON 303, ECON 306.

ECON 407 (3) Topics in Macroeconomics
Selected topics in advanced macroeconomic analysis.
Prerequisite: One of ECON 301, ECON 304 and one of ECON 302, ECON 305 and one of ECON 303, ECON 306.

ECON 417 (3) Welfare Economics
The criteria for evaluating economic performance with special reference to the problems of justice in the distribution of income and economic efficiency. Topics include social evaluation functions, pareto-optimality, compensation criteria, and consistency of collective decision making.
Prerequisite: One of ECON 301, ECON 304.

ECON 420 (3) Optimization and Economic Theory
An introduction to static and dynamic optimization methods with economic applications.
Prerequisite: MATH 200 and one of ECON 301, ECON 304 and one of ECON 303, ECON 306. Permission of the instructor is also acceptable.

ECON 421 (3) Introduction to Game Theory and Applications
Principles of rational behaviour in strategic situations and various notions of equilibrium useful in predicting outcomes.
Applications from economics, business, politics, law and biology.
Prerequisite: One of ECON 301, ECON 304.

ECON 422 (3) Mathematics for Economists
Provides the required preparation in mathematics for the study of graduate economic theory. Solving systems of simultaneous equations; unconstrained and constrained maxima; elementary theory of difference and differential equations. Restricted to students taking graduate economic theory courses.

ECON 425 (3) Introduction to Econometrics
Theoretical and applied issues in statistics and econometrics. Statistical distributions, sampling theory, maximum likelihood methods of estimation and hypothesis testing, generalized least squares, measurement errors, non-normal errors, systems of equations, discrete-choice models, outliers, regression diagnostics, and model selection.
Prerequisite: All of ECON 325, ECON 326.

ECON 426 (3) Econometric Analysis
Further topics in econometrics including such areas as nonlinear estimation, distributed lag models, time-series analysis, time-varying parameters, multivariate analysis, simulation and forecasting models, Monte Carlo experiments, duration models, large econometric models, Bayesian statistics, asymptotic theory, and ergodic theory.
Prerequisite: ECON 425.

ECON 436 (3) Historical Background to Contemporary Issues in Canadian Economy
Demographic change, immigration, unemployment and labour markets, the inter-provincial transfer of resources, industrial and trade policy.
Prerequisite: One of ECON 304, ECON 301 and one of ECON 302, ECON 305.

ECON 441 (3) The Process of Economic Development
Industrialization of an agrarian economy; how the West grew rich; history of Japanese development; technical progress and growth; evolution of the patterns of income distribution; role of international trade in development; environment and development.
Prerequisite: One of ECON 301, ECON 304.

ECON 442 (3) Issues in Economic Development
Divergence in the world economy, poverty, consequences of initial inequality, institutions, the impact of history, recent developmental experience--some case studies, labour and credit markets, the trickle down process.
Prerequisite: One of ECON 301, ECON 304.

ECON 444 (3) The Contemporary Japanese Economy
An economic analysis of selected issues in contemporary Japan. The postwar growth record, economic management and planning, industrial policy, labour market and industrial relations, foreign trade and investment, rapid industrialization and its consequences, external economic relations.
Prerequisite: One of ECON 301, ECON 304.

ECON 447 (3) Monetary Theory
Theoretical analysis of economies that use money; the emergence of money; the roles of money in the economy; models of money demand; the optimal quantity of money seignorage and inflation; monetary policy and macroeconomic stability; monetary policy in an open economy.

**Prerequisite:** One of ECON 301, ECON 304 and one of ECON 302, ECON 305.

**ECON 450 (3) Economics of Taxation**

The economic analysis of taxation. Equity and efficiency; optimal taxation theory; partial and general equilibrium analysis of incidence; analysis of taxes such as the personal and corporate income taxes, sales and excise taxes, payroll taxes and property tax.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 451 (3) Economics of Public Expenditures**

The role of government in the economy; efficiency and economic justice. Theory of public goods; applications to topics such as education, medical care and social services. Pricing and investment rules for public enterprises.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 455 (3) International Trade**

International trade theory and policy in general equilibrium; relative costs, factor proportions, imperfect competition and the pattern of trade; efficiency and distribution. Credit granted for only one of ECON355 and ECON455.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 456 (3) International Macroeconomics and Finance**

Balance of payments; market for foreign exchange; mechanism for adjusting the balance of payments; internal vs. external stability; current problems and issues.

**Prerequisite:** One of ECON 302, ECON 305.

**ECON 457 (3) Seminar in International Economic Relations**

Selected topics focusing upon various issues arising in international economic relations. Open only to fourth-year students in the Major program in International Relations.

**Prerequisite:** All of ECON 101, ECON 102.

**ECON 460 (3) Economics of Labour Markets**

The theory of labour supply and demand for individuals, households, and firms. Policy implications for Canadian taxation and benefit programs. Employee selection, hiring and promotion. Credit may not be obtained for both ECON 360 and 460.

**Prerequisite:** One of ECON 301, ECON 304 and one of ECON 302, ECON 305.

**ECON 461 (3) Economics of Trade Unions**

The microeconomic and macroeconomic effects of unions on wages, prices and employment. Industrial disputes and their resolution. Credit may not be obtained for both ECON 361 and 461.

**Prerequisite:** One of ECON 301, ECON 304 and one of ECON 302, ECON 305.

**ECON 465 (3) Market Structure**

Market structure and social welfare, theory of price discrimination, equilibrium in oligopolistic markets, entry and exit decisions, product differentiation and spatial models, theories of hierarchical organization, agency problem in the modern corporation, vertical integration and control, market structure and technical progress.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 466 (3) The Economics of Government Regulation of Business**

Normative and positive theories of government regulation of business. Topics include natural monopoly, socially optimal monopoly pricing, regulation of multi-firm industries, competition policy. Selected empirical studies.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 468 (3/6) d Economics of Intellectual Property: Patents, Drugs, and Rock ‘n Roll**

Economic research into patents and copyrights, and policies regulating them. Analysis of the impact of stronger intellectual property rights on innovative activity, with applications to culture, the music industry, pharmaceuticals, consumer electronics, and the Internet.

**Prerequisite:** One of ECON 301, ECON 304.

**ECON 471 (3) Economics of Nonrenewable Resources**

Application of economic analysis to the management of nonrenewable natural resources. Emphasis is placed on the economics of alternative energy sources. Other topics include mineral economics, criteria for the optimal use of resources, and measurement of resources.

**Prerequisite:** One of ECON 301, ECON 304.
ECON 472 (3) Economics of Renewable Resources
Application of economic analysis to the management of renewable resources. Special attention is given to criteria for the optimal use of depleting resources such as forests and water. Other topics include public policy with regard to environmental quality, conservation, and outdoor recreation.
Prerequisite: One of ECON 301, ECON 304.

ECON 480 (3) Transportation
Economic characteristics of the provision of transportation services, both passenger and freight; the market structure of the industry and the economic impact of the varying degrees of public regulation and promotion within the industry; the role of economic analysis in resolving problems of Canadian policy.
Prerequisite: One of COMM 295, ECON 301, ECON 304.
Equivalency: COMM 446.

ECON 482 (3) The Economic Consequences of Religion
Analysis of the economic aspects of religious behaviour, the structure of religious organizations, the effects of competition in the religious marketplace, the economic benefits of religion, and some of the ill-effects of religion (such as religious strife and terrorism).
Prerequisite: ECON 301.

ECON 485 (3) Political Economy
State and politics in economics. How states emerge, how dictators stay in power. Why groups engage in costly conflict, how countries turn into democracies and what its benefits are.
Prerequisite: One of ECON 301, ECON 304, ECON 308 and one of ECON 302, ECON 305, ECON 309 and all of ECON 325, ECON 326.

ECON 487 (3) Comparative Economic Systems
Economic analysis of non-market/non-price systems of resource allocation. Economic analysis of central planning, co-ordination problems in hierarchical organizations, and the role of quantity restrictions, quotas, standards, etc. in regulating economic behaviour. The Soviet system of economic planning is used throughout as an example of the issues discussed. Credit may be obtained for only one of ECON 387 or ECON 487.
Prerequisite: One of ECON 301, ECON 304.

ECON 490 (3) Seminar in Applied Economics
Selected problems and issues in the theory and practice of Economics. Each section will focus on a different field. Restricted to Economics Majors, and Combined Majors in Economics their final academic session.
Prerequisite: All of ECON 325, ECON 326 and one of ECON 301, ECON 304 and one of ECON 302, ECON 305. For additional possible prerequisites see individual course descriptions on the School's website.

ECON 492 (3/6) Directed Reading
ECON 493 (3) Advanced Empirical Methods for International Economics
Econometric methodologies necessary to conduct applied research, including time series analysis and panel data methods; review of empirical work in international economics. Registration restricted to students in the Bachelor of International Economics Program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ECON 328.

ECON 494 (3) Seminar in Applied International Economics
Focus on a particular aspect of applied international economics. Independent empirical research project required. Registration restricted to students in the Bachelor of International Economics Program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ECON 493.

ECON 495 (3) Honours Seminar
Reports and group discussions of selected topics for fourth-year Honours students.

ECON 499 (6) Honours Essay
Essay on some theoretical, applied, or institutional problem. Open only to fourth-year Honours students.

ECON 500 (3) Microeconomics
This course is not eligible for Credit/D/Fail grading.

ECON 502 (3) Macroeconomics
This course is not eligible for Credit/D/Fail grading.

ECON 514 (3) Information and Incentives
This course is not eligible for Credit/D/Fail grading.

ECON 515 (3/6) d Special Topics in Microeconomic Theory
This course is not eligible for Credit/D/Fail grading.

ECON 516 (3) Special Topics in Macroeconomics
This course is not eligible for Credit/D/Fail grading.

ECON 517 (3) Social Evaluation, Social Choice, and Economic Performance
This course is not eligible for Credit/D/Fail grading.

ECON 518 (3) History of Economic Analysis I
This course is not eligible for Credit/D/Fail grading.

ECON 519 (3) History of Economic Analysis II
This course is not eligible for Credit/D/Fail grading.

ECON 522 (3) Economic Applications of Game Theory
This course is not eligible for Credit/D/Fail grading.

ECON 523 (3) Behavioural Economics
This course is not eligible for Credit/D/Fail grading.

ECON 526 (3) Mathematics for Economics
This course is not eligible for Credit/D/Fail grading.

ECON 527 (3) Econometric Methods of Economic Research
This course is not eligible for Credit/D/Fail grading.

ECON 531 (3) Economic History of Modern Europe
This course is not eligible for Credit/D/Fail grading.

ECON 532 (3) Economic History of North America
This course is not eligible for Credit/D/Fail grading.

ECON 541 (3) Economic Development I
This course is not eligible for Credit/D/Fail grading.

ECON 542 (3) Economic Development II
This course is not eligible for Credit/D/Fail grading.

ECON 543 (3) Economics of Transition Economies
This course is not eligible for Credit/D/Fail grading.

ECON 544 (3) Political Economy, Institutions, and Business
This course is not eligible for Credit/D/Fail grading.

ECON 546 (3) Monetary Theory and Policy I
This course is not eligible for Credit/D/Fail grading.

ECON 547 (3) Monetary Theory and Policy II
This course is not eligible for Credit/D/Fail grading.

ECON 550 (3) Government Finance: Expenditures
This course is not eligible for Credit/D/Fail grading.

ECON 551 (3) Government Finance: Revenues
This course is not eligible for Credit/D/Fail grading.

ECON 553 (3) The Economics of Income Security
This course is not eligible for Credit/D/Fail grading.

ECON 555 (3) International Trade
This course is not eligible for Credit/D/Fail grading.

ECON 556 (3) International Finance
This course is not eligible for Credit/D/Fail grading.

ECON 557 (3) Empirical Topics in International Economics
This course is not eligible for Credit/D/Fail grading.

ECON 560 (3) Economics of Labour
This course is not eligible for Credit/D/Fail grading.

ECON 561 (3) Topics in Industrial Relations
This course is not eligible for Credit/D/Fail grading.

ECON 562 (3) Research Design and Policy Evaluation in Economics
This course is not eligible for Credit/D/Fail grading.

ECON 565 (3) Market Structure and Business Behaviour
This course is not eligible for Credit/D/Fail grading.

ECON 566 (3) Business Performance and Public Policy
This course is not eligible for Credit/D/Fail grading.

ECON 567 (3) Organization Theory and Non-market Allocation
This course is not eligible for Credit/D/Fail grading.

ECON 571 (3) The Economics of Renewable Resources
This course is not eligible for Credit/D/Fail grading.

ECON 572 (3) The Economics of Non-renewable Resources
This course is not eligible for Credit/D/Fail grading.

ECON 573 (3) Environmental Economics
This course is not eligible for Credit/D/Fail grading.

ECON 574 (3) Special Topics in the Economics of Resource Use
This course is not eligible for Credit/D/Fail grading.

ECON 580 (3) Social and Economic Measurement
This course is not eligible for Credit/D/Fail grading.

ECON 581 (3) Cost-Benefit Analysis
This course is not eligible for Credit/D/Fail grading.

ECON 590 (2-6) d Special Advanced Course
This course is not eligible for Credit/D/Fail grading.

ECON 592 (2-6) c Directed Reading
This course is not eligible for Credit/D/Fail grading.

ECON 594 (6) Applied Economics
This course is not eligible for Credit/D/Fail grading.

ECON 595 (0) Major Essay

ECON 599 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

ECON 600 (3) Microeconomics I
This course is not eligible for Credit/D/Fail grading.

ECON 601 (3) Microeconomics II
This course is not eligible for Credit/D/Fail grading.

ECON 602 (3) Macroeconomics I
This course is not eligible for Credit/D/Fail grading.

ECON 603 (3) Macroeconomics II
This course is not eligible for Credit/D/Fail grading.

ECON 620 (3) Mathematical Economics I
This course is not eligible for Credit/D/Fail grading.

ECON 621 (3) Mathematical Economics II
This course is not eligible for Credit/D/Fail grading.
ECON 626 (3) Econometric Theory I
This course is not eligible for Credit/D/Fail grading. Prerequisite: ECON 527.

ECON 627 (3) Econometric Theory II
This course is not eligible for Credit/D/Fail grading. Prerequisite: ECON 626.

ECON 628 (1-3) d Topics in Applied Econometrics I
This course is not eligible for Credit/D/Fail grading. Prerequisite: Prior graduate-level work in econometrics is required.

ECON 629 (1-3) d Topics in Applied Econometrics II
This course is not eligible for Credit/D/Fail grading. Prerequisite: Prior graduate-level work in econometrics is required.

ECON 640 (3) Ph.D. Research Seminar
This course is not eligible for Credit/D/Fail grading.

ECON 690 (2-6) d Workshops in Economics
This course is not eligible for Credit/D/Fail grading.

ECON 699 (0) Doctoral Dissertation

Educational and Counselling Psychology, and Special Education, Faculty of Education

ECPS: Educational & Counselling Psychology, & Special Education

For a list of subjects and corresponding departments within the Faculty of Education, see the tables "Courses in the Faculty of Education" at the beginning of the Courses section.

ECPS 490 (3/6) c Directed Study in Educational & Counselling Psychology, and Special Education
Directed investigation of a problem or issue, requiring a written report or alternate mode of reporting or disseminating results of the investigation. This course is not eligible for Credit/D/Fail grading.

Curriculum and Pedagogy, Faculty of Education

EDCP: Curriculum and Pedagogy

EDCP 150 (6) General Science for Elementary Classrooms
This course is not eligible for Credit/D/Fail grading.

EDCP 210 (3) Introduction to Music Education
Role of music education in schools and society, including historical, philosophical, psychological, and sociological perspectives. Includes guided class observations and practice music teaching in elementary and secondary schools. Criminal Record Check required. This course is not eligible for Credit/D/Fail grading.

EDCP 301 (2) Art - Elementary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 302 (3-5) d Art - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading. Prerequisite: A concentration in art or permission of the Head.

EDCP 303 (6) Ceramic Design and Pedagogical Approaches: Art Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: 6 credits of introductory art studio or art history courses.

EDCP 304 (6) Textile Design and Pedagogical Approaches: Art Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: 6 credits of introductory art studio or art history courses.

EDCP 305 (3) Digital Media in Arts Education: Introduction
This course is not eligible for Credit/D/Fail grading.
EDCP 306 (3) Digital Media in Arts Education: Advanced
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 305.

EDCP 308 (2) Music - Elementary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 309 (3) Instrumental Pedagogy: Elementary
[3-0-0]

EDCP 311 (3-5) d Music - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 312 (4/6) c Instrumental Pedagogy: Secondary
This course is not eligible for Credit/D/Fail grading.

EDCP 313 (4/6) d Choral Pedagogy: Secondary
This course is not eligible for Credit/D/Fail grading.

EDCP 314 (3) Instrumental Jazz Pedagogy: Secondary
[3-0]

EDCP 315 (3) Choral Jazz Pedagogy
[3-0]

EDCP 316 (3) Contemporary Methods of Instruction in Ear Training, Music Reading, and Musicianship I
This course is not eligible for Credit/D/Fail grading.

EDCP 317 (3) Contemporary Methods of Instruction in Ear Training, Music Reading, and Musicianship II
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 316.

EDCP 318 (3) Canadian Music in the Classroom: Elementary/Secondary
[3-0]

EDCP 319 (3) The Musical: Organization and Production
[3-0]

EDCP 320 (2) Physical Education - Elementary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading. [0-2-0]

EDCP 322 (3-5) d Physical Education - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in physical education or permission of the head.

EDCP 323 (3) Outdoor Environmental Education: Curriculum and Pedagogy
Costs for field trips and an overnight experience are borne by students. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 325 (3) Approaches to Health Education

EDCP 326 (3) Health Education: Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading.

EDCP 327 (3/6) d Special Topics in Health Education

EDCP 328 (3) Environmental Education
This course is not eligible for Credit/D/Fail grading.

EDCP 329 (3) Agriculture in the Curriculum
Agricultural awareness, understanding the food system, and integration of food and agricultural literacy across the curriculum. This course is not eligible for Credit/D/Fail grading.

EDCP 331 (2) Social Studies - Elementary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 332 (3-5) d Social Studies - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 333 (3) Contemporary Issues in Social Studies: Secondary
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 334 (3) Canadian Studies: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 335 (3) Law-Related Education: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 340 (2) Mathematics - Elementary and Middle Years: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 341 (3) Mathematics across the Curriculum: Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading.

EDCP 342 (3-5) Mathematics - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in mathematics or permission of the Head.

EDCP 343 (3) Mathematics Education: Problem Solving
[3-0-0]  
Prerequisite: One of EDCP 340, EDCP 342.

EDCP 344 (3) Mathematics Education: Geometry and Measurement
[3-0-0]  
Prerequisite: One of EDCP 340, EDCP 342.

EDCP 349 (2) Science - Elementary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 350 (3) Biological Sciences - Elementary: Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading.

EDCP 351 (3) Physical Sciences - Elementary: Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading.

EDCP 352 (2-5) d General Science - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in agricultural sciences, biological sciences, chemistry, earth and space science, or physics, or permission of the Head.

EDCP 353 (2/3) d Agricultural Sciences - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in Agricultural Sciences or permission of the Head.

EDCP 354 (2/3) d Biological Sciences - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in biological sciences or permission of the Head.

EDCP 355 (2/3) d Chemistry - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in chemistry or permission of the Head.

EDCP 356 (2/3) d Earth and Space Science - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in earth and space science or permission of the Head.

EDCP 357 (2/3) d Physics - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in physics or permission of the Head.

EDCP 358 (3-5) d Applied Studies in Mathematics, Science and Technology I: Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 360 (1) Elementary and Middle Years: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 362 (3-12) d Curriculum Design and Evaluation: Practical and Theoretical Issues

EDCP 363 (3) Interdisciplinarity in Curriculum and Pedagogy
EDCP 370 (3) Integrating ICT Across the Curriculum: Elementary and Middle Years
  This course is not eligible for Credit/D/Fail grading.

EDCP 371 (3) Integrating Design and Technology Across the Curriculum: Elementary and Middle Years
  Pass/Fail. This course is not eligible for Credit/D/Fail grading. [3-0-0]

EDCP 372 (3) Integrating Business Applications across the Curriculum: Elementary and Middle Years
  Pass/Fail. This course is not eligible for Credit/D/Fail grading. [3-0-0]

EDCP 373 (3-5) d Information and Communication Technologies I - Secondary: Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 374 (3-5) d Design and Technology I - Secondary: Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 375 (3-5) d Business Education I - Secondary: Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 376 (3) Information and Communication Technologies II - Secondary: Curriculum and Pedagogy
  This course is not eligible for Credit/D/Fail grading.

EDCP 377 (3) Design and Technology II - Secondary: Curriculum and Pedagogy
  This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 374.

EDCP 378 (3) Business Education II - Secondary: Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 390 (3) Home Economics - Elementary and Middle Years: Curriculum and Pedagogy
  This course is not eligible for Credit/D/Fail grading.

EDCP 391 (3-5) d Home Economics I - Secondary: Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 392 (3) Assessment and Evaluation in Textile Studies: Home Economics
  Practical and conceptual issues of developing and evaluating secondary school textile studies curricula in home economics.

EDCP 400 (2-6) d Studies in an Art Education Studio Area
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 401 (3) Visual Arts for Classroom Practice: Two-Dimensional Practices and Processes
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 402 (3) Visual Arts for Classroom Practice: Printmaking Practices and Processes
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 403 (3) Visual Arts for Classroom Practice: Three-Dimensional Practices and Processes
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 404 (3) Visual Arts for Classroom Practice: Textile Design
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 405 (3) Visual Arts for Classroom Practice: New Media and Digital Processes
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 406 (3) Visual Arts for Classroom Practice: Photography
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 407 (3) Art Education Curriculum and Pedagogy: Theory and Practice
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 408 (3) Art, Education and Cultural Diversity
  Pass/Fail. This course is not eligible for Credit/D/Fail grading. [3-0]

EDCP 409 (3) Art Education Theory and Research
  Pass/Fail. This course is not eligible for Credit/D/Fail grading. [3-0]
  Prerequisite: Art education as a major or minor and completion of a practicum in Art Education.
EDCP 410 (3) Music and Movement - Elementary: Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 308. Or an introductory course in music education.

EDCP 411 (3) Music - Elementary: Advanced Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 308 or an introductory course in music education.

EDCP 412 (3) Conducting and Rehearsal Techniques for Teachers
Prerequisite: Prior experience in teaching music.

EDCP 413 (3) Digital Media for Music Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 305 or equivalent experience.

EDCP 414 (3) Elementary Choral Music
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 308 or an introductory course in music education.

EDCP 415 (3) Music Education for Children with Exceptional Needs
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EPSE 312, EPSE 317.

EDCP 416 (3) Music Education: Orff Basics
This course is not eligible for Credit/D/Fail grading.

EDCP 417 (3) Music Education: Orff Level I
Prerequisite: One of EDCP 309, EDCP 416, EDCP 411, EDCP 414.

EDCP 418 (3) Music Education: Orff Level II
Prerequisite: EDCP 417.

EDCP 419 (3) Music Education: Orff Level III
Prerequisite: EDCP 418.

EDCP 420 (3) Advanced Physical Education: Elementary
This course is not eligible for Credit/D/Fail grading. [0-3-0]

EDCP 423 (3) Outdoor Environmental Education: Design, Implementation and Assessment
Costs for field trips and an overnight experience are borne by students. This course is not eligible for Credit/D/Fail grading.

EDCP 430 (3/6) d Social Studies - Elementary: Advanced Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 331.

EDCP 431 (3) Special Study in Social Studies: History
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 432 (3) Special Study in Social Studies: Geography
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 433 (3/6) c Current Practices in Values Education
This course is not eligible for Credit/D/Fail grading.

EDCP 440 (3) Topics in the Curriculum and Pedagogy in Mathematics: Secondary
[3-0-0]

EDCP 441 (3/6) d Assessment in Mathematics Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EDCP 340, EDCP 342.

EDCP 442 (3) Mathematics History for Teachers
[3-0]

EDCP 446 (3) Forest Education
Transportation and living costs for required field experiences will be borne by the student. [3-0]

EDCP 447 (3) Technology-Based Science Education
This course is not eligible for Credit/D/Fail grading.

EDCP 448 (3) Conceptions of the Natural World: Implications for Science Education
[3-0]

EDCP 449 (3) Teaching Earth and Space Science Beyond the Textbook

EDCP 450 (3) Teaching Life Science Beyond the Textbook
EDCP 451 (3) Teaching Physical Science Beyond the Textbook
EDCP 452 (3) Science, Technology, and Society
EDCP 453 (3) Biology for Teaching: Topics and Pedagogical Approaches - Secondary
  Teacher Education Office approval is required. Open only to secondary students admitted with an academic deficiency. Not for credit towards a graduate degree or for undergraduate credit in an academic subject. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 454 (3) Chemistry for Teaching: Topics and Pedagogical Approaches - Secondary
  Teacher Education Office approval is required. Open only to secondary students admitted with an academic deficiency. Not for credit towards a graduate degree or for undergraduate credit in an academic subject. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 455 (3) Earth and Space Science for Teaching: Topics and Pedagogical Approaches - Secondary
  Teacher Education Office approval is required. Open only to secondary students admitted with an academic deficiency. Not for credit towards a graduate degree or for undergraduate credit in an academic subject. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 456 (3) Botany for Teaching: Topics and Pedagogical Approaches - Secondary
  Teacher Education Office approval is required. Open only to secondary students admitted with an academic deficiency. Not for credit towards a graduate degree or for undergraduate credit in an academic subject. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 457 (3) Zoology for Teaching: Topics and Pedagogical Approaches - Secondary
  Teacher Education Office approval is required. Open only to secondary students admitted with an academic deficiency. Not for credit towards a graduate degree or for undergraduate credit in an academic subject. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
  This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 358.
EDCP 460 (3-6) Recent Developments in Elementary Curriculum and Pedagogy
  [3-0-0]
EDCP 462 (3) Perspectives in Curriculum Theory
  [3-0]
EDCP 467 (3/6) d Special Topics in Curriculum and Pedagogy
  This course is not eligible for Credit/D/Fail grading.
EDCP 468 (3-9) d Directed Study in Curriculum and Pedagogy
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 470 (3) ICT Practices in Education
  [3-0]
EDCP 471 (3/12) c Technological Practices in Education: Technical Problems
EDCP 472 (3) Business Practices in Education
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 473 (3) Digital Media in ICT Education: Ethical Uses
  This course is not eligible for Credit/D/Fail grading.
EDCP 474 (3) Digital Media in ICT Education: Design and Pedagogy
  This course is not eligible for Credit/D/Fail grading.
EDCP 475 (3) Digital Media in ICT Education: Development and Assessment
  This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 474.
EDCP 480 (3) Visual Culture Across the Curriculum
EDCP 481 (3) Media Studies Across the Curriculum
EDCP 491 (3) Home Economics II - Secondary: Curriculum and Pedagogy
  This course is not eligible for Credit/D/Fail grading. Prerequisite: EDCP 391.
EDCP 492 (3) Special Study in Home Economics: Textile Studies
EDCP 493 (3) Special Study in Home Economics: Foods Studies
EDCP 494 (3) Special Study in Home Economics: Family Studies
EDCP 495 (3-12) d Special Topics in Home Economics Education
EDCP 496 (3) Global Education and Curriculum
[3-0-0]
EDCP 497 (3) Career Education and Curriculum
EDCP 498 (3) Curriculum Inquiry in Home Economics Education
  Culminating inquiry in curriculum and pedagogy for the Home Economics Education Diploma. This course is not eligible for Credit/D/Fail grading.
EDCP 501 (3) Master’s Seminar
  Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDCP 504 (3-12) c Review of Research in Art Education: Theory and Practice
  This course is not eligible for Credit/D/Fail grading.
EDCP 505 (3) Review of Research in Music Education: Theory and Practice
  This course is not eligible for Credit/D/Fail grading.
EDCP 508 (3/12) c Review of Research in Curriculum and Pedagogy
  Studies of recent research bearing on education practice. This course is not eligible for Credit/D/Fail grading.
EDCP 510 (3) Video Ethnography in Education Research: Culture, Technology, and Interpretation
  This course is not eligible for Credit/D/Fail grading. Prerequisite: A qualitative research methods course.
EDCP 512 (3/6) d Education Action Research
  This course is not eligible for Credit/D/Fail grading.
EDCP 513 (3) Case-Study Research and Cross-Case Analysis
  This course is not eligible for Credit/D/Fail grading. Prerequisite: A qualitative research methods course.
EDCP 514 (3) Arts-Based Educational Research: A/r/tography
  This course is not eligible for Credit/D/Fail grading.
EDCP 515 (3) Education and Complexity Theory
  Critical examination of current practices in education, teaching, and teacher education from a complexity science perspective. This course is not eligible for Credit/D/Fail grading.
EDCP 520 (3) Perspectives, Practice, and Curriculum Issues in Contemporary Art Education
  Emphasis is placed upon the foundations and conflicting conceptions of curriculum in art education. Theory/practice issues in the development, implementation, and evaluation of art programs are explored. This course is not eligible for Credit/D/Fail grading.
EDCP 521 (3) Historical and Social Foundations of Art Education
  Histories of art education are examined. Social and cultural implications for art education (past and present) are explored. This course is not eligible for Credit/D/Fail grading.
EDCP 522 (3) Psychological Foundations of Art Education
  Psychological considerations specifically related to cognitive development in art, are explored. Implications for art education theory and practice are drawn. This course is not eligible for Credit/D/Fail grading.
EDCP 523 (3/6) d Seminar in Art Education
  This course is not eligible for Credit/D/Fail grading.
EDCP 524 (3) Technology, Virtual Worlds, and Digital Visual Culture in Art Education
  Foundations and conflicting conceptions of digital visual culture and art education. Theory and practice in the development and implementation of art education technology. This course is not eligible for Credit/D/Fail grading.
EDCP 525 (3/6) d Special Colloquia in Music Education
  The Special Colloquia in Music Education offer opportunities to critically engage with particular aspects of music education. Specific topics vary from year to year. This course is not eligible for Credit/D/Fail grading.
EDCP 526 (3/6) Theory and Principles of Music Education
This course is not eligible for Credit/D/Fail grading.

EDCP 530 (3) Curriculum Innovations in Physical Education
Developing an integrated approach toward curriculum planning and instruction by examining curriculum models. Rethinking the PE curriculum. This course is not eligible for Credit/D/Fail grading.

EDCP 531 (3) Health Promotion, Wellness and Lifeskills in Outdoor Settings
This course is not eligible for Credit/D/Fail grading.

EDCP 532 (3) Theories and Dimensions of Place-Based Education: Ecohumanist, Critical, and Indigenous Lenses
This course is not eligible for Credit/D/Fail grading.

EDCP 533 (3) Health, Outdoor and Physical Experiential Education Curriculum, Pedagogy and Place in the Elementary School
Concepts, skills, and dispositions necessary to teach health, outdoor and physical education through inclusive, developmentally appropriate progressions. Introduction to theoretical, philosophical and practical research dimensions of constructivist learning and teaching approaches with reference to the BC Curriculum. This course is not eligible for Credit/D/Fail grading.

EDCP 534 (3) Seminar in School Health Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDUC 306.

EDCP 535 (3) Research in School Health Education
This course is not eligible for Credit/D/Fail grading.

EDCP 536 (3) Curriculum and Pedagogy in Home Economics
This course is not eligible for Credit/D/Fail grading.

EDCP 537 (3) Foundations of Home Economics Education
A review and critical analysis of the history and philosophy of school home economics programs. This course is not eligible for Credit/D/Fail grading.

EDCP 538 (3) Theory and Research in Environmental Education
Research literature and theoretical issues in environmental education. This course is not eligible for Credit/D/Fail grading.

EDCP 539 (3) Narrativity, Ecopedagogy and Indigeneity
Through seminars, course readings, and experiential learning, the power of narrative is explored as it intersects with ecological and Indigenous knowings and practices toward a more multi-storied, just, and ecologically sustainable world. This course is not eligible for Credit/D/Fail grading.

EDCP 541 (3) Problems in Historical Understanding
Recent controversies in North American historical literature and implications for school curriculum in the light of research on teaching and learning history. This course is not eligible for Credit/D/Fail grading.

EDCP 542 (3) Theorizing Pedagogy
Pedagogy as construed by teacher-researchers, curriculum thinkers, indigenous scholars, educational philosophers, and cultural theorists. This course is not eligible for Credit/D/Fail grading.

EDCP 544 (3) Mathematics and Science Teaching and Learning with Technologies
Theoretical underpinnings and pedagogical, social and economic implications of 21st century technology-enhanced mathematics and science education. This course is not eligible for Credit/D/Fail grading.

EDCP 550 (3) Mathematics Education: Origins and Issues
This course is not eligible for Credit/D/Fail grading.

EDCP 551 (3) Mathematics Education: Current Issues
An advanced course in curriculum and pedagogy. This course is not eligible for Credit/D/Fail grading.

EDCP 552 (3) Mathematics Education: Early Years
Recent theories and research. This course is not eligible for Credit/D/Fail grading.

EDCP 553 (3) Mathematics Education: Beyond the Early Years
Recent theories and research. This course is not eligible for Credit/D/Fail grading.

EDCP 555 (3) Critical Analysis of Curriculum in Science Education
Current ideas about science curriculum, the nature of science, and its implications for scientific literacy. This course is not eligible
EDCP 556 (3) Theory and Research in the Social Context of School Science
Historical and current social, political and economic influences on science curriculum and science teaching. This course is not eligible for Credit/D/Fail grading.

EDCP 557 (3) Issues in the Teaching and Learning of the Sciences
Conceptual and practical issues associated with contemporary approaches. This course is not eligible for Credit/D/Fail grading.

EDCP 558 (3) Science Learning in Informal Environments
Theoretical perspectives and current research on science learning in contexts other than formal science classes. This course is not eligible for Credit/D/Fail grading.

EDCP 559 (3) Research in the Teaching and Learning of the Sciences
Current models and methods of inquiry in science education. This course is not eligible for Credit/D/Fail grading.

EDCP 560 (3) Scholarship of Curriculum Practice in Higher Education
This course is not eligible for Credit/D/Fail grading.

EDCP 561 (3) Scholarship of Teaching and Learning in Higher Education
This course is not eligible for Credit/D/Fail grading.

EDCP 562 (3) Curriculum Issues and Theories
This course is not eligible for Credit/D/Fail grading.

EDCP 563 (3) Curriculum Evaluation
This course is not eligible for Credit/D/Fail grading.

EDCP 564 (3) Texts, Politics, and Ideologies of Curriculum Development
This course is not eligible for Credit/D/Fail grading.

EDCP 565 (3) Teaching in Museums
Issues, theories, and research studies. This course is not eligible for Credit/D/Fail grading.

EDCP 566 (3) Curriculum Change, Planning, and Implementation
This course is not eligible for Credit/D/Fail grading.

EDCP 567 (3) Curriculum Issues and Theories in Museums
The intersection between Museum Education and Curriculum Theory through a survey of research and practices in curriculum, teaching, and learning. Curriculum studies as it relates to museum education. This course is not eligible for Credit/D/Fail grading.

EDCP 568 (3) Curricula in their Historical Context
This course is not eligible for Credit/D/Fail grading.

EDCP 569 (3) Schooling in Comparative Perspective: North American and International Interpretations
This course is not eligible for Credit/D/Fail grading.

EDCP 570 (3) Seminar in the Teaching of Information and Communication Technologies
This course is not eligible for Credit/D/Fail grading.

EDCP 571 (3) History of Media and Technology in Education
This course is not eligible for Credit/D/Fail grading.

EDCP 580 (3/12) c Problems in Education
Directed Studies and Major Essay in the diverse disciplines and topics of curriculum and pedagogy. This course is not eligible for Credit/D/Fail grading.

EDCP 581 (3-12) c Laboratory or Studio Practicum
Emphasis on the identification and development of content and processes essential to the on-going laboratory or studio engagement. Such areas include web media, installation and performance art, and music performance. This course is not eligible for Credit/D/Fail grading.

EDCP 585 (3-6) d Special Course in Curriculum and Pedagogy
This course is not eligible for Credit/D/Fail grading.

EDCP 590 (3) Graduating Paper
This course is not eligible for Credit/D/Fail grading.
EDCP 598 (3/12) c Field Experiences
Field experiences in community-based or museum contexts. Focus on curriculum design and evaluation. This course is not eligible for Credit/D/Fail grading.

EDCP 599 (6-12) c Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

EDCP 601 (3/6) d Doctoral Seminar in Curriculum and Pedagogy: History and Theory
This course is not eligible for Credit/D/Fail grading.

EDCP 602 (3/6) d Doctoral Seminar in Curriculum and Pedagogy: Conceptualizing Research
This course is not eligible for Credit/D/Fail grading.

EDCP 605 (3-12) d Doctoral Seminar in Art Education
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDCP 606 (3/12) d Doctoral Seminar in Music Education
This course is not eligible for Credit/D/Fail grading.

EDCP 699 (0) Doctoral Dissertation
Pass/Fail.

Educational Studies, Faculty of Education

EDST: Educational Studies

EDST 314 (3) Social Issues in Education
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 400 (2-5) d Social and Ethical Considerations in Education
[5-0-0]

EDST 401 (3) Education, School, and Social Institutions
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 403 (1) Education, Knowledge, and Curriculum
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 404 (1) Ethics and Teaching
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 425 (3) Educational Anthropology
Selected concepts from educational anthropology for teachers. Comparative study of school and classroom culture, school teaching, and multicultural education. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 426 (3) History of Education
An examination of selected topics in the history of Canadian and British Columbian education and of the relationships between historical development and current educational policy. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 427 (3) Philosophy of Education
An introductory course in which consideration is given to the philosophical foundations of education and to the practical bearing of theory upon curriculum content and classroom practice in our schools. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 428 (3) The Social Foundations of Education
An application of the social sciences to the study of education. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 429 (3) Educational Sociology
Selected theories of society and schooling applied to Canadian education. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 451 (3) Issues and Frameworks in Environmental Education
Competing conceptions of environmental education; the social construction of nature and of science; addressing class, race, culture, and gender in developing sound teaching strategies. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDST 452 (3) Gender and Education
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 453 (3) Moral Education in Elementary and Secondary Schooling
   Approaches to moral education; developing educationally and morally justifiable teaching strategies. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 454 (3) Critical Thinking: Frameworks, Methods, and Challenges
   Competing conceptions of critical thinking, including feminist and post-colonial; teaching and evaluation strategies. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 455 (3) History of Childhood and Youth
   Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 493 (3) Introduction to the Study of Higher Education
   An overview of the field of study of higher education in Canada and other countries emphasizing current issues such as accessibility, enrolment, diversity of offerings, and internationalization. [3-0-0]

EDST 501 (3) Research Traditions in Educational Administration
   This course is not eligible for Credit/D/Fail grading.

EDST 502 (3/6) c Growing Up in History: Critical Approaches to Children and Youth
   This course is not eligible for Credit/D/Fail grading.

EDST 503 (3) Foundations of Adult Learning and Education
   This course is not eligible for Credit/D/Fail grading.

EDST 504 (3/6) c History of Educational Policy
   This course is not eligible for Credit/D/Fail grading.

EDST 505 (3) First Nations and Educational Change
   This course is not eligible for Credit/D/Fail grading.

EDST 506 (3) Educating the Body: Physicality and Identity in Historical Perspective
   This course is not eligible for Credit/D/Fail grading.

EDST 507 (3/12) d Topics in the History of Education
   This course is not eligible for Credit/D/Fail grading.

EDST 508 (3/12) c Review of Research in Educational Studies
   This course is not eligible for Credit/D/Fail grading.

EDST 509 (3) Constructing Citizens: Canada and the Educational Past
   This course is not eligible for Credit/D/Fail grading.

EDST 510 (3) Adult Education Research Traditions
   This course is not eligible for Credit/D/Fail grading. Equivalency: ADED 510.

EDST 511 (3) Organization and Administration of Higher Education
   This course is not eligible for Credit/D/Fail grading.

EDST 512 (3) Transitions and Access Across the Life Course
   This course is not eligible for Credit/D/Fail grading. Equivalency: HIED 512.

EDST 513 (3) Current issues in Higher Education
   This course is not eligible for Credit/D/Fail grading.

EDST 514 (3) Adult Education Program Planning Theory
   This course is not eligible for Credit/D/Fail grading.

EDST 515 (3) Survey Research Methods
   This course is not eligible for Credit/D/Fail grading.

EDST 516 (3) Adult Education and Community
   This course is not eligible for Credit/D/Fail grading.

EDST 517 (3) Improvement of Instruction Through Supervision
   This course is not eligible for Credit/D/Fail grading.
EDST 518 (3) Theory and Research on Adult Learning
   This course is not eligible for Credit/D/Fail grading.
EDST 519 (3) Theory and Research on Adult Instruction
   This course is not eligible for Credit/D/Fail grading.
EDST 520 (3) Perspectives on Adult Education Practice
   This course is not eligible for Credit/D/Fail grading.
EDST 521 (3) Foundations of Higher Education
   This course is not eligible for Credit/D/Fail grading.
EDST 522 (3) Adult Education Program Planning and Evaluation
   This course is not eligible for Credit/D/Fail grading.
EDST 523 (3/6) d Comparative Education
   This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EDST 426, EDST 427, EDST 429.
EDST 524 (6) Advanced Seminar in Comparative Education
   This course is not eligible for Credit/D/Fail grading.
EDST 525 (3) Program Evaluation in Adult and Community Education
   This course is not eligible for Credit/D/Fail grading.
EDST 526 (3) Advanced Study of Educational Organizations
   This course is not eligible for Credit/D/Fail grading.
EDST 527 (3) Higher Education Policy: International and Comparative Perspectives
   This course is not eligible for Credit/D/Fail grading.
EDST 528 (3) Social Movements, Political Learning and Popular Education
   This course is not eligible for Credit/D/Fail grading.
EDST 530 (3) Continuing Professional Education and Learning
   Study of the history, politics, and pedagogical dimensions of continuing professional education. This course is not eligible for Credit/D/Fail grading.
EDST 531 (3) The Politics of Educational Governance
   This course is not eligible for Credit/D/Fail grading. [3-0-0]
EDST 532 (3) Leadership in Educational Organizations
   This course is not eligible for Credit/D/Fail grading.
EDST 533 (3) Planning in Educational Organizations
   This course is not eligible for Credit/D/Fail grading. [3-0]
EDST 535 (3) Comparative and International Adult Education
   This course is not eligible for Credit/D/Fail grading.
EDST 536 (3) Higher Education Systems in Canada
   This course is not eligible for Credit/D/Fail grading.
EDST 540 (3/6) d Locating Oneself in Global Learning
   This course is not eligible for Credit/D/Fail grading.
EDST 541 (3) Adult Learning: Contexts and Perspectives
   This course is not eligible for Credit/D/Fail grading.
EDST 542 (3) Fostering Learning in Practice
   This course is not eligible for Credit/D/Fail grading.
EDST 543 (3) Understanding Research
   This course is not eligible for Credit/D/Fail grading.
EDST 544 (3) Global/Local Learning
   This course is not eligible for Credit/D/Fail grading.
EDST 545 (3) Indigenous Inquiry and Research
   This course is not eligible for Credit/D/Fail grading.
EDST 546 (3) Indigenous Methodology and Epistemology
This course is not eligible for Credit/D/Fail grading.

EDST 548 (3) Critical Perspectives on Teacher Unions in Educational Leadership
This course is not eligible for Credit/D/Fail grading.

EDST 550 (3) The Role of the School Principal
This course is not eligible for Credit/D/Fail grading.

EDST 551 (3) Personnel Administration in Education
This course is not eligible for Credit/D/Fail grading.

EDST 552 (3) School Law
This course is not eligible for Credit/D/Fail grading.

EDST 553 (3-6) d Group Inquiry into Educational Practices
This course is not eligible for Credit/D/Fail grading.

EDST 554 (3) Administration and Educational Policy
This course is not eligible for Credit/D/Fail grading.

EDST 555 (3) Educational Finance
This course is not eligible for Credit/D/Fail grading.

EDST 556 (3) Leadership and Administration of Educational Programs
This course is not eligible for Credit/D/Fail grading.

EDST 557 (3) Professional Ethics and School Leadership
This course is not eligible for Credit/D/Fail grading.

EDST 560 (3) Institutional Analysis and Planning in Higher Education
This course is not eligible for Credit/D/Fail grading.

EDST 561 (3/12) c Practicum
This course is not eligible for Credit/D/Fail grading.

EDST 565 (3/6) d Special Course in Subject Matter Field
This course is not eligible for Credit/D/Fail grading.

EDST 570 (3) Topics in Sociology of Education
This course is not eligible for Credit/D/Fail grading.

EDST 571 (3) Educational Research: Relating Questions, Theory, and Methodology
This course is not eligible for Credit/D/Fail grading.

EDST 572 (3) Research, Writing, and Representation
This course is not eligible for Credit/D/Fail grading.

EDST 573 (3) Sociology of the Curriculum
This course is not eligible for Credit/D/Fail grading.

EDST 575 (3) Work and Learning
This course is not eligible for Credit/D/Fail grading.

EDST 576 (3) Feminist Theory, Pedagogy and Curriculum
This course is not eligible for Credit/D/Fail grading.

EDST 577 (3) Social Contexts of Educational Policy, Politics and Practice
This course is not eligible for Credit/D/Fail grading.

EDST 578 (3) Multiculturalism and its Critical Alternatives: Diversity in Education and Society
This course is not eligible for Credit/D/Fail grading.

EDST 579 (3) School-Community Relations
This course is not eligible for Credit/D/Fail grading.

EDST 580 (3-12) c Directed Study
This course is not eligible for Credit/D/Fail grading.
EDST 581 (3) Leadership, Administration, and the Aims of Education
This course is not eligible for Credit/D/Fail grading.

EDST 582 (3) The Study of Educational Organizations
This course is not eligible for Credit/D/Fail grading.

EDST 583 (3/6) d Advanced Seminar in Educational Studies
This course is not eligible for Credit/D/Fail grading.

EDST 585 (3) Capstone: Society, Culture, and Politics in Education
This course is not eligible for Credit/D/Fail grading.

EDST 588 (3) Environmental Philosophy and Education
This course is not eligible for Credit/D/Fail grading.

EDST 590 (3) Graduating Paper
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 591 (3) d Indigenous Epistemology and Curriculum
This course is not eligible for Credit/D/Fail grading.

EDST 592 (3/6) c Topics in Philosophy of Education
This course is not eligible for Credit/D/Fail grading.

EDST 593 (3/6) d Ethics and Education
This course is not eligible for Credit/D/Fail grading.

EDST 594 (3) Philosophy of Educational Research
This course is not eligible for Credit/D/Fail grading.

EDST 595 (3) Philosophical Research in Education
This course is not eligible for Credit/D/Fail grading.

EDST 596 (3/6) c Philosophy and Educational Policy
This course is not eligible for Credit/D/Fail grading.

EDST 597 (3) Educational Theories: Equality, Democracy, and Justice
This course is not eligible for Credit/D/Fail grading.

EDST 598 (3-12) d Field Experiences
This course is not eligible for Credit/D/Fail grading.

EDST 599 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

EDST 601 (3/6) d Doctoral Seminar
Required of students in the first year of a doctoral program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 602 (3/6) c Doctoral Seminar
For students in the second year of a doctoral program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDST 690 (0) Ed.D. Thesis
Pass/Fail.

EDST 699 (0) Doctoral Dissertation
Pass/Fail.

Faculty of Education

EDUC: Education

EDUC 140 (3) Introduction to Indigenous Studies

EDUC 141 (3) Indigenous Studies
For students in the Indigenous Teacher Education Program (NITEP) only.

EDUC 143 (2) Seminar and Classroom Observation I
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 170 (3) Reviewing the Principles of Teaching
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 172 (3) Language and the Curriculum
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 173 (2) Teaching History and Government I
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 174 (2) Teaching Geography I
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 175 (2) Teaching Secondary English
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 176 (2) Teaching Mathematics I
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 177 (2) Teaching General Sciences
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 179 (3) Practicum I
For Dadaab, Kenya teacher education students. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 210 (3) Global Citizenship, Part 1: Introduction

EDUC 211 (3) Global Citizenship, Part 2: Community Service Learning and Capstone Conference
Prerequisite: One of ASTU 210, EDUC 210.
Equivalency: ASTU 211.

EDUC 240 (3) Issues in Indigenous Education
[3-0]

EDUC 244 (2) Seminar and Classroom Observation II
Pass/Fail This course is not eligible for Credit/D/Fail grading.

EDUC 270 (2) Communication Skills in Teaching
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 272 (2) Teaching Chemistry
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 273 (2) Teaching History and Government II
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 274 (2) Teaching Geography II
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 275 (3) Global Education
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 276 (2) Teaching Mathematics II
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 277 (3) Teaching Physics
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 278 (2) Teaching Biology
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 279 (3) Practicum II
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EDUC 280 (3) English and Reading: Secondary
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.
EDUC 315 (2) School-based Orientation Practicum
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 316 (1-3) d Communication Skills in Teaching
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 319 (1) Field Experience and Seminar
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 321 (1) School-based Orientation Practicum: Elementary
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EDUC 315.

EDUC 323 (1) School-based Orientation Practicum: Middle Years
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EDUC 315.

EDUC 342 (6) Teaching First Nations Languages in Elementary Schools
Prerequisite: One of LLED 489, LING 200, LING 400. LLED 486 and LING 433 are recommended as pre- or corequisites.

EDUC 344 (2) Issues in Indigenous Education
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of EDUC 143, EDUC 244.

EDUC 390 (3) Teaching and Learning in Digital Environments: Critical Perspectives

EDUC 395 (3/6) d Regional Field Studies in Education: Study, Travel, and Community Experience
Not offered on a regular basis.
Prerequisite: 12 credits of coursework approved by the Associate Dean (Teacher Education) as being appropriate to the particular study.

EDUC 399 (1) Field Experience and Seminar
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 418 (12-18) d School-based Extended Practicum: Elementary
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Normally all requirements set to precede this practicum.

EDUC 419 (12-18) d School-based Extended Practicum: Middle Years
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Normally all requirements set to precede this practicum.

EDUC 420 (2) Governance, Finance, and School Organization in its Social Context
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 421 (12-18) d School-based Extended Practicum: Secondary
This course is not eligible for Credit/D/Fail grading. Prerequisite: Normally all requirements set to precede this practicum.

EDUC 430 (1) Community-based Field Experience
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of EDUC 418, EDUC 419, EDUC 421.

EDUC 432 (3/6) d Clinical Supervision of Teaching
Recent research on teaching effectiveness. Enrolment limited to persons with teaching or supervisory experience.

EDUC 440 (3) Aboriginal Education in Canada
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EDUC 442 (1-3) d Critical Issues in Indigenous Education
Post-practicum students will explore how a school program may need to be modified in order to integrate more fully First Nations history, content, and world views.

EDUC 449 (3/6) c Supervised Research Investigation
Available only to outstanding students approved by the Associate Dean (Teacher Education).

EDUC 450 (2-3) Inquiry Seminar I
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
EDUC 451 (2-3) d Inquiry Seminar II
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EDUC 450.

EDUC 452 (2-3) d Inquiry Seminar III
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EDUC 451.

EDUC 480 (1-3) d Program Synthesis: E- Portfolio
This course is not eligible for Credit/D/Fail grading.

EDUC 490 (1-6) d Special Studies in Education
Topics not covered in a course. A pilot course may be offered under this name for only one year and with permission of the Associate Dean (Teacher Education).

EDUC 492 (3) Critical Analysis of Teaching: Planning for Context Appropriate Instruction

EDUC 495 (4-18) c Practicum (Elementary) for Previously Certified Teachers
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Completion of recent elementary teaching methods courses in the subjects to be taught.

EDUC 496 (4-18) c Practicum (Secondary) for Previously Certified Teachers
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Recent completion of secondary teaching methods courses in the subjects to be taught.

EDUC 500 (3) Research Methodology in Education
Overview of methodological approaches to research in education. This course is not eligible for Credit/D/Fail grading.

EDUC 503 (3/6) c Ethnography and Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: EDUC 500.

EDUC 504 (3) Seminar in Qualitative Data Analysis
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EDUC 503, EPSE 595. (May also be taken as co-requisites.)

EDUC 566 (6) Principles of Secondary Education
Recent thought on classroom procedures, provisions for individual differences, discipline. The place of various school subjects in total education, and remedial education in Canada and other countries. This course is not eligible for Credit/D/Fail grading.

EDUC 601 (6/12) c Doctoral Seminar
This course is not eligible for Credit/D/Fail grading.

EDUC 699 (0) Doctoral Dissertation
Pass/Fail.

Electrical & Computer Engineering, Faculty of Applied Science

EECE: Electrical and Computer Engineering

EECE 265 (3) Circuits and Electronics
Introduction to circuit analysis and electronic circuits; topics chosen for applicability to systems involving signal acquisition, amplification, low/high pass filtering and power control. Not open to students in the Faculty of Applied Science. This course is not eligible for Credit/D/Fail grading. [3-2-0]

EECE 280 (4) Electrical and Computer Engineering Laboratory I
Introduction to oscilloscopes, signal generators and electrical measuring instruments. Design projects in analog and digital logic circuits. This course is not eligible for Credit/D/Fail grading. [1-5-0]
Prerequisite: All of PHYS 153, MATH 101.
Corequisite: EECE 251.

EECE 283 (2) Electro-Mechanical Laboratory
Experiments in analog and digital electronics, including microcomputers. Not open to students in Electrical and Computer Engineering. This course is not eligible for Credit/D/Fail grading. [1-3-0]
EECE 301 (2) Topics in Nanotechnology and Microsystems
Guest lectures and preparatory theory will highlight emerging devices and systems. Restricted to students admitted to the Nanotechnology and Microsystems Option in the Electrical Engineering. This course is not eligible for Credit/D/Fail grading. [2-0]
Corequisite: APSC 201.

EECE 320 (4) Discrete Structures and Algorithms
Discrete structures, such as trees and graphs, and their properties; introduction to algorithms and algorithmic complexity. Proof of correctness; design techniques such as greedy algorithms and dynamic programming. Credit will be granted for only one of EECE 320 or CPSC 320. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of CPSC 260, CPSC 221.
Equivalency: CPSC 320.

EECE 321 (3) Languages and Translation
Principles and practice of automated language translation. Language syntax and semantics, typing, binding and parameter passing. Syntactic and lexical analysis. Language automata, parsing. Compilers and compiler-compilers. This course is not eligible for Credit/D/Fail grading. [3-1-0]
Prerequisite: CPSC 260.

EECE 359 (4) Signals and Communications
Review of Fourier analysis of signals; convolution and correlation; filtering, sampling, multiplexing and modulation of signals; introduction to probability with applications in communications. Credit will be granted for only one of EECE 359 or EECE 369, although EECE 359 is not equivalent to EECE 369. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of EECE 253, ELEC 202, EECE 269, ELEC 221.

EECE 362 (3) Communications Systems and Networks
Transceiver architectures; link budget analysis; elements of analog and digital communications methods; packet switched networks; multiple access; Internet architecture and protocols. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of EECE 269, EECE 359, EECE 369.

EECE 370 (3) Electrical Machines and Power Transmission
Electric power, three-phase systems, transmission/distribution; transformers, motors, generators. Not open to students in Electrical and Computer Engineering. Credit will only be given for one of EECE 365, 370, 373, 374 or 376. This course is not eligible for Credit/D/Fail grading. [2-2*-1]
Prerequisite: One of EECE 251, EECE 263.

EECE 374 (3) Electronics and Electromechanics
BJT and MOSFET amplifiers; cascade and differential amplifiers; nonideal OP amps; feedback; active filters; permanent magnet. DC motors; variable voltage control; software control of variable frequency; mechanical power, torque and speed. Credit will be granted for only one of EECE 356, EECE 365, EECE 370, EECE 373, EECE 374, EECE 376, or ELEC 342. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: EECE 251 and one of EECE 253, EECE 263.

EECE 375 (6) Computer-Based Instrumentation Design Laboratory
Theory and practice of electronic instrumentation for software engineers. Computer-based data acquisition and control techniques. Design project. This course is not eligible for Credit/D/Fail grading. [1-10-0]

EECE 400 (10) Nanotechnology and Microsystems Capstone Design Project
Design, analysis, and implementation of solutions in response to a real world nanotechnology and microsystems engineering problem. Projects are provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. This course is not eligible for Credit/D/Fail grading. [2-6-0; 2-6-0]

EECE 415 (3) Requirements Engineering for Software-Intensive Systems
Elicitation, analysis, validation, description, management and traceability of functional and non-functional requirements. Specialized techniques. Emphasis on software-intensive systems but also applicable to other kinds of engineered systems. This course is not eligible for Credit/D/Fail grading. [3-1-0]

EECE 423 (3) Software Systems for Modeling and Simulation
Discrete, continuous and hybrid approaches to modeling and simulating natural and artificial systems. Credit will be granted for only one of EECE 423 or CPSC 405. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: Either (a) CPSC 260 or (b) all of CPSC 211, CPSC 221; and one of STAT 251, MATH 318.

EECE 451 (3) Engineering Product Development and Management
Product development cycle: generation of ideas and market requirements for new products, economic and quality considerations,
the team approach, relationships with suppliers and evaluation of proposed products. Cases involving North American and Japanese firms. 

**EECE 467 (3) Real-time Implementation of DSP Algorithms**  
Review of sampling, digital filter design, convolution, transforms; DSP systems and architecture; programming DSP boards in "C" and assembly, fixed-point vs. floating point arithmetic; testing; DSP solutions in audio and telecommunications. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]

**EECE 468 (3) Digital Process Control**  
Discrete systems, z-transform; sampled data systems; process control algorithms; multivariable control; state space methods; response to stochastic inputs, Wiener and Kalman filtering; least squares parameter identification. *This course is not eligible for Credit/D/Fail grading.* [2-3-0]

Prerequisite: EECE 360.

**EECE 470 (3) Microwave Circuits**  
Transmission lines; microwave integrated circuit lines; passive microstrip devices; microwave solid state control devices and circuits, amplifiers, oscillators and frequency conversion circuits. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]

Prerequisite: One of EECE 364, PHYS 301, PHYS 354.

**EECE 474 (6) Instrumentation and Design Laboratory**  
Theory and practice of electrical measurements and electronic instrumentation. *This course is not eligible for Credit/D/Fail grading.* [1-10-0]

**EECE 478 (3) Computer Graphics**  
Physical and virtual graphics I/O devices. The GKS standard Interactive graphics. Transformations, modelling, rendering algorithms for 2-D and 3-D graphics. Curves and surfaces. Credit will be granted for only one of CPSC 314 or EECE 478. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]

Prerequisite: CPSC 260.

**EECE 485 (3) Digital Instrumentation for Mechanical Systems**  
Design of microcomputer-based controllers and instrumentation; basics of digital and analog computer interface hardware; processor structure and function; high-level and low-level languages and system design-related issues. Laboratory experiments in basic logic elements, computer interface control, and sensor-based software control of various devices. Credit will be granted for only one of EECE 485 or APSC 380. Not open to students in Electrical and Computer Engineering. *This course is not eligible for Credit/D/Fail grading.* [2-3*-2*]

Prerequisite: One of EECE 365, PHYS 253 and one of CPSC 152, CPSC 122, APSC 160 or APSC 171.

**EECE 503 (3) Biomedical Microdevices**  
Principles of sensors, actuators, microfluidics, biotechnology and nanotechnology, with applications in probing, detection, assaying, and drug delivery. *This course is not eligible for Credit/D/Fail grading.*

**EECE 508 (3) Multivariable Feedback Control**  
Well-posedness and internal stability of feedback systems, performance limitations, uncertainty, LFT representations, robust stability and robust performance, model reduction, linear matrix inequalities, H- infinity control, multi-objective control, mu-analysis and synthesis, H-infinity gain- scheduling, control applications. Credit will be granted for only one of MECH 528 or EECE 509. *This course is not eligible for Credit/D/Fail grading.*

Prerequisite: Completion of MECH 466, MECH 468, EECE 360, or equivalent is recommended.

**EECE 509 (3) Advanced Microsystems Design**  
Project-based modeling techniques applied to microsystems; multi-physics at microscale; physical limitations in MEMS; interface with electronics; behavioural modeling languages for mixed analog-digital system design. *This course is not eligible for Credit/D/Fail grading.*

**EECE 510 (3) Strategy and Leadership for Engineers**  
Strategic frameworks. Organizational change. Team dynamics, effectiveness, and decision-making. Personal leadership style and development. *This course is not eligible for Credit/D/Fail grading.*

**EECE 511 (3) Topics in Software Engineering**  
*This course is not eligible for Credit/D/Fail grading.*

**EECE 512 (3) Cybersecurity**  
*This course is not eligible for Credit/D/Fail grading.*

**EECE 513 (3) Error Resilient Computing Systems**
This course is not eligible for Credit/D/Fail grading.

EECE 514 (3) Software Verification and Testing
This course is not eligible for Credit/D/Fail grading.

EECE 518 (3) Human Interface Technologies
Human sensation, perception, kinetics; input technologies, gesture, vision, speech, audio; metaphors, information appliances, ubiquitous computing, wearable computing; output technologies, video display, speech, audio, tactile, haptic; evaluation methodology; user-centered design. This course is not eligible for Credit/D/Fail grading.

EECE 519 (3) Computer-Supported Collaborative Work
Technical and social perspectives on collaboration and teamwork. Communications theory and collaboration technologies including email, instant messaging, videoconferencing, hypertext, knowledge management, and digital libraries. This course is not eligible for Credit/D/Fail grading.

EECE 527 (3) Advanced Computer Architecture
Modern processor design with an emphasis on superscalar microarchitecture. Topics include: Quantitative principles, pipelining, memory hierarchy, multithreading, advanced instruction flow, and data flow techniques. This course is not eligible for Credit/D/Fail grading.

EECE 528 (3) Parallel and Reconfigurable Computing
Matching software parallelism to parallel hardware systems. Flynn’s classification; Amdahl’s Law; levels of parallelism; extra parallel work; communication; message passing; shared memory; vector programming; custom instruction set design; high-level synthesis; processor arrays; FPGAs. This course is not eligible for Credit/D/Fail grading.

EECE 531 (3) Nanoscale Modeling and Simulations
The many-body problem, molecular dynamics, tight-binding, first-principles (ab-initio) methods, the Hartree-Fock approach, the density functional theory, nanoscale simulation software and applications. This course is not eligible for Credit/D/Fail grading.

EECE 532 (3) Biomedical Microdevices
Principles of sensors, actuators, microfluidics, biotechnology and nanotechnology, with applications in probing, detection, assaying, and drug delivery. This course is not eligible for Credit/D/Fail grading.

EECE 534 (3) Green Nanoelectronic Devices
The fundamentals for operation, fabrication of green electronic devices using nanomaterials for generation, storage and management of clean electrical energy are presented. Examples include photovoltaic devices, light-emitting diodes, piezoelectric scavengers, thermoelectric devices, and batteries. This course is not eligible for Credit/D/Fail grading.

EECE 535 (3) Advanced Biophotonics
Physical principles and design of optical microscopy, optical spectroscopy, and optical imaging devices and systems, and their applications in diagnostics and therapeutics. This course is not eligible for Credit/D/Fail grading.

EECE 541 (3) Multimedia Systems
Theoretical and practical issues in designing multimedia systems. Interactive multimedia, digital video broadcasting and streaming, media asset management, video indexing and retrieval, content protection, and design of multimedia middleware. This course is not eligible for Credit/D/Fail grading.

EECE 542 (3) Computer-Integrated Surgery
Computer-integrated surgery systems such as point-based and intensity-based registration, targeting error estimation, surgical interface design, surgical robotics, and virtual reality, learned through hands-on applications and problems. This course is not eligible for Credit/D/Fail grading. [3-0-0]

EECE 543 (3) Software Project Management

EECE 544 (3) Medical Imaging
Physical principles of ultrasound, magnetic resonance, computed tomography and X-ray projection imaging. Methods of feature detection, segmentation, registration and visualization of 2D and 3D images. Applications in diagnostics, therapeutics and interventions. This course is not eligible for Credit/D/Fail grading.

EECE 549 (3) Dynamic Modeling of Electric Machines and Controls
Numerical aspects of time-domain simulation are reviewed. Dynamic modeling and analysis of power systems components
including transformers, induction and synchronous machines, inverters, electric drives and associated controls. This course is not eligible for Credit/D/Fail grading.

**EECE 550 (3) Topics in Power Electronic Design**
New devices and applications in power electronics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EECE 493.

**EECE 553 (3) Advanced Power Systems Analysis**
Computer-oriented analysis of electric power systems with regard to multiphase line constants, steady-state analysis of single and parallel circuits, lightning and switching surges; large-scale solution of power-flow problems; optimal real and reactive power flow. This course is not eligible for Credit/D/Fail grading.

**EECE 554 (3) Advanced Power System Control and Dynamics**
Synchronous machine modelling; excitation and speed governor systems; enhancing power system damping through excitation or governor control; linear optimal stabilization of power systems; load shedding, generator dropping and other emergency measures; asynchronous operation and resynchronization; nonlinear stability; power-frequency control. This course is not eligible for Credit/D/Fail grading.

**EECE 555 (3) Renewable and Efficient Electric Power Systems**
This course is not eligible for Credit/D/Fail grading.

**EECE 559 (3) Energy Storage Systems**
Superconducting Magnetic Energy Storage. Pumped Storage. Other possible technologies. System modeling and control. This course is not eligible for Credit/D/Fail grading.

**EECE 560 (3) Network Analysis and Simulation**

**EECE 561 (3) Alternative Energy Sources**
Photovoltaic, wind, small hydro and fuel cell systems for stand alone and grid connected use. This course is not eligible for Credit/D/Fail grading.

**EECE 562 (3) Statistical Signal Processing with Applications in Wireless Communications and Defence**

**EECE 563 (3) Wireless Communication Systems**
This course is not eligible for Credit/D/Fail grading.

**EECE 564 (3) Detection and Estimation of Signals in Noise**
Formulation of the detection problem, optimum receiver principles, signal space, maximum likelihood decisions, error performance calculations. Estimation of signals in noise, linear and non-linear estimation, cost functions, recursive mean square estimation, Wiener and Kalman filters. This course is not eligible for Credit/D/Fail grading.

**EECE 565 (3) Communication Networks**
Analysis and design of communications networks; network architectures; Internet protocols; routing; scheduling algorithms; medium access control; congestion control; admission control; optimization techniques; network management. This course is not eligible for Credit/D/Fail grading.

**EECE 566 (3) Communication and Information Theory**
Coding for noisy channels, linear block codes, cyclic codes, convolutional codes, maximum likelihood decoding, trellis coded modulation, measure of information, source coding, channel capacity theorem. This course is not eligible for Credit/D/Fail grading.

**EECE 567 (3) Power System Dynamics and Stability**
This course is not eligible for Credit/D/Fail grading.

**EECE 568 (3) Control Systems**
State-space analysis of continuous and discrete multivariable systems. Controllability and observability. Sensitivity considerations. Stability of linear and nonlinear systems. This course is not eligible for Credit/D/Fail grading.

**EECE 569 (3) Mobile Communications Networks**
Network architectures: cellular networks, ad hoc networks; access protocols; radio and network resource management; quality of
service; mobility and location management; routing; mobile-IP; current wireless technologies for personal, local and satellite networks.

EECE 570 (3) Fundamentals of Visual Computing
Computational and mathematical methods for data driven processing and model-based analysis of digital images and other visual data: perception, capture; representation, modeling; enhancement, restoration; registration, fusion; feature extraction, segmentation; recognition; practical applications. This course is not eligible for Credit/D/Fail grading.

EECE 571 (1-12) d Electrical Engineering Seminar and Special Problems
This course is not eligible for Credit/D/Fail grading.

EECE 573 (3) Micro and Nano Fabrication Technologies
Review of principles and practices of micro/nano fabrication technologies. Material and process selection; IC fabrication; silicon micromachining; LIGA; micro-EDM; mechanical processing; nanostructuring. Applications to MEMS/NEMS and other emerging devices. This course is not eligible for Credit/D/Fail grading.

EECE 574 (3) Self-Tuning Control
Adaptive control; system identification; self-tuning control; design and implementation considerations; algorithm convergence and stability; industrial applications. This course is not eligible for Credit/D/Fail grading.

EECE 575 (3) Digital Image and Video Processing
Mathematical preliminaries; image perception and modelling; image sampling and quantization; mathematical modelling; image enhancement; image restoration; image reconstruction from projections; image analysis; digital video; spatio-temporal sampling and reconstruction; motion modelling and estimation; video filtering. This course is not eligible for Credit/D/Fail grading.

EECE 576 (3) Semiconductor Theory for Device Applications
A quantum mechanical treatment of the structure and electronic properties of semiconducting materials and electronic devices; including bandstructure, carrier transports mechanisms, quantum tunneling, and scattering. This course is not eligible for Credit/D/Fail grading.

EECE 577 (3) Solid State Electronic and Photonic Devices
Solid-state devices of current interest (e.g., heterostructure transistors and lasers, very high speed silicon bipolars, short-channel MOSFETs) and their application in high-speed circuits. This course is not eligible for Credit/D/Fail grading.

EECE 578 (3) Integrated Circuit Design-for-Test
Test and design-for-test methodologies. Fault modeling, test generation, test architectures, System on Chip test infrastructure and methodologies. Digital, analog, and mixed-signal circuit test and design for testability and manufacturability. EECE 479 is recommended. This course is not eligible for Credit/D/Fail grading.

EECE 579 (3) Advanced Topics in VLSI Design
A course in VLSI design with an emphasis on new methodologies in digital IC design. Top-down design and CAD tools are illustrated through a class project. EECE 479 and EECE 481 are recommended. This course is not eligible for Credit/D/Fail grading.

EECE 580 (3) Emerging Electronic Materials and Devices
The physics, fabrication and characterization of organic and carbon nanotube based capacitors, transistors, batteries, electrochromic windows, active displays, chemical sensors, photo-detectors, strain gauges, actuators and single molecule devices. This course is not eligible for Credit/D/Fail grading.

EECE 581 (3) Advanced Microsystems Design
Project-based modeling techniques applied to Microsystems; multi-physics at microscale; physical limitations in MEMS; interface with electronics; behavioural modeling languages for mixed analog-digital system design. This course is not eligible for Credit/D/Fail grading.

EECE 582 (3) Optical Fibers and Devices
Modeling and analysis of dielectric waveguides; loss and dispersion in optical fibers; integrated-optics and photonics devices. This course is not eligible for Credit/D/Fail grading.

EECE 583 (3) CAD Algorithms for Integrated Circuits
Algorithms used in contemporary computer-aided design tools targeting custom integrated circuits and field-programmable gate arrays, including high-level synthesis, logic optimization, partitioning, placement and routing, optimization techniques. This course is not eligible for Credit/D/Fail grading.

EECE 584 (6) Nanophotonics Fabrication
Design, fabricate, and test a photonic integrated circuit (PIC) using silicon-on-insulator (SOI) technology. Modelling and design of
optical components. This course is not eligible for Credit/D/Fail grading.

**EECE 585 (3) Electromagnetic Compatibility**

History of electromagnetic compatibility; standards and regulations; component models; radiated emissions; conducted emissions; transmission lines and cross-talk; shielding; electrostatic discharge; EMC system design. This course is not eligible for Credit/D/Fail grading. [2-3*-0]

**EECE 586 (3) Waves, Principles and Applications in Signal Processing**

Concepts, methodologies and tools of signal processing using wavelets, including multi-resolution analysis, wavelet packets, wavelet dictionaries, wavelet denoising and selected applications. This course is not eligible for Credit/D/Fail grading.

**EECE 587 (3) Radio-Frequency Integrated Circuits**

RLC matching networks, general noise theory, radio transmitter and receiver architectures, low-noise amplifiers, mixers, voltage controlled oscillators, power amplifiers. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of EECE 269, EECE 359, EECE 369.

Corequisite: EECE 488.

**EECE 588 (3) Analog Integrated Circuit Design**

Analysis and design emphasizing CMOS implementations. Gain stages, biasing circuits, comparators, sample-and-hold circuits, switched-capacitor circuits, Nyquist-rate and oversampling A/Ds and D/A, oscillators, PLLs. This course is not eligible for Credit/D/Fail grading.

**EECE 589 (3) Introduction to Robotics**

This course is not eligible for Credit/D/Fail grading.

**EECE 592 (3) Architecture for Learning Systems**

Learning in neural networks; error backpropagation, simulated annealing, content addressable memories. Data representation topics. Reinforcement learning (RL). Implementation challenges in real world scale problems. Architectures for function approximation in RL. Comparison with conventional AI; history and emerging trends. This course is not eligible for Credit/D/Fail grading.

**EECE 593 (3) Active Silicon Photonics Design**

This course is not eligible for Credit/D/Fail grading. Prerequisite: EECE 584.

**EECE 594 (3) Semiconductor Lasers and Optoelectronics**

Theory, modeling, design, and performance of semiconductor lasers; laser applications; semiconductor materials; advanced technology for semiconductor laser fabrication. This course is not eligible for Credit/D/Fail grading.

**EECE 595 (3) Mixed-Signal and RF Integrated Circuits and Systems Test**

This course is not eligible for Credit/D/Fail grading.

**EECE 597 (6) Engineering Report**

Project report on assigned topic of specialization. For students registered in the M.Eng. program in Electrical or Computer Engineering. This course is not eligible for Credit/D/Fail grading.

**EECE 599 (12) Thesis**

For M.A.Sc. This course is not eligible for Credit/D/Fail grading.

**EECE 699 (0) Doctoral Dissertation**

For Ph.D.

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**Electrical & Computer Engineering, Faculty of Applied Science**

**ELEC: Electrical Engineering**

**ELEC 201 (4) Circuit Analysis I**

The fundamentals of analysis of lumped linear time-invariant circuits; network theorems; operational amplifiers; first order circuits; DC analysis of diodes, BJT, and FET circuits. This course is not eligible for Credit/D/Fail grading. [4-2*-2*]

Prerequisite: MATH 101 and one of PHYS 102, PHYS 153, PHYS 158.

Corequisite: One of MATH 255, MATH 256, MATH 265.

**ELEC 202 (4) Circuit Analysis II**

Phasor analysis and AC three phase systems power; transfer functions; Bode plots; filters and resonance; Laplace transforms;
transformers; two-port networks. First and second order circuits. This course is not eligible for Credit/D/Fail grading. [4-0-1]
Prerequisite: All of PHYS 153, MATH 101 and one of EECE 251, EECE 263, ELEC 201, ELEC 203.
Corequisite: One of MATH 255, MATH 256, MATH 265.

ELEC 203 (3) Basic Circuit Analysis
Ideal passive elements and sources; Kirchhoff's Laws; DC circuits; natural and complete response of first order circuits; operational amplifiers; impedance; phasors; complex power. Not open to students in Electrical and Computer Engineering. This course is not eligible for Credit/D/Fail grading. [3-2*-1]
Corequisite: One of MATH 255, MATH 256.

ELEC 204 (4) Linear Circuits
Basic concepts and analysis techniques in the context of electric and electronic circuits including Bode plots and the Laplace transform. Treatment of RLC circuits, phasors, op-amps. Introduction to nonlinear circuit elements, diodes, BJT, FET circuits. This course is not eligible for Credit/D/Fail grading. [4-0-1]
Prerequisite: MATH 152 and one of PHYS 102, PHYS 158, PHYS 153.
Corequisite: One of MATH 256, MATH 255.

ELEC 205 (1) Electronics Laboratory
Experiments involving electronic devices and circuits. This course is not eligible for Credit/D/Fail grading. [0-1-0; 0-1-0]
Corequisite: One of EECE 252, ELEC 204.

ELEC 211 (2) Engineering Electromagnetics
Electrostatics, electric currents, dielectrics, capacitance, electrostatic potential, magnetostatics. This course is not eligible for Credit/D/Fail grading. [2-0-1]
Prerequisite: One of MATH 263, MATH 253 and one of PHYS 102, PHYS 153, PHYS 158.
Corequisite: MATH 264.

ELEC 221 (4) Signals and Systems
Complex numbers, LTI systems, convolution sum, discrete-time Fourier series and transforms, z-transform, sampling, introduction to filtering and modulation, feedback systems, stability. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of MATH 263, MATH 253 and one of PHYS 102, PHYS 153, PHYS 158.
Corequisite: MATH 264.

ELEC 271 (1) Selected Topics in Biomedical Engineering
Effective communication in a multidisciplinary environment, introduction to emerging areas of biomedical engineering and biotechnology, ethics, and responsibility. Restricted to students admitted to the Biomedical Engineering program in Electrical Engineering. This course is not eligible for Credit/D/Fail grading. [1-0-0]
Corequisite: One of EECE 253, ELEC 202.

ELEC 281 (3) Technical Communication
Written and oral communication in engineering. Technical description, report preparation, business correspondence, and oral presentation of technical material. Restricted to students in second year of Electrical and Computer Engineering programs. Credit will be granted for only one of ELEC 281, CPEN 281, BMEG 201 or APSC 201. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.

ELEC 291 (6) Electrical Engineering Design Studio I
Design projects involving electronic devices and circuits, electromagnetics, signals and systems, and microcomputers. This course is not eligible for Credit/D/Fail grading. [2-6-0]
Prerequisite: One of EECE 251, ELEC 201 and one of EECE 259, CPEN 211.

ELEC 292 (6) Biomedical Engineering Design Studio
Design projects involving electronic devices and circuits, electromagnetics, signals and systems, microcomputers with applications in biomedical engineering. Final group project requiring oral presentation of student-prepared slides. This course is not eligible for Credit/D/Fail grading. [2-6-0]
Corequisite: One of EECE 251, ELEC 201 and one of EECE 259, CPEN 211 and one of EECE 269, ELEC 221.

ELEC 301 (4) Electronic Circuits
Analysis and design of electronic circuits; biasing of and small-signal models for transistors; frequency response of amplifiers; feedback and stability aspects of amplifier design; OP-AMPS: active filters; oscillators; IC specification and selection. Credit will only be given for one of EECE 356, ELEC 301, and EECE 374. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Prerequisite: Either (a) one of EECE 251, ELEC 201, EECE 263, ELEC 203 and one of EECE 253, ELEC 202; or (b) one of EECE 252, ELEC 204.
ELEC 302 (3) Electronic Circuits for Electromechanical Design
Semiconductor fundamentals; modelling of electronic devices including diodes and transistors; design of power supplies, waveform generators and logic circuits; signals in time and frequency domains; operational amplifiers; active filters; oscillators; device specification and selection. This course is not eligible for Credit/D/Fail grading. [3-2*-0]
Prerequisite: One of EECE 251, ELEC 201, EECE 263, ELEC 203, MECH 221.

ELEC 311 (4) Electromagnetic Fields and Waves
Waves and propagation; Maxwell's equations; applications including transmission lines; impedance matching and Smith charts; reflection and refraction; waveguides and antennas. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Prerequisite: One of ELEC 261, ELEC 211 and either (a) all of MATH 101, MATH 263, MATH 265, MATH 267 or (b) all of MATH 101, MATH 253, MATH 264, MATH 265, MATH 267 or (c) all of MATH 101, MATH 253, MATH 256, MATH 264.

ELEC 315 (4) Electronic Materials and Devices
Fundamental aspects of electronic materials such as: semiconductors, metals, dielectrics, piezoelectrics, magnetic materials, and their applications in devices such as diodes, transistors, and transducers. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Prerequisite: One of EECE 261, ELEC 211, ENPH 253.

ELEC 321 (4) Stochastic Signals and Systems
Stochastic behaviour of signals and systems; discrete and continuous probability; random processes; modeling and identification of linear time-invariant systems; binary hypothesis testing and decision making. Credit will be granted for only one of ELEC 321 or STAT 357. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of ELEC 269, ELEC 221, STAT 305. STAT 305 may be taken concurrently, with registration assistance from Electrical and Computer Engineering Student Services. Equivalency: STAT 321.

ELEC 331 (4) Computer Communications
Analysis, design and implementation of computer networks and their protocols. Application layer protocols, transmission control protocol (TCP), Internet protocol (IP), routing algorithms, reliable data transfer, multiple access, Ethernet. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of ELEC 269, ELEC 221, CPSC 261, EECE 359, EECE 315, CPEN 331.

ELEC 341 (4) Systems and Control
Continuous time system analysis by Laplace transforms; system modeling by transfer function and state space methods; feedback, stability and sensitivity; control design; frequency domain analysis. Credit will be granted for only one of EECE 360, ELEC 341 or ELEC 369. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Prerequisite: One of EECE 253, ELEC 202, ELEC 204, ELEC 269, ELEC 221.

ELEC 342 (4) Electro-Mechanical Energy Conversion and Transmission
Three phase power; transformers and harmonics; magnetic materials and circuits, electromechanical energy conversion; DC machines; rotating magnetic field, AC induction and synchronous machines; variable frequency operation, brushless DC machines; stepper and single-phase motors. Credit will only be given for one of EECE 373, ELEC 342, and EECE 374. This course is not eligible for Credit/D/Fail grading. [3-3*-1]
Prerequisite: PHYS 170 and one of EECE 253, EECE 263, ELEC 202, ELEC 203.

ELEC 343 (3) Electromechanics
Electromechanical energy conversion; linear actuators; torque/speed of rotating devices; reluctance, stepper, permanent-magnet, induction, brushless-DC motors and DC motors; actuator/motor drive circuits/controllers. Credit will be granted for only one of EECE 365, ELEC 344, EECE 370, EECE 373, ELEC 342, EECE 374, EECE 376, or ELEC 343. This course is not eligible for Credit/D/Fail grading. [3-2*-0]
Prerequisite: One of EECE 253, ELEC 202, ELEC 363, ELEC 302.

ELEC 344 (3) Applied Electronics and Electromechanics
Characteristics of semiconductor devices; analog circuits; force and torque production; motor principles and torque-speed characteristics; principles of power electronics. Not open to students in Electrical and Computer Engineering. This course is not eligible for Credit/D/Fail grading. [2-2*-2]
Prerequisite: One of EECE 251, ELEC 201, EECE 263, ELEC 203, MECH 221.

ELEC 352 (4) Electric Energy Systems
Balanced and unbalanced three phase energy systems. Modeling of generators, transmission lines, transformers and loads. High voltage transmission, low voltage industrial and domestic distribution. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of EECE 253, ELEC 202 and one of EECE 373, ELEC 342.
ELEC 361 (4) Molecules to Mechanisms
Forces, scaling, thermal, fluidic, and mechanical properties relevant to the design of emerging devices and systems whose basic structures are at micrometer and nanometer scales. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Corequisite: EECE 360.

ELEC 371 (3) Biomedical Engineering Instrumentation
Theory and experiments involving instruments for general, orthopedic, cardiac and minimally invasive surgery as well as sensors for respiratory, cardiac, bioelectric, biochemical and nervous system measurement. Restricted to students admitted to the Biomedical Engineering option in Electrical Engineering. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Either (a) all of MATH 265, MATH 267 or (b) MATH 256; and one of MATH 253, MATH 263; and either (a) EECE 253 or (b) all of ELEC 202, EECE 259 or (c) all of CPEN 211, EECE 261 or (d) all of ELEC 211, EECE 262 or (e) ELEC 292.

ELEC 391 (6) Electrical Engineering Design Studio II
Introduction to project management. Problem definition. Design principles and practices. Implementation techniques including circuit design, software design, solid modeling, PCBs, assembling, and packaging. Testing and evaluation. Effective presentations. This course is not eligible for Credit/D/Fail grading. [2-6-0]
Prerequisite: One of CPEN 291, ELEC 291, ELEC 292, EECE 352, ELEC 315, EECE 356, ELEC 301, EECE 359, ELEC 360, ELEC 341, ELEC 364, ELEC 311, EECE 373, ELEC 342.

ELEC 400 (1-8) Topics in Electrical Engineering
Lectures or projects on subjects of current interest. This course is not eligible for Credit/D/Fail grading.

ELEC 401 (3) Analog CMOS Integrated Circuit Design
Design and analysis of analog integrated circuits, with emphasis on CMOS design techniques. Gain stages, opamp design, frequency compensation, oscillators, A/D, D/A converters, PLL, DLL. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of EECE 356, ELEC 301, EECE 363, ELEC 302, EECE 374.

ELEC 402 (4) Introduction to VLSI Systems
Static CMOS combinational logic circuits. Standard cells design and layout. Memory element (flip-flop and latch) design. Dynamic logic families. Synchronous logic and timing analysis. Power, scaling, and industry trends. Verification. VHDL/Verilog design, layout and synthesis project using CAD tools. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Prerequisite: One of EECE 353, CPEN 311.

ELEC 403 (3) Advanced Digital VLSI Systems
Logical effort. Noise in digital systems. Low power techniques. Power distribution. SRAM and DRAM design. Non-volatile memory technologies. High speed adder, multiplier and divider design. Clock Trees. Synchronization and FIFO. Scaling, and industry trends. High-speed circuit design and layout project. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of ELEC 402, EECE 479.

ELEC 404 (3) RF Integrated Circuits
Introduction to radio-frequency (RF) communication systems; matching networks, transceiver architectures, low noise amplifiers, mixers, oscillators, etc. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of ELEC 221, EECE 359, EECE 369.
Corequisite: One of ELEC 488, EECE 401.

ELEC 411 (3) Antennas and Propagation
Basic antenna concepts; antennas for low, medium and high frequencies; terrestrial and satellite propagation links; environmental effects on electromagnetic radiation. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: One of EECE 364, ELEC 311, PHYS 301, PHYS 354.

ELEC 412 (3) Optical Waveguides and Photonics
Planar dielectric waveguides; single mode optical fibers; integrated optics waveguides and devices; semiconductor lasers; optical detectors; optical communications links. This course is not eligible for Credit/D/Fail grading. [2-0-2]

ELEC 413 (3) Semiconductor Lasers
An introduction to lasers and applications. Theory, modeling, fabrication and performance of semiconductor lasers. Optical communications links. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 415 (3) Semiconductor Devices: Physics, Design and Analysis
Physics of operation, and design and analysis of semiconductor devices of topical interest, e.g., solar cells, LEDs, high-speed MOSFETs, high-frequency HBTs, low-noise HEMTs. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 352, ELEC 315, PHYS 304.
ELEC 416 (3) Quantum Dots and Device Applications
Theory and modeling techniques of 0-dimensional structures. Electronic, magnetic, and optical properties of quantum dots. Current and future applications of quantum dots including: single electron transistors, quantum dot lasers, optical detectors. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 421 (3) Digital Signal and Image Processing
DSP fundamentals; image processing; signal representation; digital filtering; statistical estimation; DSP applications. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: One of EECE 269, ELEC 221, EECE 359, EECE 369.

ELEC 422 (3) Biosignals and Systems
Data acquisition, time and frequency domain analysis, analog and discrete filter design, sampling theory, time-dependent processing, linear prediction, random signals, biomedical system modeling, and stability analysis; introduction to nonlinear systems. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 331, ELEC 371 and one of EECE 360, ELEC 341 and one of EECE 269, ELEC 221, EECE 359 and one of CPSC 260, CPSC 259 and one of STAT 251, MATH 318, MATH 302, STAT 302.

ELEC 431 (3) Communication Systems I
Review of probability theory, signals and noise; digital communication over Gaussian noise channels, optimal receiver design, modulation techniques and error performance calculations; measure of information, source coding, symbol and stream codes; channel coding, capacity, simple linear block codes; practical applications. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 269, EECE 359, ELEC 221 and one of EECE 357, ELEC 321, MATH 302, MATH 318, STAT 251, STAT 302, STAT 357.

ELEC 432 (3) Communication Systems II
Communication over bandlimited additive white Gaussian noise channels; power spectra of digitally modulated signals; intersymbol interference; cyclic, convolutional, low-density parity check and turbo codes; trellis coded modulation; spread spectrum techniques; security; wireless communication systems and standards; practical applications. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 431, ELEC 371 and one of EECE 360, ELEC 341 and one of EECE 269, ELEC 221, EECE 359 and one of CPSC 260, CPSC 259 and one of STAT 251, MATH 318, MATH 302, STAT 302, STAT 357.

ELEC 433 (3) Error Control Coding for Communications and Computers
Design techniques, including Hamming, BCH, Reed-Solomon, LDPC and convolutional codes, ARQ techniques, and LFSR implementation of encoding-decoding algorithms. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 434 (3) Introduction to Optical Networks
Wavelength division multiplexing, framing techniques, traffic grooming, virtual topology design, routing and wavelength assignment, protection and restoration, optical packet switching. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 269, ELEC 221, EECE 359, EECE 369.

ELEC 441 (3) Control Systems
Relationships between system parameters and system responses for linear control systems. Design specifications for dynamic and steady-state performance and realization by use of feedback control. Robust design of PID controllers and multivariable controllers. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of EECE 360, ELEC 341.

ELEC 442 (3) Introduction to Robotics
Common manipulator configurations, actuator and sensor technology. Efficient representations and computational methods for real-time microprocessor-based implementation of robot control algorithms. Robot control methods, network equivalents, impedance control. Introduction to teleoperation implementation aspects. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: PHYS 170.

ELEC 451 (4) Power Electronics
Power diodes, thyristors, transistors and FETs; analysis of idealized circuits with generalized loads; AC-DC, DC-DC, DC-AC, AC-AC converters, modulation techniques, gating circuits; practical design and applications. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of EECE 356, EECE 365, ELEC 301, ELEC 344, ELEC 373, ELEC 342.

ELEC 452 (3) Industrial Drives
Typical mechanical loads; dynamic and static characteristics and analysis of DC and AC drives; microprocessor-based controllers; commercial choices of drives for various applications. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of EECE 373, ELEC 342, EECE 376, ELEC 343.

ELEC 453 (4) Power System Analysis
Transmission and distribution; phasors, complex power; balanced/unbalanced three-phase operation; symmetrical components, sequence networks; voltage regulation; short circuit capacity; circuit breakers; transmission lines, series/shunt impedance; short, medium, and long line models. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of EECE 373, ELEC 342.

ELEC 454 (4) Power System Analysis II
Power system monitoring/control; large networks; automatic generation control; optimum power flow calculations; traveling wave transmission lines; EMTP and MATLAB programs for transients, short-circuit, and transient stability analysis. This course is not eligible for Credit/D/Fail grading. [3-0-2]  
Prerequisite: One of EECE 458, ELEC 453.

ELEC 455 (3) Power Systems Protection
Analysis of disturbances, security of power systems, cascading and blackouts; role and impact of protection; transducers and measuring elements; protection of transmission and distribution systems; protection of generators, substation equipment, special protection systems and relays. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: One of EECE 458, ELEC 453 and one of EECE 373, ELEC 342, EECE 374.

ELEC 456 (3) Decision Support Methods in Power Systems Operation
Principles; acceptable regions of operation; energy management systems; load flow methods; static and dynamic security; contingency analysis; transient and voltage stability; on-line stability assessment. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 457 (3) Optimization of Power System Operation
Application of linear and nonlinear optimization methods in power systems; constrained optimization; optimal power flow; economic dispatch; electricity market; local prices for active and reactive power; security-constrained OPF; state estimation, reliability analysis. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 461 (3) Nanotechnology in Electronics
Topics of special importance to understanding and designing electronic devices in which quantum effects and the discrete nature of matter become important. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: One of CHEM 312, EECE 352, ELEC 315, PHYS 250, PHYS 304.  
Corequisite: One of APSC 201, MTRL 478.

ELEC 462 (3) Sensors and Actuators in Microsystems
The mechanisms, design, fabrication, and testing of microsensors, actuators, and microelectromechanical systems (MEMS). This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 463 (3) Micro/Nanofabrication and Instrumentation Laboratory
Microfabrication methods and nanofabrication techniques. Imaging and characterization of micro and nanostructures. Restricted to students admitted to the Nanotechnology and Microsystems Option in Electrical Engineering. This course is not eligible for Credit/D/Fail grading. [2-4-0]

ELEC 464 (3) Nanotechnology and Nature
Examples of nature’s fabrication methods, sensors, actuators, energy harvesting, signaling and information processing, and comparisons with artificial methods. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 465 (3) Microsystems Design
Structured modeling and design practices; multiphysics at microscales; physical limitations in MEMS; interface with electronics; behavioural modeling languages for mixed analog-digital system design. Credit will only be given for one of EECE 489, ELEC 465, or EECE 581. This course is not eligible for Credit/D/Fail grading. [3-0-0]

ELEC 471 (3) Medical Imaging
Physical principles of ultrasound, magnetic resonance, computed tomography, X-ray projection imaging and molecular imaging in medical imaging for diagnostics, therapeutics, and interventions. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: One of EECE 331, ELEC 371 and one of EECE 360, ELEC 341 and one of EECE 364, ELEC 311 and one of EECE 269, ELEC 221, EECE 359.  
Equivalency: BMED 390.

ELEC 472 (3) Biomechatronics
Design of mechatronic systems to measure and manipulate biological materials and processes; compliant structures;
bioelectronic circuits; biomedical embedded systems and BioMEMS. Example applications from clinical medicine and biomedical research. Credit will be granted for only one of MECH 423 or EECE 424. **This course is not eligible for Credit/D/Fail grading.** [2-0-0]

**Prerequisite:** One of EECE 251, ELEC 201 and one of EECE 253, ELEC 202 and one of EECE 259, CPEN 211 and one of EECE 360, ELEC 341.

**ELEC 473 (3) Biological Micro-Electro-Mechanical Systems**

Principles of sensors, actuators, microfluidics, biotechnology and nanotechnology, with applications in probing, detection, assaying and drug delivery. **This course is not eligible for Credit/D/Fail grading.** [3-0-0]

**ELEC 474 (3) Biophotonics**

Lens theory, light sources and detectors, image resolution and contrast, tissue absorption and scattering, fluorescence, microscopy, spectroscopy, optical imaging systems, and their applications to life sciences and medicine. **This course is not eligible for Credit/D/Fail grading.**

**ELEC 481 (3) Economic Analysis of Engineering Projects**

Time-money relationships; economic analysis of alternatives including the effects of interest rates, inflation, depreciation, taxation and uncertainty; cost estimation and budgeting; financial analysis of engineering operations. **This course is not eligible for Credit/D/Fail grading.**

**ELEC 491 (10) Electrical Engineering Capstone Design Project**

Design, analysis, and implementation of solutions in response to a real world electrical engineering problem, provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. **This course is not eligible for Credit/D/Fail grading.** [2-6-0; 2-6-0]

**Prerequisite:** One of ELEC 391, EECE 380.

**ELEC 492 (10) Electrical Energy Systems Capstone Design Project**

Design, analysis, and implementation of solutions in response to a real world electrical energy systems problem, provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. **This course is not eligible for Credit/D/Fail grading.** [2-6-0; 2-6-0]

**Prerequisite:** One of ELEC 391, EECE 380.

**ELEC 493 (10) Nanotechnology and Microsystems Capstone Design Project**

Design, analysis, and implementation of solutions in response to a real world nanotechnology and Microsystems engineering problem. Projects are provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. **This course is not eligible for Credit/D/Fail grading.** [2-6-0; 2-6-0]

**Prerequisite:** One of ELEC 391, EECE 380.

**ELEC 494 (10) Biomedical Engineering Capstone Design Project**

Design, analysis, and implementation of solutions in response to a real world biomedical engineering problem, provided by industry, research laboratories, or other suitable entities. Includes coverage of topics such as project management. **This course is not eligible for Credit/D/Fail grading.** [2-6-0; 2-6-0]

**Prerequisite:** One of ELEC 391, EECE 380.

**ELEC 499 (3/6) c Undergraduate Thesis**

Project in electrical engineering or computer engineering involving design, experimental and/or computer simulation work as selected from topics supplied by faculty members. An individual project thesis is to be prepared according to specifications available from the departmental office. **This course is not eligible for Credit/D/Fail grading.** [0-6-0] or [0-12-0]

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**Commerce, Faculty of Commerce & Business Administration**

**EMBA: Executive M.B.A.**

**EMBA 500 (6-20) d EMBA Core**

Restricted to Executive M.B.A. students. **This course is not eligible for Credit/D/Fail grading.**

*Equivalency:* BA 500.

**EMBA 501 (1.5) Business Law**

Restricted to Executive M.B.A. students. **This course is not eligible for Credit/D/Fail grading.**

*Equivalency:* BALA 500.

**EMBA 508 (1.5) Topics in Business Law**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMBA 511</td>
<td>Application of Statistics in Management</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BALA 580.</td>
</tr>
<tr>
<td>EMBA 512</td>
<td>Operations and Logistics</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>EMBA 513</td>
<td>Supply Chain Management</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BASC 514.</td>
</tr>
<tr>
<td>EMBA 518</td>
<td>Topics in Operations and Logistics</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BASC 514.</td>
</tr>
<tr>
<td>EMBA 521</td>
<td>Organizational Behaviour</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>EMBA 522</td>
<td>Leadership</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>EMBA 523</td>
<td>Negotiation</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAHR 507.</td>
</tr>
<tr>
<td>EMBA 524</td>
<td>Business Ethics</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAHR 502.</td>
</tr>
<tr>
<td>EMBA 525</td>
<td>Managing Change</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAHR 508.</td>
</tr>
<tr>
<td>EMBA 526</td>
<td>International Health Care Systems</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>EMBA 528</td>
<td>Topics in Human Resources</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAHR 580.</td>
</tr>
<tr>
<td>EMBA 531</td>
<td>Informational Technology</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
</tr>
<tr>
<td>EMBA 532</td>
<td>Survey of Information Technology Applications in Business</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAIT 501.</td>
</tr>
<tr>
<td>EMBA 538</td>
<td>Topics in Management Information Systems</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAIT 580.</td>
</tr>
<tr>
<td>EMBA 551</td>
<td>Managerial Accounting</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.</td>
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<tr>
<td>EMBA 552</td>
<td>Financial Reporting</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAAC 500.</td>
</tr>
<tr>
<td>EMBA 558</td>
<td>Topics in Accounting</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAAC 580.</td>
</tr>
<tr>
<td>EMBA 561</td>
<td>Marketing Strategy</td>
<td>1.5</td>
<td>Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading. Equivalency: BAMA 500.</td>
</tr>
</tbody>
</table>
EMBA 562 (1.5) Creative Marketing Strategies
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAMA 507.

EMBA 568 (1.5) Topics in Marketing
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAMA 580.

EMBA 571 (1.5) Basic Finance
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAFI 500.

EMBA 572 (1.5) Financial Strategies
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAFI 506.

EMBA 578 (1.5) Topics in Finance
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAFI 580.

EMBA 586 (1.5-6) d Directed Studies
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

EMBA 587 (1.5-6) d Executive Project
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

EMBA 588 (1-6) d Prior Learning Assessment and Recognition
This course is not eligible for Credit/D/Fail grading.

EMBA 591 (1.5) Foundations of Managerial Economics
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

EMBA 592 (1.5) Strategic Management
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

EMBA 593 (1.5) Strategic Decision Making
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BASM 500.

EMBA 594 (1.5) Economic Evaluation
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.
Equivalency: BAPA 503.

EMBA 595 (1.5) Economics Ethics and Health Care Priority Setting
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

EMBA 596 (1.5) Management Consulting Processes and Tools
This course is not eligible for Credit/D/Fail grading.

EMBA 597 (1.5) Health Care Strategy and Structure: An Economic Framework
This course is not eligible for Credit/D/Fail grading.

EMBA 598 (1.5-6) d Topics in Strategy and Economics
Restricted to Executive M.B.A. students. This course is not eligible for Credit/D/Fail grading.

School of Architecture and Landscape Architecture, Faculty of Applied Science

ENDS: Environmental Design

ENDS 101 (1) Introductory Workshop
Week long orientation to the School community, the City and the study of design one week prior to the start of Winter Session
Term 1. Credit will be granted for only one of ENDS 101 or DES 101. This course is not eligible for Credit/D/Fail grading.

ENDS 110 (3) Measured Architectural Drafting
Techniques applicable to analytic and technical drawing used in architecture, landscape architecture, and urban design with focus primarily on analog drawing. Credit will be granted for only one of ENDS 110 or DES 110.

ENDS 211 (3) Introduction to Environmental Design
Survey of the visual, cultural, ecological and spatial literacies in environmental design and planning.

ENDS 220 (3) Architecture in Context: Vancouver
The unfolding architecture and urbanism of Metro Vancouver. Using Vancouver as a laboratory to examine the historical transformation of the built environment, and how this has affected particular activities, land uses, and social groups within the region. Credit will be granted for only one of ENDS 220 or DES 220.

ENDS 221 (3) Sustainability by Design
Introduction to interactions between human and natural urban systems using local and international examples of successful sustainable community designs. Credit will be granted for only one of ENDS 221 or DES 230.

ENDS 231 (3) Thinking by Design
Introduction to design thinking through the analysis of architecture, landscape architecture, urban design, and hands-on design projects. Credit will be granted for only one of ENDS 231 or DES 200.

ENDS 281 (3) Architecture in Context and Across Cultures: A History
A world survey of architecture, from prehistory to postmodernity, which relates architecture to landscape and city, design principles and cultural values, formal and vernacular practices. It explores the different ways in which history has been conveyed and the purposes it serves.

ENDS 301 (3-9) d Environmental Design Studio I
Introduction to the study of relationships of human beings' environments; methods of analysis and composition; physical properties of land, natural and man-made; simple spatial and functional programs deployed in the creation of outdoor spaces. This course is not eligible for Credit/D/Fail grading.

ENDS 302 (3-9) d Environmental Design Studio II
Expands the terms of the purposeful transformation of "place" to include modifications to the environment at the scale of the individual; concepts of dwelling and habitation; the human body as an instrument of measure, dimension and design of the private realm. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENDS 301.

ENDS 320 (3) Design, Media and Representation
Theories, histories and techniques of design representation; geometry, design and expression are principle areas of focus. Credit will be granted for only one of ENDS 320, DES 211 or ARCH 515.

ENDS 401 (3-9) d Environmental Design Studio III
The exploration of a complex physical and spatial program for building in the public realm, resulting in an integrative design project. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENDS 302.

ENDS 402 (3-9) d Environmental Design Studio IV
Expands the scale and design enquiry to emphasize the relationships between communities and environment, urban infrastructure, and ecological systems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENDS 401.

ENDS 404 (3) Environmental Design History
A survey of environmental influences in architecture and landscape architecture design across time, geographies, and cultures, from neolithic settlements to nineteenth-century urbanization. Restricted to students in the Environmental Design program.

ENDS 420 (3) Technology and Technique
Introduction to fundamental design principles and investigations of buildings, landscape, machines and furniture, including structure, enclosure, envelope and detailing.

ENDS 440 (3) Environment and Urban Form
Relationships between, and integration of, the natural environment and the physical form, spatial structure, and livability of cities.

ENDS 482 (1-9) d Special Topics
ENGL 100 (3) Reading and Writing about Literature
A writing-intensive introduction to the disciplines of literary studies through the exploration of texts in their critical and theoretical contexts. Fulfils the first-year component of the Faculty of Arts Writing and Research Requirement. Open only to students in the Faculty of Arts. Recommended for students intending to become English majors. Essays are required. This course is not eligible for Credit/D/Fail grading.

ENGL 110 (3) Approaches to Literature
Study of selected examples of poetry, fiction, and drama. Essays are required. This course is not eligible for Credit/D/Fail grading.

ENGL 111 (3) Approaches to Non-fictional Prose
Study of a selection of prose texts ranging in length from the essay to the book, with emphasis on writing of the twentieth century. Essays are required. This course is not eligible for Credit/D/Fail grading.

ENGL 112 (3) Strategies for University Writing
Study and practice of the principles of university-level discourse, with multidisciplinary readings and emphasis on processes of research-based writing. Essays are required. This course is not available for students in the Faculty of Arts. This course is not eligible for Credit/D/Fail grading.

ENGL 120 (3) Literature and Criticism
Enriched study of selected works of literature from a number of critical perspectives. Open to students with a BC-equivalent mark of "A" (86%) in English 12 or "B+" (80%) in English Literature 12. Essays are required. This course is not eligible for Credit/D/Fail grading.

ENGL 121 (3) Introduction to Literary Theory
Enriched study of various theories of literature. Open to students with a BC-equivalent mark of "A" (86%) in English 12 or "B+" (80%) in English Literature 12. Essays are required. This course is not eligible for Credit/D/Fail grading.

ENGL 140 (3) Challenging Language Myths
Critical consideration of a broad range of commonly held beliefs about language and its relation to the brain and cognition, learning, society, change and evolution. Note: This is an elective course that does not fulfill writing requirements in any faculty or the literature requirement in the Faculty of Arts. This course is not eligible for Credit/D/Fail grading. Equivalency: LING 140.

ENGL 200 (3) Principles of Literary Studies
A collaboratively-taught exploration and application of key scholarly, theoretical and critical approaches informing the study of literatures in English. This course is not eligible for Credit/D/Fail grading. Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 210 (6) An Introduction to English Honours
For Honours students accepted by the English Honours Committee on the recommendation of the instructor. Students permitted to take this course must take ENGL 211 concurrently. Prerequisite: Restricted to students in the Honours program.

ENGL 211 (3) Seminar for English Honours
An introduction to practical criticism; required of and open only to students of ENGL 210. A limited number of texts from a range of genres and periods will be chosen for close critical analysis. This course is not eligible for Credit/D/Fail grading.

ENGL 220 (3) Literature in English to the 18th Century
A survey of prose, poetry and drama to the 18th Century. This course is not eligible for Credit/D/Fail grading. Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 221 (3) Literature in Britain: the 18th Century to the Present
A survey of poetry, drama, fiction and non-fiction prose from the 18th century to the present.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 222 (3) Literature in Canada**

The major types of Canadian writing: fiction, poetry, non-fictional prose, and drama

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 223 (3) Literature in the United States**

The major types of American writing: fiction, poetry, drama and non-fictional prose.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 224 (3) World Literature in English**

English literature produced outside Britain and North America.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 225 (3) Poetry**

Principles, methods, and resources for reading poetry.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 226 (3) Drama**

Principles, methods and resources for reading drama.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 227 (3) Prose Fiction**

Principles, methods and resources for reading the novel and the short story.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 228 (3-6) d Topics in Literary and/or Cultural Studies**

Current research interests in English studies.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 229 (3-6) d Topics in the Study of Language and/or Rhetoric**

For an up to date listing of available topics, please see the English Department (http://english.ubc.ca/undergraduate/undergraduate-courses/2016-winter-session/ ). *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 230 (3-6) d Biblical and Classical Backgrounds of English Literature**

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 231 (3) Introduction to Indigenous Literatures**

A study of cultural expression in contemporary indigenous contexts.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 232 (3) Approaches to Media Studies**

Approaches to the study of media: philosophical; technological; cultural; theoretical.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

**ENGL 241 (3) Shakespeare Now**

Introductory topics in Shakespeare studies that seek to identify relationships between Shakespeare’s work and present-day issues and concerns. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 242 (3) Introduction to Children's and Young Adult Literature
History, genres, and scholarly study of writing for children and adolescents. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 243 (3) Speculative Fiction
Genres and sub-genres of speculative fiction, such as science fiction and fantasy, alternate history, dystopian and post-apocalyptic narrative, and slipstream, as well as the intersections among them. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 244 (3) Environment and Literature
Literary, critical, and/or pop-culture texts about environmentalism and ecology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 245 (3) Comics and Graphic Media
Introduction to the critical study of comics and graphic media. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level ENGL or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 246 (3) Literature and Film
Approaches to the study of the relationships between literature and film. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level ENGL or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 247 (3) Television Studies
Introduction to methods and practices of television studies, with emphasis on the use of literary approaches to televised narrative.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level ENGL or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 248 (3) Mystery and Detective Fiction
Thematic and generic approaches to mystery, crime, and detective writing in English, primarily short-fiction and novels; may also include comics, radio, film, and television.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level ENGL or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 249 (3) Literary Nonfiction
Principles, methods and resources for reading literary non-fiction, including personal essays, memoir, and literary journalism. May also include nature, travel or food writing or graphic memoir. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Second-year standing and 3 credits of 100-level English or one of WRDS 150 or 350, ASTU 100 or 101, ARTS 001.

ENGL 301 (3) Technical Writing
Study of the principles of written communication in general business and professional activities, and practice in the preparation of abstracts, proposals, reports, and correspondence. This course is closed to first- and second-year students in Arts. Not for credit towards the English Major or Minor.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 302 (3) Advanced Practical Writing
Library research in the student's professional field; the writing of articles and research papers; detailed preparation of term or graduating essays required in a number of departments and faculties. Attention will be given to appropriate style. Not for credit towards the English Major or Minor.
Prerequisite: ENGL 301. Permission of the course chair is also acceptable.

ENGL 303 (6) Intermediate Composition
Study of the principles and extensive practice in the writing of effective prose, from arrangement and punctuation to various stylistic strategies. May be taken in the second year. Not for credit towards the English Major or Minor.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 304 (3/6) d Advanced Composition**

Special emphasis on rhetoric, with a focus on audience, authorial voice, and range of style.

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 307 (3-12) d Studies in Rhetoric**

Topics in rhetorical theories and their application.

**Prerequisite:** Third-year standing.

**ENGL 308 (3-12) d Rhetorical Criticism**

A study of literary texts from a rhetorical perspective.

**Prerequisite:** Third-year standing.

**ENGL 309 (3-12) d Rhetoric of Science, Technology, and Medicine**

Exploration of the persuasive dimension of discourse practices in science, technology, and medicine.

**Prerequisite:** Third-year standing.

**ENGL 310 (3) History and Theory of Rhetoric: Classical Rhetoric**

Introduction to classical rhetoric with attention to the analysis of present-day texts.

**Prerequisite:** Third-year standing.

**ENGL 311 (3) History and Theory of Rhetoric: The Later Theory**

Rhetorical theory from Augustine to the 21st century, emphasizing questions of persuasion in everyday life.

**Prerequisite:** Third-year standing.

**ENGL 312 (3-12) d Discourse and Society**

Introduction to theories of language and culture, and to techniques for analysing discourses in their social contexts.

**Prerequisite:** Third-year standing.

**ENGL 318 (3) History of the English Language: Early History**

Principles of language change and language typology. The development of the English language from its Indo-European origins to the end of the Anglo-Saxon period. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** Third-year standing.

**ENGL 319 (3) History of the English Language: Later History**

Principles of language change. The development and spread of the English language from the Norman Conquest to the Modern English period. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** Third-year standing. Knowledge of the International Phonetic Alphabet. ENGL 318 or ENGL 330 or the equivalent is recommended.

**ENGL 321 (3-12) d English Grammar and Usage**

Descriptive approaches to the English Language

**Prerequisite:** Third-year standing.

**ENGL 322 (3-12) d Stylistics**

Application of linguistic theory and method to stylistic analysis.

**Prerequisite:** Third-year standing.

**ENGL 323 (3-12) d Varieties of English**

Study of geographical, social, and/or urban dialects of English.

**Prerequisite:** Third-year standing.

**ENGL 324 (3-6) d English Corpus Linguistics**

Methods of collecting and analyzing linguistic data using electronic resources. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.
ENGL 326 (3-12) d Studies in the English Language
Topics in the history or structure of the English language.
Prerequisite: Third-year standing.

ENGL 327 (3-6) d Cognitive Approaches to the Study of Meaning
Interpretation of linguistic usages through cognitive concepts.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 328 (3-12) d Metaphor, Language and Thought
Exploration of the concepts underlying figurative language (in vocabulary as well as in grammar), using data from both colloquial and literary language.
Prerequisite: Third-year standing.

ENGL 330 (3/6) d The Structure of Modern English: Sounds and Words
An introduction to phonology, morphology, and lexical semantics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Third-year standing.

ENGL 331 (3) The Structure of Modern English: Sentences and Their Uses
An introduction to syntax, pragmatics, and sentence semantics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Third-year standing.

ENGL 332 (3) Approaches to Media History
History of media and technological change; literary, rhetorical, or linguistic methods of inquiry.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 334 (3-6) d Literature and the Archive
Analysis of a range of archival materials. Addresses broader considerations of how the archive as a cultural institution informs the production and interpretation of literature.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 335 (3-6) d Digital Humanities
Tools, methods, and theories of digital humanities as used in English scholarship. Research methods and data gathering tools, the interpretation of data, and the digital visualization of argumentation. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 336 (3-6) d Print Culture and Media Studies
Relationships between literature, print culture, and media. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 337 (3/6) d Text and Image
Relationship between texts and images, or the aspect of text as image, in literary and non-literary works and of various genres, periods, and media. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 338 (3/6) d Literature and Science
Relations between science and literature; the representation of science; and science writing in its literary, historical, and cultural contexts. Science as literature, science in literature, science fiction, and models of knowledge in science and literature.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.
ENGL 339 (3/6) d Trauma and Memory: Literature, Performance and Theory
Interdisciplinary explorations of trauma and memory in literature, performance, and theory.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 340 (3) Introduction to Old English
Old English grammar, with readings in the prose of the period.
Prerequisite: Third-year standing.

ENGL 343 (3) Old English Literature
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 344 (3-12) d Medieval Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 346 (3-6) d Chaucer and the Middle Ages
A detailed study of Chaucer's major works.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 347 (3-12) d Renaissance Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 348 (3/6) d Shakespeare and the Renaissance
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 349 (3-12) d Seventeenth-Century Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 352 (3) Middle English
The forms and development of the language.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 354 (3/6) d Milton and the Seventeenth Century
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 356 (3) Chaucer
For Honours students.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.
ENGL 357 (3-12) d Restoration and Eighteenth-Century Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 358 (3-12) d Studies in an Eighteenth-Century Genre
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 359 (3-12) d Studies in Romanticism
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 360 (3-6) d Early Canadian Writing
Pre-Confederation colonial literature from its emergence until the end of World War 1. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 362 (3-12) d Studies in a Nineteenth-Century Genre
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 364 (3-12) d Nineteenth-Century Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 365 (3-6) d Modernist Literature
Literary experimentation in 19th to 20th century movements known as modernism. Includes interdisciplinary approaches to literary, performance, and media arts, and intellectual and social histories of the period. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 367 (3) Shakespeare
Intensive study of at least six plays. For Honours students.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 369 (3-12) d Studies in American Literature to 1900
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 370 (3-6) d Literatures and Cultures of Africa and/or the Middle East
Literary and cultural works from Africa; some sections include Africa and the Middle East. Multiple perspectives on local, national, and global issues including colonialism, migration, transnationalism, education, art and politics. May include fiction, poetry, drama, digital media, and other forms. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3
credits of first-year English or equivalent (WRDS 150, ASTU 100, ASTU 150, ARTS 001) or permission of instructor. Recommended: 6 credits of 100- and/or 200-level English and/or writing classes.

ENGL 375 (3-6) d Global South Connections
Literary and cultural networks relating to societies in the Global South; may address areas such as colonization, decolonization, nationalism, social movements, forced and voluntary migrations of peoples, cultural hybridity, translation, and globalization. Please see the Department for current offering. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 376 (3) Milton
For Honours students.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 377 (3-6) d World Literature and Social Movements
Transnational and world literature and art practices that reflect on the conceptual, linguistic and visual aspects of social movements, addressing histories of colonialism, transnational feminist literature and art practices, histories of protest and cultures of resistance. This course is not eligible for Credit/D/Fail grading.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 379 (3-6) d Migrations, Movements, and Transnational Networks in Literary and Cultural Production
Writing related to transnationality and migration; forced and voluntary movements of people, denationalization or citizenship, diasporic and differential legal identities, cultural flows, borderlands and contact zones, new cosmopolitanisms, creoles and translations.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 399 (0) Co-operative Work Placement
Supervised work experience related to English studies, in an approved company or organization for a minimum of 455 hours. Orientation workshops and final reports.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 402 (3-12) d Studies in Poetry
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 405 (3-12) d Studies in Drama
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 406 (3-12) d Studies in Prose Fiction
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 407 (3/6) d A Critical History of English Literature
Not open to students who have taken ENGL 201 or ENGL 210 or ENGL 220.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of
100- and/or 200-level English and/or writing courses.

**ENGL 408 (3/6) d History of Criticism and Theory**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 409 (3/6) d Modern Critical Theories**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 412 (3) Studies in Critical Theory**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 417 (3/6) d The Literature of the Bible**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 418 (3-12) d Studies in European Literature**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 419 (3/6) d History of the Book**

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 458 (3) Canadian Environmental Writing**

Offers advanced study of ecocritical theory and its application to Canadian literature, including Indigenous authors. [3-0-0]

*Prerequisite:* 9 credits of 300-level English.

**ENGL 462 (3-12) d Twentieth-Century British and Irish Studies**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 464 (3-12) d Twentieth-Century Studies**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 466 (3-12) d Studies in a Twentieth-Century Genre**

Please see the Department website for further information on topics offered in the current session.

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

**ENGL 468 (3/6) d Children's Literature**

*Prerequisite:* (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.
ENGL 470 (3-12) d Canadian Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 472 (3-12) d American Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 474 (3-12) d Studies in Contemporary Literature
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 476 (3-12) d Indigenous Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 478 (3-12) d Post-colonial Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing and, one of (a) 6 credits of 100-level English; or, (b) WRDS 150 or ASTU 150 plus 3 credits of 100-level English; or, (c) 6 credits of ASTU 100 or 3 credits of ASTU 100 and 3 credits of 100-level English; or, (d) ARTS 001.

ENGL 480 (3-12) d Asian Canadian and/or Asian Transnational Studies
Please see the Department website for further information on topics offered in the current session.
Prerequisite: (Pre-requisites must be met by the first day of class or students will be withdrawn). Third-year standing; and 3 credits of 100- and/or 200-level English or one of WRDS 150 or 350; ASTU 100 or 101; ARTS 001. Recommended: 6 credits of 100- and/or 200-level English and/or writing courses.

ENGL 489 (3) Language Majors Seminar
Required of all Language Majors. See department website (http://www.english.ubc.ca/ugrad/majors/compl_lang.htm) for options. This course is not eligible for Credit/D/Fail grading.

ENGL 490 (3) Literature Majors Seminar
Required of all Literature Majors. See Department Website (www.english.ubc.ca) for options. This course is not eligible for Credit/D/Fail grading.

ENGL 491 (3-12) c Senior Honours Seminar
Offerings in literary theory. This course is not eligible for Credit/D/Fail grading.

ENGL 492 (3-12) c Senior Honours Seminar
Offerings in literary research. This course is not eligible for Credit/D/Fail grading.

ENGL 496 (3-6) d Directed Readings in English Literature
For Honours students only. This course is not eligible for Credit/D/Fail grading.

ENGL 499 (3/6) c Honours Essay
This course is not eligible for Credit/D/Fail grading.

ENGL 500 (3) Research in English Studies
Required of all graduate students in the M.A. program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

ENGL 501 (3-12) d Studies in Bibliography
This course is not eligible for Credit/D/Fail grading.

ENGL 502 (3-12) d Studies in Criticism
This course is not eligible for Credit/D/Fail grading.
ENGL 503 (3-12) d Studies in Prose
This course is not eligible for Credit/D/Fail grading.

ENGL 504 (3-12) d Studies in Drama
This course is not eligible for Credit/D/Fail grading.

ENGL 505 (3-12) d Studies in Fiction
This course is not eligible for Credit/D/Fail grading.

ENGL 506 (3-12) d Studies in Poetry
This course is not eligible for Credit/D/Fail grading.

ENGL 507 (3-12) d Studies in English Historical Linguistics
This course is not eligible for Credit/D/Fail grading.

ENGL 508 (3-12) d Linguistic Studies of Contemporary English
This course is not eligible for Credit/D/Fail grading.

ENGL 509 (3-12) d Studies in Rhetoric
This course is not eligible for Credit/D/Fail grading.

ENGL 510 (3-12) d Studies in Old English
This course is not eligible for Credit/D/Fail grading.

ENGL 511 (3-12) d Chaucer
This course is not eligible for Credit/D/Fail grading.

ENGL 512 (3-12) d Middle English Studies
This course is not eligible for Credit/D/Fail grading.

ENGL 514 (3-12) d Studies in the Renaissance
This course is not eligible for Credit/D/Fail grading.

ENGL 515 (3-12) d Shakespeare
This course is not eligible for Credit/D/Fail grading.

ENGL 519 (3-12) d Studies in the Sixteenth Century
This course is not eligible for Credit/D/Fail grading.

ENGL 520 (3-12) d Studies in the Seventeenth Century
This course is not eligible for Credit/D/Fail grading.

ENGL 525 (3-12) d Studies in the Eighteenth Century
This course is not eligible for Credit/D/Fail grading.

ENGL 530 (3-12) d Studies in the Romantic Period
This course is not eligible for Credit/D/Fail grading.

ENGL 535 (3-12) d Studies in the Victorian Period
This course is not eligible for Credit/D/Fail grading.

ENGL 539 (3-12) d Studies in the Twentieth Century
This course is not eligible for Credit/D/Fail grading.

ENGL 540 (3-12) d Studies in American Literature to 1890
This course is not eligible for Credit/D/Fail grading.

ENGL 541 (3-12) d Studies in American Literature Since 1890
This course is not eligible for Credit/D/Fail grading.

ENGL 545 (3-12) d Studies in Canadian Literature
This course is not eligible for Credit/D/Fail grading.

ENGL 546 (3-12) d Studies in Commonwealth/Post-colonial Literatures
This course is not eligible for Credit/D/Fail grading.

ENGL 547 (3/6) c Directed Reading
This course is not eligible for Credit/D/Fail grading.
ENGL 549 (6-12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

ENGL 551 (3-12) d Studies in Literary Movements
This course is not eligible for Credit/D/Fail grading.

ENGL 552 (3/6) d Practical Criticism
Close reading and analysis of selected literary texts. This course is not eligible for Credit/D/Fail grading.

ENGL 553 (3-12) d Studies in Literary Theory
This course is not eligible for Credit/D/Fail grading.

ENGL 555 (3-12) d Studies in Literature and the Other Arts
This course is not eligible for Credit/D/Fail grading.

ENGL 561 (3-12) d Topics in Science and Technology Studies
Advanced seminar on a theme or topic of interest to both STS and English. This course is not eligible for Credit/D/Fail grading.

ENGL 649 (0) Doctoral Dissertation

Engineering Physics, Faculty of Science

ENPH: Engineering Physics

ENPH 253 (5) Introduction to Instrument Design
Practice in engineering design and instrument development including mechanical and electrical design, and communications with sensors, actuators. Micro-controller implementation and system integration. Engineering design review process and presentations. Engineering communication in design and product release. [3-6-0]
Prerequisite: ENPH 259.

ENPH 257 (2) Heat and Thermodynamics
Thermometry, thermal properties of matter; heat transfer by conduction; convection and radiation; kinetic theory of gases and gas laws; heat engines; refrigeration; change of state; first and second laws of thermodynamics. [1-3-1]
Prerequisite: Either (a) SCIE 001 or (b) one of MATH 200, MATH 217, MATH 226, MATH 255, MATH 263; and either (a) all of PHYS 108, PHYS 109 or (b) one of PHYS 102, PHYS 153 or (c) all of PHYS 157, PHYS 158, PHYS 159 or (d) all of PHYS 118, PHYS 119.

ENPH 259 (3) Experimental Techniques
Basic experimental techniques in acquisition, analysis, and presentation and communication of data and technical results. [2-3-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 120, ENGL 121 and either (a) all of PHYS 108, PHYS 109 or (b) one of PHYS 102, PHYS 153 or (c) SCIE 001 or (d) all of PHYS 157, PHYS 158, PHYS 159 or (e) all of PHYS 118, PHYS 119.

ENPH 270 (2) Mechanics II
Dynamics: systems of particles, kinematics and kinetics of rigid bodies (plane motion), energy and momentum, rotating coordinates. [2-0-1]
Prerequisite: PHYS 170.

ENPH 352 (2) Laboratory Techniques in Physics
Some of the experiments will be based on the lecture material for PHYS 301. Other techniques and subjects will also be covered. [0-3-0]
Corequisite: PHYS 301.

ENPH 459 (5) Engineering Physics Project I
Project planning, management and reporting. This course involves writing a project proposal, carrying out an open-ended Engineering project, and reporting the results both orally and in writing. This course is not eligible for Credit/D/Fail grading. [1-3-0; 1-0-1]
Prerequisite: ENPH 253.

ENPH 479 (4) Engineering Physics Project II
Projects designed to give students research development and design experience. Projects are provided by research faculty in Science and Engineering and from local industry. This course is not eligible for Credit/D/Fail grading. [1-5-1; 1-2-1*]
Prerequisite: ENPH 459.

ENPH 480 (3) Engineering Physics Project III
An optional course for those students wishing to continue their project work beyond the development in ENPH 479. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENPH 479.

ENPH 481 (3) Entrepreneurial Projects I
A project course for students pursuing entrepreneurial training within Engineering Physics, and wishing to further develop projects resulting from ENPH 459. This course is not eligible for Credit/D/Fail grading. [0-5-1]
Prerequisite: ENPH 459.

Engineering and Public Policy, Faculty of Applied Science

ENPP: Engineering and Public Policy

ENPP 501 (3) Law, Public Policy, and Governance
Policy process and parliamentary government, federalism and multilevel governance, bureaucracy and public service, charter and rights-based litigation, interest groups and collective action, mechanisms for interest group consultation and input, policy instruments, environmental law, international law, and climate change. This course is not eligible for Credit/D/Fail grading.

ENPP 502 (3) Public Policy Analysis - Tools and Methods
Epistemology; policy analysis basics: policy paradigms based on utility maximization; equity and rights based frameworks; tools, methods and applications of quantitative policy analysis: cost-benefit approaches, risk analysis, decision analysis, values, tradeoffs and multi-attribute utility theory, modeling uncertainty; critiques and limitations of tools: psychology, perception and decision making, ethical challenges. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENPP 501.

ENPP 503 (3) Public Policy Case Studies
Policy analysis case studies in various technology areas including: energy & environment, climate change and adaptation, information technology, intellectual property law, health and medicine, biotechnology, nanotechnology, infrastructure, and material supply. Emphasis will be on policy dimensions of technology development and commercialization, and the interactions between policy process and technology selection and deployment. This course is not eligible for Credit/D/Fail grading.
Prerequisite: ENPP 501.
Corequisite: ENPP 502.

ENPP 504 (3) Applied Economics in Public Policy
Factor analysis, multiple regression, non-linear regression, multivariate ANOVA, spatial econometric modeling. Market concentration, externalities and imperfect information, tools to restrict monopolies and industrial policies, tools to treat market failures due to externalities, quotas, standards, tradable permits, taxes and subsidies, unbiased labelling and government provision, cost effectiveness analysis, cost-benefit analysis, economic impact analysis, life cycle cost analysis. This course is not eligible for Credit/D/Fail grading.

ENPP 596 (6) M.Eng. Project in Engineering and Public Policy
Carry out a project and prepare an engineering report under the supervision of faculty members and/or researchers/scientists from project sponsoring organizations. This course is not eligible for Credit/D/Fail grading.

ENPP 597 (1) Seminar
Presentations and discussions of current topics in the area of engineering and public policy. This course is not eligible for Credit/D/Fail grading.

Earth, Ocean and Atmospheric Sciences, Faculty of Science

ENVR: Environmental Science

ENVR 200 (3) Introduction to Environmental Science
Seminars and field trips introducing the major global, regional, and local environmental issues facing human societies. [3-0-0]
Prerequisite: Open to all students with second-year, or higher, standing.
ENVR 300 (3) Introduction to Research in Environmental Science
Environmental research. Students investigate research methodologies and reporting in a range of scientific disciplines and fields. [3-0-0]
Prerequisite: Open to all students with third-year, or higher, standing in the Faculty of Science.

ENVR 400 (6) Community Project in Environmental Science
Instructor-guided collaboration between student teams and community partners on community-based environmental science projects. Teams articulate project questions and goals, devise methods, conduct research and communicate results. Credit will be given for only one of ENVR 400 or ENVR 449. [3-0-0;3-0-0]
Prerequisite: ENVR 300.

ENVR 410 (3) Energy, Environment, and Society
The role of energy in human societies throughout history and the environmental and social implications of energy use. Coverage of both the science and policy of energy use. Energy supply and demand, energy transitions, analytical tools, impacts, and alternatives. [3-0-0]
Prerequisite: Fourth-year standing in B.Sc., B.A.Sc. or related programs.

ENVR 420 (3) Ecohydrology of Watersheds and Water Systems
Analysis of water resources from a water-in-ecosystem perspective. Application to natural, managed, and urban systems, considering ecological interactions with hydrological processes. Exploration of biogeochemical processes related to water quality, and human impacts on water resources. [3-0-0]
Prerequisite: One of GEOB 305, EOSC 329.

ENVR 430 (3) Ecological Dimensions of Sustainability
Current issues. Application to agricultural, energy, and resource systems in terrestrial and aquatic contexts. Analysis of complex problems; incorporation of science into novel interdisciplinary solutions. [3-0-0]
Prerequisite: One of ENVR 300, BIOL 230. Or fourth year standing in the BSCN program or other demonstrated ecology background.

ENVR 440 (3) Analytical Methods in Sustainability Science
Sustainability analysis through a series of case studies. Example approaches include cost-benefit analysis, trade-offs analysis, and life-cycle analysis. Active learning in a computer lab using real-world data. [2-2-0]
Prerequisite: One of ENVR 200, ASIC 220, SCIE 220, GEOG 211. Third-year standing.

ENVR 448 (3/6) Directed Studies in Environmental Science
Investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of an ENSC advisor and of the supervising faculty member is required prior to registration.
Prerequisite: Third year standing in the Faculty of Science.

ENVR 449 (6) Environmental Science HonoursThesis
[3-0-0]
Prerequisite: ENVR 300 and fourth-year standing in the B.Sc. Environmental Sciences honours program.

ENVR 490 (3) Student Directed Seminars in Environmental Sciences
Self-directed, collaborative studies in environmental sciences, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the Handbook for Student Directed Seminars (www.vpacademic.ubc.ca/sds/sds_handbook.pdf). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Prerequisite: Third-year standing.

Earth, Ocean and Atmospheric Sciences, Faculty of Science

EOSC: Earth and Ocean Sciences

EOSC 110 (3) The Solid Earth: A Dynamic Planet
Earth’s origin, composition, structure, and natural resources. Plate tectonics as the driving force for volcanism, mountain building, and earthquakes. Imaging Earth’s interior. Environmental geoscience and sustainability. (Consult the Credit Exclusion list for the Faculty of Science section of the Calendar.) [3-0-0]
Corequisite: EOSC 111 is recommended.

EOSC 111 (1) Laboratory Exploration of Planet Earth
An examination of the processes that shape and change the planet earth. This laboratory course accompanies any of EOSC 110, EOSC 112, EOSC 114, EOSC 116. Course content is customizable at the individual student level. [0-3-0]

**Corequisite:** One of EOSC 110, EOSC 112, EOSC 114, EOSC 116.

**EOSC 112 (3) The Fluid Earth: Atmosphere and Ocean**
Introduction to processes in ocean and atmosphere. Heat, current, winds, clouds, marine life, resources. Effects of coupling, climate change, pollution. (Consult the Credit Exclusion list, within the Faculty of Science section in the Calendar.) [3-0-0]

**Corequisite:** EOSC 111 is recommended.

**EOSC 114 (3) The Catastrophic Earth: Natural Disasters**
Introduction to causes and physical characteristics of disasters such as volcanic eruptions, earthquakes, tsunamis, hurricanes, storm surge, thunderstorms, tornadoes, landslides, wind waves, meteor impacts, mass extinctions. [3-0-0]

**Corequisite:** EOSC 111 is recommended.

**EOSC 116 (3) Mesozoic Earth: Time of the Dinosaurs**
Earth's tectons, climate, and oceans during the time of the dinosaurs. Reading the fossil record of Earth from its earliest origins up to and including the Mesozoic, 250 - 65 million years ago. [3-0-0]

**Corequisite:** EOSC 111 is recommended.

**EOSC 118 (3) Earth's Treasures: Gold and Gems**
Origin, properties, valuation, prospecting and geology of gold, platinum, silver, diamonds, rubies, emeralds, and other precious metals and gems. [3-0-0]

**EOSC 210 (3) Earth Science for Engineers**
Focus on the interaction between society and the geologic environment. Locating, assessing and developing natural resources; understanding and preparing for natural hazards, design of structures and waste disposal sites. For applied science and forestry students only. [3-2-0]

**Prerequisite:** One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

**EOSC 211 (3) Computer Methods in Earth, Ocean and Atmospheric Sciences**
Mathematical computer-based problem solving in the physical, chemical, and biological sciences. Problems drawn from studies of the earth, the oceans and the atmosphere. Credit will be granted for only one of APSC 160, CPSC 301, or EOSC 211. [2-0-2]

**Prerequisite:** One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

**EOSC 212 (3) Topics in the Earth and Planetary Sciences**
Cutting edge problems in earth, ocean, atmospheric and planetary sciences. Topics will be introduced through discussions of the current literature. [3-0-0]

**Prerequisite:** Second-year standing in science or engineering.

**EOSC 213 (3) Computational Methods in Geological Engineering**
Combining basic physical principles with their mathematical description and generating computational models that describe them. Introduction to basic building blocks in modeling, simulation and parameter estimation. [3-1-0]

**Prerequisite:** One of MATH 200, MATH 253 and one of MATH 152, MATH 221, MATH 223 and one of APSC 160, CPSC 103, CPSC 110, EOSC 211.

**EOSC 220 (3) Introductory Mineralogy**
Introduction to crystallography, physical and chemical properties of minerals. Recognition and identification of common minerals. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [2-3-0]

**Prerequisite:** One of CHEM 111, CHEM 121, SCIE 001.

**EOSC 221 (3) Introductory Petrology**
Optical mineralogy and the classification and genesis of igneous, metamorphic and sedimentary rocks. [2-3-0]

**Prerequisite:** EOSC 220.

**EOSC 222 (3) Geological Time and Stratigraphy**
Measuring geological time and understanding Earth history using stratigraphic principles, paleontology and radioactive decay. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [2-2-0]

**Prerequisite:** Second-year standing in Science. One of EOSC 1**, EOSC 210, GEOB 103 is recommended.

**EOSC 223 (3) Field Techniques**
Introduction to the techniques of geological mapping and the interpretation of field data. Includes three one-day field trips on weekends plus a seven-day field school after Spring examinations. A fee is to be paid by January 31. [2-2-0]

**Corequisite:** EOSC 221.

**EOSC 240 (3) Site Investigation**
Theory and practice of site investigation for geological engineers, including background studies, field work, remote sensing, development of ground models, importance of geological variability and uncertainty. Impacts on design, project risk and decision making. [2-2-0]

Prerequisite: EOSC 210.

EOSC 250 (3) Fields and Fluxes
Application of classical theory of scalar and vector fields to geophysical sciences. Conductive, convective and radiative energy flux, gravitation, electrostatics, and magnetostatics. Gauss' and Stokes' theorems. [3-0-0]

Prerequisite: One of PHYS 101, PHYS 107, PHYS 117, PHYS 157.
Corequisite: MATH 200. One of PHYS 102, 108, 118, 158 is recommended.

EOSC 256 (3) Earthquakes
Characteristics, types, plate tectonics, faults, earth stresses and strains, seismic waves, magnitude scales, instrumentation, hazard mapping, prediction, and forecasting. [3-0-0]

Prerequisite: Either (a) one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 157; or (b) SCIE 001.

EOSC 270 (3) Marine Ecosystems
Introduction to diversity of marine habitats and ecosystems; hydrothermal vent, intertidal, coral reef, estuarine, deep sea, and polar ecosystems; impacts of ecosystem change; evolution of ocean plankton; invasive species; climate change; pollution. [3-0-0]

Prerequisite: One of SCIE 001, CHEM 111, CHEM 121, CHEM 154.

EOSC 310 (3) The Earth and the Solar System
The Earth as a planet: its composition, internal dynamics, and surface evolution. Rotation, magnetic field, plate tectonics, earthquakes, volcanoes. The ocean, atmosphere, and biosphere as components of a varying geo-environment. Not for credit in the Faculties of Science and Applied Science. No background in science or mathematics is required. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: Second-year standing.

EOSC 311 (3) The Earth and its Resources
An introduction to the Earth with emphasis on its industrial and aesthetic resources. Rocks, minerals, gold, diamonds, sediments, fossils, oil and gas, canyons, and volcanoes and the processes that create them. Not for credit in the Faculties of Science and Applied Science. No background in Science or Mathematics is required. [3-0-0]

Prerequisite: Second-year standing.

EOSC 314 (3) The Ocean Environment
An introduction to the oceans and the processes that have shaped them, their composition and movement, waves, tides, beaches, interactions with the atmosphere and human exploitation of the non-living resources. Not for credit in the Faculties of Science or Applied Science. No background in Science or Mathematics is required. [3-0-0]

Prerequisite: Second-year standing.

EOSC 315 (3) The Ocean Ecosystem
An introduction to life in the oceans, its variety and evolution; primary producers and their links to the environment, zooplankton, marine communities, living marine resources and their role in today's world. Not for credit in the Faculties of Science or Applied Science. [3-0-0]

Prerequisite: Second-year standing

EOSC 320 (3) Sedimentology
Origin, diagenesis and geochemistry of sediments and sedimentary rocks. [2-2-0]

Prerequisite: EOSC 221 and one of EOSC 210, EOSC 222.

EOSC 321 (3) Igneous Petrology
The origin and formation of igneous rocks. [2-3-0]

Prerequisite: EOSC 221.

EOSC 322 (3) Metamorphic Petrology
Deciphering lithospheric processes as recorded by the mineralogy, chemistry and textures of metamorphosed rocks. [2-3-0]

Prerequisite: EOSC 221.

EOSC 323 (3) Structural Geology I
Analysis and interpretation of natural deformation. [2-3-0]

Prerequisite: All of EOSC 221, EOSC 223 and one of EOSC 210, EOSC 222.
EOSC 326 (3) Earth and Life Through Time
The fossil record of adaptation and extinction emphasizing the interaction of biological and geological processes. Not for credit in any Earth, Ocean and Atmospheric Sciences specialization. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: Biology 100-level and third-year standing in Science.

EOSC 327 (3) Geochemical Thermodynamics
Application of chemical thermodynamics to problem solving in the earth sciences. Geochemical tools are developed for: low-T aqueous geochemistry, high-T, high-P processes in the lithosphere, ore-deposit formation, and for prediction of geochemical reaction rates in all environments. [2-2-0]
Prerequisite: EOSC 220.
Corequisite: One of CHEM 201, CHEM 205.

EOSC 328 (3) Field Geology
Recording and processing geological data in the field. Held within the three weeks following April examinations after third year. A special fee is to be paid by January 31.
Prerequisite: All of EOSC 323, EOSC 330 and one of EOSC 321, EOSC 322.

EOSC 329 (3) Groundwater Hydrology
Introduction to theory of groundwater flow; flow nets; regional groundwater resource evaluation; well hydraulics; role of groundwater in geologic processes. [2-3*-3*]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

EOSC 330 (3) Principles of Geomorphology
Landform development; morphological and historical analysis of landforms; applications in engineering and resource development. Please consult the Faculty of Science Credit Exclusion List:
www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-2-0]
Prerequisite: One of GEOB 103, EOSC 110, EOSC 210.

EOSC 331 (3) Introduction to Mineral Deposits
Introduction to economic geology and models related to mineral exploration. Study includes typical deposit types and their plate tectonic setting. [2-3-0]
Prerequisite: EOSC 221.

EOSC 332 (3) Tectonic Evolution of North America
An overview of the geology and tectonic evolution of North America; comparisons and contrasts between Precambrian rocks of the North American craton and Phanerozoic belts of the Cordilleran, Appalachian, Ouachita and Innuitian orogens; interrelations between sedimentation, deformation, metamorphism and magmatism in a plate tectonic context. [3-0-0]
Prerequisite: EOSC 323 or permission of the instructor.

EOSC 333 (3) Elemental and Isotopic Geochemistry
Analytical methods in geochemistry, major and trace element geochemistry, radiogenic isotopes, geochemistry of seawater, the mantle, basalts, subduction zones, sedimentary rocks, continental crust. [2-3-0]
Prerequisite: EOSC 221.

EOSC 340 (3) Global Climate Change
Mechanisms and processes of past and future global environmental and climate change. [3-0-0]
Prerequisite: Either (a) SCIE 001 or (b) one of CHEM 111, CHEM 121, CHEM 154 and one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157.

EOSC 350 (3) Environmental, Geotechnical, and Exploration Geophysics I
Principles of geophysical survey design, data acquisition, processing and interpretation with emphasis on near-surface problems. Magnetic, seismic reflection/refraction, electromagnetic and ground penetrating radar surveys. Case history analysis of environmental and geotechnical problems. [3-2-0]
Prerequisite: One of MATH 200, MATH 253 and third-year standing or higher in Science or Applied Science.

EOSC 352 (3) Geophysical Continuum Dynamics
Introduction to tensor calculus and continuum mechanics. Stress, strain and strain-rate tensors. Mass, momentum and energy balance. Applications to problems of geophysical heat transport, elasticity and fluid dynamics illustrated using MATLAB. [3-0]
Prerequisite: One of EOSC 250, MATH 317.

EOSC 353 (3) Seismology
Hooke's law for isotropic continua, elastic wave equation, reflection and refraction methods for imaging the Earth's internal
structure, plane waves in an infinite medium and interaction with boundaries, body wave seismology, inversion of travel-time curves, generalized ray theory, crustal seismology, surface waves and earthquake source studies. [3-3*]

Prerequisite: EOSC 352.

**EOSC 354 (3) Analysis of Time Series and Inverse Theory for Earth Scientists**

Continuous and discrete Fourier transforms, correlation and convolution, spectral estimates, optimum least-squares filters, deconvolution and prediction, frequency-wave number filtering. A practical course on computer techniques applied to the analysis of a wide range of geophysical phenomena. [3-2-0]

**Prerequisite:** Either (a) SCIE 001 or (b) one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 157.

**EOSC 355 (3) The Planets**

Diversity among the planets and moons of the solar system; integrating concepts across scientific disciplines, including geology, geophysics, and atmospheric science to understand how planets evolve. [3-0]

**Prerequisite:** Either (a) SCIE 001 or (b) one of MATH 101, MATH 103, MATH 105, MATH 121; and one of CHEM 111, CHEM 121, CHEM 154 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157.

**EOSC 372 (3) Introductory Oceanography: Circulation and Plankton**

Physical and chemical processes and their controls on the distribution of plankton in the ocean. [3-0-0]

**Prerequisite:** Either (a) SCIE 001 or (b) one of CHEM 111, CHEM 121, CHEM 154 and one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157.

**EOSC 373 (3) Introductory Oceanography: Climate and Ecosystems**

Physical, chemical, and biological processes in the ocean and their interaction with climate and marine food-webs. [3-0-0]

**Prerequisite:** EOSC 372.

**EOSC 398 (3) Co-operative Work Placement I**

Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in the Summer Session (Terms 1 and 2) following second year. Technical report required. Restricted to students admitted to the Co-operative Education Option in Earth, Ocean and Atmospheric Science. This course is not eligible for Credit/D/Fail grading.

**EOSC 399 (3) Co-operative Work Placement II**

Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in Winter Session (Term 1) in third year. Technical report required. Restricted to students admitted to the Co-operative Education Option in Earth, Ocean and Atmospheric Science. This course is not eligible for Credit/D/Fail grading.

**EOSC 420 (3) Volcanology**

Field and lab-based studies in volcanology concentrating on physical and chemical aspects of volcanic processes. [2-3-0]

**Prerequisite:** All of EOSC 220, EOSC 221.

**EOSC 421 (3) Advanced Sedimentology**

Description and interpretation of ancient and modern sediments, with emphasis on the origin, composition, textures, structures, diagenesis and chemistry of biogenic sediments. [2-2-0]

**Prerequisite:** EOSC 320 or permission of instructor.

**EOSC 422 (3) Structural Geology II**

Studies of natural deformation using advanced techniques. [2-3-0]

**Prerequisite:** EOSC 323.

**EOSC 424 (3) Advanced Mineral Deposits**

Advanced concepts in the processes that lead to the formation of mineral deposits. Introduction to the study of ore minerals using reflected light microscopy. [2-3-0]

**Prerequisite:** EOSC 331.

**EOSC 425 (3) Paleontology**

Paleobiogeography in the context of plate tectonics. Mass extinction events. Fossilization and biases in the fossil record. Species concepts in paleontology. Biostratigraphy. Paleontological evidence for early life; the colonization of oceanic and terrestrial environments and; the evolution of the primates. [2-3-0]

**Prerequisite:** EOSC 222.

**EOSC 426 (3) Fundamentals of Geomicrobiology**

Foundational knowledge of the interactions between microorganisms and Earth's surface chemistry. This course is not eligible for
Credit/D.Fail grading. [3-0-0]
Prerequisite: One of BIOL 111, BIOL 112, BIOL 121, CHEM 111, CHEM 121, EOSC 110, EOSC 112. Third year standing in Science.

EOSC 428 (3) Field Techniques in Groundwater Hydrology
Hydraulic head measurements, water-quality sampling, pump and slug testing, infiltration measurements, profiling techniques. Held over five days after spring term at the Richmond groundwater hydrology field-school site. Enrolment limitations.
Prerequisite: EOSC 329 or permission of the instructor.

EOSC 429 (3) Groundwater Contamination
Contaminant transport processes in groundwater flow systems; aqueous and multiphase transport; mathematical models describing migration and chemical evolution of contaminant plumes; case studies. [2-2-0]
Prerequisite: EOSC 329.

EOSC 430 (3) Aqueous Geochemistry
Prerequisite: Either (a) all of CHEM 111, CHEM 113 or (b) all of CHEM 121, CHEM 123 or (c) SCIE 001 or (d) CHEM 154.
Corequisite: EOSC 329.

EOSC 431 (3) Groundwater Remediation
Methods for containment and remediation of subsurface contaminants; including groundwater control, groundwater extraction, and in situ treatment. Experience with common design approaches. [2-2-0]
Prerequisite: EOSC 429.

EOSC 432 (3) Fossil Fuels
Corequisite: EOSC 320.

EOSC 433 (3) Geological Engineering Practice I - Rock Engineering
Application of rock mechanics, hydrogeology, and engineering design tools in realistically complex geological environments. Influence and treatment of geological uncertainty, and use of field data, geotechnical monitoring, and numerical analyses for tunnelling, mining and rock slope engineering projects. Case histories. [2-2-0]
Prerequisite: All of EOSC 329, CIVL 210, MINE 303.

EOSC 434 (3) Geological Engineering Practice II - Soil Engineering
Application of geomorphology, hydrogeology, and soil mechanics to geotechnical design. Influence and treatment of geological uncertainty in geotechnical hazard and risk assessments; multi-disciplinary approaches to geotechnical engineering problems in realistically complex geological environments. Case histories. [2-2-0]
Prerequisite: All of EOSC 329, EOSC 330, CIVL 210.

EOSC 442 (1) Climate Measurement and Analysis
Local climate time series collection and analysis. Retrieval and analysis of on-line climate data and model output. [0-3-0]
Prerequisite: EOSC 340 and one of CPSC 110, CPSC 301, EOSC 211, MATH 210, PHYS 210 and one of STAT 200, STAT 241, BIOL 300.

EOSC 445 (6) Engineering Design Project
Geological engineering design project from scope definition to final design. Based on a problem from industry. [2*-3-0, 2*-3-0]
Prerequisite: Fourth-year standing in Geological Engineering.

EOSC 447 (6) Thesis
For B.A.Sc. Topic to be approved by the Department. [0-3-0]

EOSC 448 (3/6) c Directed Studies
Investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of an undergraduate advisor and of the supervising faculty member is required before registration.

EOSC 449 (6) Thesis
Original research work under the direction of a faculty member. Required of all honours students. Open to major students with a satisfactory standing, appropriate background courses and permission of the course instructor and the directing faculty member.

EOSC 450 (3) Potential Fields in Earth and Planetary Sciences
Theory, application and quantitative interpretation of potential field methods in Earth and planetary sciences. Topics drawn from problems in geophysical exploration, geodesy, geodynamics of the planets, geomagnetism, planetary magnetic fields, heat flow and fluid flow. [3-0-0]

Prerequisite: One of PHYS 312, MATH 316, MATH 257 and one of PHYS 102, PHYS 108, PHYS 118, PHYS 158, SCIE 001.

EOSC 453 (3) Physics of the Earth and Other Planets
Identification and quantitative analysis of diverse physical problems in the earth, ocean, atmospheric, and planetary sciences. [3-0-0]

Prerequisite: One of PHYS 312, MATH 316, MATH 257.

EOSC 454 (4) Applied Geophysics
Using geophysics to characterize the Earth's subsurface for resource exploration, engineering, or environmental applications. Data acquisition, processing, and interpretation of geophysical surveys. Inversion examples drawn from potential (electrical, magnetic, gravity) or wave field (seismic, ground penetrating radar) surveys. [3-2-0]

Prerequisite: All of EOSC 352, EOSC 353, EOSC 450 and one of PHYS 301, PHYS 354.

EOSC 470 (3) Biological Oceanography
A quantitative examination of processes regulating the abundance, distribution and production of phytoplankton, zooplankton, microbes and fish. Controls of primary and secondary production, ecosystem dynamics and foodwebs. [3-0-0]

Prerequisite: One of EOSC 372, EOSC 373.

EOSC 471 (3) Waves, Currents and Ocean Mixing
Use of observations, theory and model results to solve physical oceanographic problems including applications to transport and mixing of pollutants or nutrients. [3-0-0]

Prerequisite: EOSC 211 and one of ATSC 201, EOSC 372, GEOB 200 and one of SCIE 001, PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157.

EOSC 472 (3) Chemical Oceanography and Marine Geochemistry
Controls on chemical composition and elemental distributions in seawater and marine sediments (including nutrient elements, dissolved gases, the carbonate system, marine organic matter, and trace metals); solution chemistry of seawater; isotopic tracers of rates and dates in marine systems; geochemical balance in the oceans. [3-0-2*]

Prerequisite: EOSC 373.

EOSC 473 (3) Methods in Oceanography
Methods of data acquisition, study and analysis required in solving oceanographic problems. Includes a field school held during the mid-term break. A fee is to be paid by January 31. Open to third- and fourth-year students in Oceanography, or with permission of the Department Head. [0-3-0]

Prerequisite: One of EOSC 372, EOSC 373.

EOSC 474 (3) Marine Pollution
An interdisciplinary study of pollution, with examples drawn from coastal and oceanic environments, including areas of local interest. Intended for third and fourth year students with a background in the sciences. [3-0-0]

EOSC 475 (3) Marine Microbiology
Advanced biology, ecology and diversity of marine microbes. Emphasis on the roles of bacteria and viruses in marine foodwebs and geochemical cycles. [3-0-0]

Prerequisite: A minimum of 6 credits of third-year level life science courses.

EOSC 478 (3) Introduction to Fisheries Science
An introduction to the ecology and management of freshwater and marine fisheries. Topics include: population dynamics, species interactions, communities, environmental influences, stock assessment, economics and sociology of fisheries. Laboratories will consist of numerical analyses and simulations. [2-0-3]

EOSC 490 (3) Student Directed Seminars in Earth, Ocean and Atmospheric Sciences
Self-directed, collaborative studies in earth, ocean and atmospheric sciences, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the Handbook for Student Directed Seminars (www.vpacademic.ubc.ca/sds/sds_handbook.pdf). This course is not eligible for Credit/D/Fail grading.

Prerequisite: Third-year standing.

EOSC 498 (3) Co-operative Work Placement III
Approved and supervised technical work experience in an industrial, university of government setting for a minimum of 14 weeks. Normally taken in the Summer Session (Terms 1 and 2) following third year. Technical report required. Restricted to
students admitted to the Co-operative Education Option in Earth, Ocean and Atmospheric Sciences. This course is not eligible for Credit/D/Fail grading.

EOCS 499 (3) Co-operative Work Placement IV
Approved and supervised technical work experience in an industrial, university or government setting for a minimum of 14 weeks. Normally taken in the Summer Session (Terms 1 and 2) following fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Option in Earth, Ocean and Atmospheric Sciences. This course is not eligible for Credit/D/Fail grading.

EOCS 510 (3) Data Analysis in Atmospheric, Earth and Ocean Sciences
This course is not eligible for Credit/D/Fail grading. [3-0-0]

EOCS 511 (3) Numerical Techniques for Ocean, Atmosphere and Earth Scientists
This course is Web-based. Credit will not be granted for both ATSC 409 and ATSC 506/EOCS 511. This course is not eligible for Credit/D/Fail grading. Equivalency: ATSC 506.

EOCS 512 (3) Advanced Geophysical Fluid Dynamics
This course is not eligible for Credit/D/Fail grading.

EOCS 513 (3) Imaging and estimation with wavelets
This course is not eligible for Credit/D/Fail grading.

EOCS 514 (3) Introduction to Geological Fluid Mechanics
This course is not eligible for Credit/D/Fail grading.

EOCS 515 (1) Graduate Seminar Course
This course is not eligible for Credit/D/Fail grading.

EOCS 516 (2) Teaching and Learning in Earth, Ocean and Atmospheric Sciences
This course is not eligible for Credit/D/Fail grading.

EOCS 520 (3) Advanced Mineralogy
Crystal structure, chemistry, origin and paragenesis of major rock-forming and ore minerals. This course is not eligible for Credit/D/Fail grading.

EOCS 521 (3) Microbeam and Diffraction Methods for the Characterization of Minerals and Materials
This course is not eligible for Credit/D/Fail grading. [2-3-0]

EOCS 522 (3) Methods and Modeling in Petrology and Geochemistry
This course is not eligible for Credit/D/Fail grading. [3-0-2]

EOCS 523 (3) Isotope Geology
This course is not eligible for Credit/D/Fail grading.

EOCS 524 (3) Problems in Paleontology
Seminar. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

EOCS 525 (3) Magmatic Ore Deposits
Magmatic ore deposits and associated ore-forming systems with a focus on the petrology and geochemistry of mineralized intrusions and volcanic rocks. This course is not eligible for Credit/D/Fail grading.

EOCS 526 (3) Mechanics of Natural Deformation
Lectures and laboratory problems. This course is not eligible for Credit/D/Fail grading.

EOCS 528 (3) Advanced Coal Geology
The origin and character of coal and associated strata. Petrology, chemistry and physical properties of coal. Sedimentology of peat, biochemical and geochemical stages of coalification and oxidation of coal. Use of organic matter as a geothermometer and inbasinal analysis. Structural analysis and character of coal deposits. Analytical methods applied to coal. This course is not eligible for Credit/D/Fail grading. Prerequisite: EOSC 433.
EOSC 530 (3) Advanced Igneous Petrology
Lectures, seminars and laboratories on the application of physical chemistry to the origin of igneous rocks; crystallization processes in silicate magmas; melt physical properties, heat transfer and fluid flow. This course is not eligible for Credit/D/Fail grading.

EOSC 531 (3) Exploration Methodology
This course is not eligible for Credit/D/Fail grading.

EOSC 532 (3) Field Laboratory in Groundwater Hydrology
Hydraulic head measurements, water-quality sampling, pump and slug testing, infiltration measurements, profiling techniques. Computer analysis of field data. Held after spring term at the Richmond groundwater hydrology field site. Enrolment limitations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EOSC 533.

EOSC 533 (3) Advanced Groundwater Hydrology
Finite-difference models of steady-state and transient groundwater flow in the saturated and unsaturated zones; applications to regional groundwater flow, groundwater recharge, subsurface contributions to streamflow, and aquifer evaluation. This course is not eligible for Credit/D/Fail grading.

EOSC 534 (3) Geological Engineering: Soils and Weak Rocks
Consult the credit exclusion list in the Faculty of Science section of the Calendar.
http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414#4978 This course is not eligible for Credit/D/Fail grading.

EOSC 535 (3) Transport Processes in Porous Media
Transport of mass and heat in groundwater flow systems; modelling techniques including an introduction to the finite-element method; modelling of groundwater contamination. This course is not eligible for Credit/D/Fail grading.

EOSC 536 (3) Advanced Rock Engineering
Consult the credit exclusion list in the Faculty of Science section of the Calendar.
http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414#4978 This course is not eligible for Credit/D/Fail grading.

EOSC 538 (3) Diamond Exploration
This course is not eligible for Credit/D/Fail grading.

EOSC 539 (3) Geochemistry of Hydrothermal Ore Deposits
This course is not eligible for Credit/D/Fail grading. Prerequisite: Completion of a course in Economic Geology

EOSC 540 (3) Advanced Groundwater Geochemistry
This course is not eligible for Credit/D/Fail grading.

EOSC 541 (3) Multi-component Reactive Transport Modeling in Groundwater
This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) EOSC 430 or (b) EOSC 540; and EOSC 533.

EOSC 542 (3) Advanced Volcanology
This course is not eligible for Credit/D/Fail grading.

EOSC 543 (1-3) d Topics in Solid Earth Sciences
This course is not eligible for Credit/D/Fail grading.

EOSC 544 (3) Geodynamics
This course is not eligible for Credit/D/Fail grading.

EOSC 545 (3) Advanced Models in Mineral Deposits
This course is not eligible for Credit/D/Fail grading.

EOSC 546 (3) Advanced Field Methods in Earth Science
This course is not eligible for Credit/D/Fail grading.

EOSC 547 (3) Tunneling and Underground Engineering
This course is not eligible for Credit/D/Fail grading.

EOSC 548 (3) Graduating Paper for Masters Candidates without Thesis
This course is not eligible for Credit/D/Fail grading.

EOSC 549 (6-12) d Master's Thesis
This course is not eligible for Credit/D/Fail grading.
EOSC 550 (3) Linear Inverse Theory
Model construction, appraisal of nonuniqueness, and inference in linear problems. Tomographic inversions. This course is not eligible for Credit/D/Fail grading.

EOSC 552 (2-4) c Geomagnetism and Aeronomy
Description of the geomagnetic field, dynamo theory of the origin of the geomagnetic field, transient magnetic variations, magnetic storms and ionospheric disturbances. This course is not eligible for Credit/D/Fail grading.

EOSC 554 (2-4) c Theoretical Glaciology
Lectures and seminars on theoretical aspects of glacier mechanics; flow, stress and temperature fields, sliding theory, flow instabilities. This course is not eligible for Credit/D/Fail grading.

EOSC 555 (2-4) c Nonlinear Inverse Theory
Model construction, appraisal of nonuniqueness, and inference in nonlinear problems. Stochastic inverses, constrained optimization, joint inversions and image processing. This course is not eligible for Credit/D/Fail grading.

EOSC 556 (2-6) c Studies in Applied Geophysics
This course is not eligible for Credit/D/Fail grading.

EOSC 561 (2-6) c Theory and Methods in Seismic Interpretation
Topics to be selected from the following: forward modelling, analysis and inversion procedures as used in multichannel reflection, wide-angle reflection and refraction studies of the lithosphere. Velocity analyses, wave equation migration, dip moveout, synthetic seismograms, tomographic inversion, one-dimensional synthetic seismograms, tau-p methods, waveform inversion, two-dimensional ray tracing and synthetic seismograms, tomographic inversion. This course is not eligible for Credit/D/Fail grading.

EOSC 562 (3) Mechanics of Earthquakes and Faulting
This course is not eligible for Credit/D/Fail grading.

EOSC 570 (3) Paleooceanography
This course is not eligible for Credit/D/Fail grading. [3-0-0]

EOSC 571 (2-6) d Seminar in Physical Oceanography and Atmospheric Science
This course is not eligible for Credit/D/Fail grading.

EOSC 573 (3) Methods in Oceanography
This course is not eligible for Credit/D/Fail grading.

EOSC 575 (3) The Biology and Ecology of Marine Zooplanktonic Organisms
This course is not eligible for Credit/D/Fail grading.

EOSC 576 (3) Inorganic Chemical Tracers in the Study of Marine Systems
The chemical composition of seawater, cycles of gases, trace metals and radionuclides within the sea, chemical tracers in the study of water mixing, water movement and changes in ocean currents over time. This course is not eligible for Credit/D/Fail grading.

EOSC 578 (5) Seminal Papers in Biological Oceanography
This course is not eligible for Credit/D/Fail grading.

EOSC 579 (1) Dynamic Oceanography
Consult the Credit Exclusion List in the Faculty of Science section of the Calendar. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EOSC 512.

EOSC 582 (3) Satellite Remote Sensing: Applications to Oceanography and Meteorology
A review of the satellite-sensed data products used in research and operational aspects of oceanography and meteorology. This course is not eligible for Credit/D/Fail grading.
Equivalency: GEOG 515.

EOSC 583 (3) Circulation Processes and Transport Mechanisms in Observational Oceanography
This course is not eligible for Credit/D/Fail grading.

EOSC 584 (2-6) d Topics in Biological Oceanography
This course is not eligible for Credit/D/Fail grading.

EOSC 585 (2-6) d Topics in Physical Oceanography
This course is not eligible for Credit/D/Fail grading.

EOSC 595 (1-6) d Directed Studies
This course is not eligible for Credit/D/Fail grading.

EOSC 598 (3) M.Eng. Graduating Paper
This course is not eligible for Credit/D/Fail grading.

EOSC 599 (6-12) d Thesis
For M.A.Sc. This course is not eligible for Credit/D/Fail grading.

EOSC 649 (0) Doctoral Dissertation

EOSC 699 (0) Doctoral Dissertation
For Ph.D. (Engineering).

Educational and Counselling Psychology, and Special Education, Faculty of Education

EPSE: Educational Psychology and Special Education

EPSE 171 (3) Education in the Adolescent Years
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EPSE 271 (3) Teaching Adolescents with Special Learning Needs
For Dadaab, Kenya teacher education students. This course is not eligible for Credit/D/Fail grading.

EPSE 301 (3) Introduction to Educational Psychology
[3-0]

EPSE 303 (3) Teaching Highly Able Learners
Identification and appraisal of developmental and educational needs of highly able learners. [3-0]

EPSE 306 (2) Education during the Adolescent Years
Developmental characteristics of persons from pre-school age through adulthood. Physical, social, cognitive, moral, and emotional growth of both normal and exceptional children in grades 8-12. The teacher's role in assisting such students to deal with major developmental issues and problems. Pass/Fail This course is not eligible for Credit/D/Fail grading. [2-0-0]

EPSE 307 (1) Applying Developmental Theories in the Classroom
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 308 (3) Human Development, Learning, and Diversity
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 310 (2/3) d Assessment and Learning in the Classroom
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 311 (1) Cultivating Supportive School and Classroom Environments
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 312 (3) Introduction to the Study of Exceptional Children
An examination of all groups of exceptional children in terms of definition, incidence, characteristics, diagnosis and treatment. Prerequisite to most other courses in Special Education. Can be taken concurrently with several other introductory courses in Special Education. [3-0]

EPSE 313 (3) Educational Application of Developmental Theories
Theories of human development; physical, social, cognitive, moral, and emotional developmental characteristics from infancy to adolescence; implications for educational practice with students of different age and developmental status during the elementary school years. Pass/Fail This course is not eligible for Credit/D/Fail grading. [3-0-0]

EPSE 314 (3) Introduction to the Education of the Visually Impaired
An introductory course reviewing the identification and education of blind and partially sighted children. Designed to aid teachers to accommodate visually impaired children in the regular class setting. [3-0]
Prerequisite: EPSE 312.
Corequisite: EPSE 312.

EPSE 315 (3) Language Disorders of Exceptional Children
The course deals with severe language disabilities in children. Emphasis is placed on theories of language acquisition as applied to assessment. [3-0]
Prerequisite: One of EPSE 312, EPSE 317.
Corequisite: One of EPSE 312, EPSE 317.

EPSE 316 (3) Learning Disabilities
Identification, assessment and needs of children with learning disabilities. [3-0-0]
Prerequisite: One of EPSE 312, EPSE 317.

EPSE 317 (3) Development and Exceptionality in the Regular Classroom
The teacher's role in dealing with major developmental and special educational issues and problems within the regular classroom program, including working with supportive services, parents, and communities. Designated sections will focus on early childhood, middle childhood or adolescence. Pass/Fail This course is not eligible for Credit/D/Fail grading. [3-0-0]

EPSE 320 (3) Classroom Inclusion of Students who are Blind and Visually Impaired
Inclusion issues of students with visual impairments in general education classrooms; information about visual impairment, classroom adaptations and accommodations, and application of Universal Design. Appropriate for education majors and classroom teachers. [3-0]

EPSE 342 (3) Field Experiences with Individual Atypical Children
Supervised experience working with several atypical children in a community setting. Diagnosing needs, planning programs and integrating instruction and materials on an individual basis. [1-9]
Prerequisite: Permission of the department is required.

EPSE 344 (3) Programming in Special Education: Developing Perspective
An examination of the range of educational methodologies and teaching procedures and a discussion of their implications for the establishment of programs useful in working with exceptional children. The course comprises a practical examination and a detailed comparison of the major special educational methodologies. [3-1]

EPSE 348 (3) Family-Centred Practice for Children with Special Needs

EPSE 390 (3/6) d Special Topics
A study of innovative practices, ideas, and theories in special education. The specific topics may change yearly to reflect changing priorities and interests in special education, and the specific interest and competencies of visiting and regular faculty. [3-6]
Prerequisite: One of EPSE 312, EPSE 317. Permission of the instructor is required.

EPSE 399 (3) Education and Culture in the Deaf Community
Designed for students intending to work with deaf persons.

EPSE 401 (3) Instructional Design
Principles of instructional design and their application to the development, analysis, and evaluation of instructional plans for selected settings, instructional formats, and age groupings of learners. [3-0]

EPSE 403 (3) Education of Students with Developmental Disabilities in Inclusive Settings
[3-0]

EPSE 404 (3) Principles of Applied Behaviour Analysis
Credit will be given for only one of EPSE 404 or 405. [3-0-0]
Prerequisite: One of EPSE 312, EPSE 317. Or permission of instructor.

EPSE 406 (3) Typical and Atypical Development in Infants and Children

EPSE 408 (3) Educational Programming for Highly Able Learners
Planning elementary and secondary level programs for highly able learners. [3-0]

EPSE 410 (3) Assistive Technologies in Special Education
The use of microcomputers, adaptive technology, and software across age levels and areas of exceptionality in special education and health care settings. [2-1]

EPSE 411 (3) Augmentative and Alternative Communication for Individuals with Severe Speech and/or Physical Impairments
[3-0-0]

EPSE 415 (3) Technology for the Visually Impaired
Preparation of teachers to work with a variety of technological devices designed for students who are blind or visually impaired, e.g., computers, electronic reading devices, and closed circuit television. This course is restricted to students enrolled in a program for Education of Visually Impaired Children. [2-2]

**EPSE 421 (3) Assessment of Learning Difficulties**
- Theories of learning and instruction; principles and practices of diagnosis and assessment as these relate to students with relevant special needs.

**EPSE 423 (3) Assessment of Classroom Learning**
- Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*
- Prerequisite: One of EPSE 306, EPSE 313.

**EPSE 425 (6) Provisions in the Education of the Visually Handicapped**
- Provisions, procedures and methodology in the teaching of specific curriculum for the blind and visually impaired. Life skills and adjustment to blindness. This course is restricted to students in a program of Education of Visually Impaired Children. [3-0]

**EPSE 426 (3) Principles of Teaching the Hearing Impaired**
- An introductory course reviewing methods of teaching, administration, and organization of the educational program for the hearing impaired. Pre or corequisite: EPSE 312 or 317. [3-0]
- Prerequisite: EPSE 312. May be taken as a corequisite.

**EPSE 431 (3) Programming for Children with Specific Learning Disabilities**
- Methods and programs for learning disabilities are reviewed. Practical experience in the development and execution of a remedial program is required. [3-0]
- Prerequisite: EPSE 316.

**EPSE 432 (3) Classroom Management**
- [3-0-0]

**EPSE 433 (3) Assessment and Positive Behavioural Support in School and Community Settings**
- [3-0-0]

**EPSE 436 (3) Survey of Behaviour Disorders in Children and Adolescents**
- [3-0]

**EPSE 437 (3) Interventions for Children and Adolescents with Behaviour Disorders**
- [3-0-0]

**EPSE 449 (3) Education of Students with Autism**
- [3-0]

**EPSE 455 (3) Introduction to Orientation and Mobility for the Blind**
- Understanding the process of teaching independent travel to blind students, including orientation and mobility skills in school. Restricted to students enrolled in a program for Education of Visually Impaired Children or those who hold the Diploma or the equivalent. [2-2]
- Prerequisite: EPSE 425.
- Corequisite: EPSE 425.

**EPSE 456 (6) Advanced Orientation and Mobility Techniques**
- *This course is not eligible for Credit/D/Fail grading.* Prerequisite: EPSE 455.

**EPSE 461 (3/6) c Educational Diagnosis and Remedial Instruction**
- Interpretation of informal and standardized test scores in educational diagnosis; estimates of actual and optimum levels of individual achievement; individual differences as factors affecting performance; methods of encouraging the optimum achievement of individuals; methods and practice materials for remedial teaching.

**EPSE 462 (3/6) c Human Development in Education**
- Investigates selected concepts of developmental theory in terms of their influence upon instructional practice. Particular emphasis is placed on social and intellectual development.
- Prerequisite: One of EPSE 306, EPSE 313.

**EPSE 481 (3) Introduction to Research in Education**
- The nature of scientific study and essentials of survey, experimental and other empirical research designs. Designed for students proceeding to graduate work.
- Prerequisite: EPSE 482. May also be taken as a corequisite.
EPSE 482 (3) Introduction to Statistics for Research in Education
Basic concepts and principles of descriptive and inferential statistics. Designed for students proceeding to graduate work involving quantitative methodology. [3-0]
Prerequisite: Proficiency in modern high school algebra. Please consult the Faculty of Science Credit Exclusion Listshttp://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 before registering.

EPSE 483 (3) Reading and Interpreting Research in Education
Introductory research methods course for students who wish to be critical readers rather than producers of educational research. Develops skills for locating, understanding, interpreting and critiquing educational empirical research. May not be used as a prerequisite to EPSE 592 or EPSE 596. [3-0]
Prerequisite: Please consult the Faculty of Science Credit Exclusion Listshttp://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 before registering.

EPSE 484 (3) Nonparametric and Related Statistics
Distribution-free statistical techniques for analysis of ranked data, and analysis of discrete observations. [3-0]
Prerequisite: EPSE 482.

EPSE 501 (3) Seminar in Human Development, Learning and Culture
This course is not eligible for Credit/D/Fail grading.

EPSE 502 (3) Cognition, Language and Literacy Processes in Education
This course is not eligible for Credit/D/Fail grading.

EPSE 503 (3) Cultural Perspectives on Learning, Development and Media
This course is not eligible for Credit/D/Fail grading.

EPSE 505 (3) Foundations in Human Development: Infancy to Adulthood
This course is not eligible for Credit/D/Fail grading.

EPSE 507 (3) Applied Child and Adolescent Psychopathology
This course is not eligible for Credit/D/Fail grading.

EPSE 508 (3-12) d Review of Research in Educational Psychology and Special Education
Studies are made of recent research bearing on educational practice. This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 482.

EPSE 509 (3) Organization of Special Education Services
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EPSE 312, EPSE 317.

EPSE 510 (3) d Advanced Application of Assistive Technologies in Special Education
This course is not eligible for Credit/D/Fail grading.

EPSE 511 (3) Special Topics in Human Development, Learning, and Culture
This course is not eligible for Credit/D/Fail grading.

EPSE 512 (3) Critical Issues in Special Education
This course is not eligible for Credit/D/Fail grading.

EPSE 513 (3) Foundations of Orientation and Mobility for Teachers of Students with Visual Impairments
Credit will be granted for only one of EPSE 455 or EPSE 513. This course is not eligible for Credit/D/Fail grading.

EPSE 514 (6) Advanced Orientation and Mobility Techniques for Instructors of Individuals who are Blind or Visually Impaired
Credit will be granted for only one of EPSE 456 or EPSE 514. This course is not eligible for Credit/D/Fail grading.

EPSE 515 (3-6) d Seminar in Behaviour Disorders
This course is not eligible for Credit/D/Fail grading.

EPSE 516 (3) Seminar in the Development and Education of Highly Able and Creative Learners
This course is not eligible for Credit/D/Fail grading.

EPSE 517 (3) Acoustic Environments and Amplification in the Classroom
This course is not eligible for Credit/D/Fail grading. Prerequisite: AUDI 598. Corequisite: AUDI 598.

EPSE 518 (3) Speech Development of Deaf and Hard of Hearing Students
This course is not eligible for Credit/D/Fail grading. Prerequisite: AUDI 598.
Corequisite: EPSE 521.

EPSE 520 (3) Curriculum Development in the Education of Deaf and Hard of Hearing Students
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 519.

EPSE 521 (3) Psychosocial Aspects of Hearing Loss
This course is not eligible for Credit/D/Fail grading.

EPSE 522 (3) Designing English Language Programs for Deaf and Hard of Hearing Students
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 519.

EPSE 524 (3) Practicum in Speech and English Language Development with Deaf and Hard of Hearing Students
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of EPSE 518, EPSE 522.

EPSE 525 (3) Studies in Sign Language
This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: EPSE 399.

EPSE 526 (3) Seminar in Specific Learning Disabilities
This course is not eligible for Credit/D/Fail grading.

EPSE 528 (3) Basic Principles of Measurement
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 482.

EPSE 529 (3) Development of Scales and Measures
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 528.

EPSE 530 (3) Seminar in Education of the Deaf and Hard of Hearing
This course is not eligible for Credit/D/Fail grading.

EPSE 531 (3) Curriculum-Based Assessment and Intervention
This course is not eligible for Credit/D/Fail grading.

EPSE 533 (3) Psychosocial Aspects of Exceptionality
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EPSE 312, EPSE 317.

EPSE 534 (3) Academic Assessment
This course is not eligible for Credit/D/Fail grading.

EPSE 535 (3) Social, Emotional, and Behavioural Assessment
This course is not eligible for Credit/D/Fail grading.

EPSE 536 (3) Foundations of Education for Students with Visual Impairments
Online course. This course is not eligible for Credit/D/Fail grading.

EPSE 537 (3) Programming in Orientation and Mobility
This course is not eligible for Credit/D/Fail grading.

EPSE 538 (3) Seminar in Orientation and Mobility for the Blind
This course is not eligible for Credit/D/Fail grading.

EPSE 539 (3) Research Issues and Trends in the Education of Students with Visual Impairments
This course is not eligible for Credit/D/Fail grading.

EPSE 540 (3) Seminar in Low Vision
This course is not eligible for Credit/D/Fail grading.

EPSE 541 (3) Braille Reading and Writing
This course is not eligible for Credit/D/Fail grading.

EPSE 542 (3) Working with Infants and Preschoolers who are Blind or Visually Impaired
This course is not eligible for Credit/D/Fail grading.
EPSE 543 (3) Working with Students with Visual Impairments: Elementary and Secondary Curriculum
This course is not eligible for Credit/D/Fail grading.

EPSE 544 (3) Literacy Instruction for Students who are Visually Impaired
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 541.

EPSE 545 (3) Teaching Independent Living Skills to Students with Visual Impairments
This course is not eligible for Credit/D/Fail grading.

EPSE 546 (3) Assistive Technology for Teachers of Students with Visual Impairments
Credit will be granted for only one of EPSE 415 or EPSE 546. This course is not eligible for Credit/D/Fail grading.

EPSE 547 (3) Advanced Communication Skills Instruction for Students with Visual Impairments
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 541.

EPSE 549 (3) Seminar in Autism
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 449.

EPSE 550 (3) Professional, Ethical and Legal Issues in School Psychology
This course is not eligible for Credit/D/Fail grading.

EPSE 551 (3-6) d School-based Consultation
This course is not eligible for Credit/D/Fail grading. Equivalency: CNPS 551.

EPSE 552 (3-6) d School-Based Interventions
This course is not eligible for Credit/D/Fail grading.

EPSE 553 (3) Theories of Cognitive and Affective Abilities
This course is not eligible for Credit/D/Fail grading.

EPSE 554 (3) Practicum in Cognitive Assessment
Administration, scoring, and interpretation of measures of cognitive ability for children and youth. This course is not eligible for Credit/D/Fail grading.
Prerequisite: EPSE 553. And admission to the SCPS program or permission of the instructor.

EPSE 561 (1-12) c Laboratory Practicum
This course is not eligible for Credit/D/Fail grading.

EPSE 565 (3/6) d Special Course in Subject Matter Field
This course is not eligible for Credit/D/Fail grading.

EPSE 568 (3) Applied Developmental Neuropsychology
This course is not eligible for Credit/D/Fail grading. Equivalency: CNPS 568.

EPSE 569 (3) Social Psychological Foundations in Applied Psychology
This course is not eligible for Credit/D/Fail grading. Equivalency: CNPS 569.

EPSE 571 (3/6) c Seminar in Research in Educational Psychology and Special Education
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 501 or approved graduate coursework.

EPSE 573 (3) Advanced Seminar in Research on Exceptional Children
This course is not eligible for Credit/D/Fail grading.

EPSE 574 (3) Principles of Behaviour Analysis
This course is not eligible for Credit/D/Fail grading.

EPSE 575 (3) Seminar in Instructional Methods for Persons with Significant Learning Challenges
This course is not eligible for Credit/D/Fail grading.

EPSE 576 (3) Assessment and Positive Behaviour Support in School and Community Settings
This course is not eligible for Credit/D/Fail grading.

EPSE 577 (3) Seminar in Assessment and Positive Behaviour Support in School and Community Settings
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 576.

EPSE 578 (3) Ethics for Behaviour Analysts
Knowledge of the ethical principles, standards, and practices consistent with the role of an applied behaviour analyst. Application of ethical reasoning in applied behaviour analytic work with children, youth, and adults in home, school, and community settings
will be emphasized. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: All of EPSE 574, EPSE 575, EPSE 576, EPSE 577.

EPSE 580 (3-12) d Investigation and Report of a Problem in Education 
This course is not eligible for Credit/D/Fail grading.

EPSE 581 (3-12) d Special Topics in Measurement, Evaluation, and Research Methodology 
This course is not eligible for Credit/D/Fail grading. Prerequisite: Courses appropriate to a specific special topic may be required.

EPSE 584 (3) Motivation in Education 
This course is not eligible for Credit/D/Fail grading.

EPSE 585 (3) Social and Emotional Development in Education 
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 505.

EPSE 586 (3) Analyzing Discourse and Talk: An Overview of Methods 
Credit will be granted for only one of EPSE 586, LLED 501, and LLED 575. This course is not eligible for Credit/D/Fail grading. 
Equivalency: LLED 501.

EPSE 587 (3) Analyzing Discourse in Education: Descriptive and Critical Approaches 
Credit will be granted for only one of EPSE 587, LLED 502, and LLED 576. This course is not eligible for Credit/D/Fail grading. 
Equivalency: LLED 502.

EPSE 589 (3-9) d Master's Internship in School Psychology 
Pass/Fail. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: Restricted to students in the School Psychology Master's Program.

EPSE 590 (3) Graduating Paper/Seminar 
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 591 (3) Theory and Practice of Program Evaluation 
This course is not eligible for Credit/D/Fail grading.

EPSE 592 (3) Experimental Designs and Analysis in Educational Research 
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 482. EPSE 483 may not be used as a prerequisite to EPSE 592.

EPSE 593 (3) Design and Analysis of Research with Small Samples and Single Subjects 
This course is not eligible for Credit/D/Fail grading.

EPSE 594 (3) Meta-Analysis: Quantitative Research Synthesis 
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of EPSE 592, EPSE 596.

EPSE 595 (3) Qualitative Research Methods 
This course is not eligible for Credit/D/Fail grading.

EPSE 596 (3) Correlational Designs and Analysis in Educational Research 
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 482. EPSE 483 may not be used as a prerequisite.

EPSE 597 (3) Structural Equation Modeling and Factor Analysis 
This course is not eligible for Credit/D/Fail grading. 
Prerequisite: EPSE 596.

EPSE 598 (3-12) d Field Experiences 
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

EPSE 599 (6) Master's Thesis 
This course is not eligible for Credit/D/Fail grading.

EPSE 601 (3/6) c Doctoral Seminar 
This course is not eligible for Credit/D/Fail grading.

EPSE 604 (3/6) d Advanced Topics in Human Development, Learning, and Culture 
This course is not eligible for Credit/D/Fail grading.

EPSE 606 (3) College and University Teaching 
This course is not eligible for Credit/D/Fail grading.

EPSE 630 (3) Advanced Seminar: Adolescence Through Emerging Adulthood
Exploration of the diversity of experience from adolescence through emerging adulthood, including current educational research and theory on developmental trajectories, and learning across family and peer, school and community, and cultural and global context. This course is not eligible for Credit/D/Fail grading.

EPSE 632 (3) Systems Change in Schools
This course is not eligible for Credit/D/Fail grading.

EPSE 633 (3) Community-Based Services
This course is not eligible for Credit/D/Fail grading.

EPSE 681 (3-12) d Advanced Topics in Measurement, Evaluation, and Research
This course is not eligible for Credit/D/Fail grading. Prerequisite: Courses appropriate to a specific advanced topic may be required.

EPSE 682 (3) Multivariate Designs and Analysis in Educational Research
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of EPSE 592, EPSE 596.

EPSE 683 (3) Hierarchical Linear Modeling, Growth and Change
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of EPSE 528, EPSE 592, EPSE 596.

EPSE 684 (3) Item Response Theory
This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 528. Or equivalent introductory measurement course.

EPSE 687 (3-12) d Doctoral Practicum In School or Counselling Psychology
Pass/Fail. This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission to the School Psychology or Counselling Psychology Ph.D. Program.

EPSE 688 (3/6) d Supervision of School Psychology Practice
Instruction and practice in the supervision of school psychology. This course is not eligible for Credit/D/Fail grading. Prerequisite: Restricted to students in the School Psychology Ph.D. Program.

EPSE 689 (3-9) d Pre-Doctoral Internship in School Psychology
Pass/Fail. This course is not eligible for Credit/D/Fail grading. Prerequisite: Restricted to students in the School Psychology Ph.D. Program.

EPSE 699 (0) Doctoral Dissertation
Pass/Fail.

Faculty of Education

ETEC: Educational Technology

ETEC 500 (3) Research Methodology in Education
This course is not eligible for Credit/D/Fail grading.

ETEC 510 (3) Design of Technology- Supported Learning Environments
This course is not eligible for Credit/D/Fail grading.

ETEC 511 (3) Foundations of Educational Technology
This course is not eligible for Credit/D/Fail grading.

ETEC 512 (3) Applications of Learning Theories to the Analysis of Instructional Settings
This course is not eligible for Credit/D/Fail grading.

ETEC 520 (3) Planning and Managing Learning Technologies in Higher Education
This course is not eligible for Credit/D/Fail grading.

ETEC 521 (3) Indigeneity, Technology, and Education
This course is not eligible for Credit/D/Fail grading.

ETEC 522 (3) Ventures in Learning Technology
This course is not eligible for Credit/D/Fail grading.

ETEC 530 (3) Constructivism Strategies for E-Learning
This course is not eligible for Credit/D/Fail grading.
ETEC 531 (3) Curriculum Issues in Cultural and New Media Studies
   This course is not eligible for Credit/D/Fail grading.

ETEC 532 (3) Technology in the Arts and the Humanities Classroom
   This course is not eligible for Credit/D/Fail grading.

ETEC 533 (3) Technology in the Mathematics and Science Classroom
   This course is not eligible for Credit/D/Fail grading.

ETEC 540 (3) Text Technologies: The Changing Spaces of Reading and Writing
   This course is not eligible for Credit/D/Fail grading.

ETEC 545 (0) Tec de Monterrey

ETEC 565 (3-12) d Special Course in Subject Matter Field
   This course is not eligible for Credit/D/Fail grading.

ETEC 580 (3-12) c Problems in Education
   This course is not eligible for Credit/D/Fail grading.

ETEC 590 (3) Graduating Project
   This course is not eligible for Credit/D/Fail grading.

French, Hispanic and Italian Studies, Faculty of Arts

FHIS: French, Hispanic and Italian Studies

FHIS 333 (3) Short Fiction in Romance Literatures
   A study of the genres of the "novella" and the short story within and across Romance cultures.

FHIS 334 (3) Afterlife of the Text: Rewritings and Adaptations

Theatre and Film, Faculty of Arts

FIPR: Film Production

FIPR 101 (3) Introduction to the History of Film Production
   The history of film and film production by decade with a strong emphasis on filmmakers and advances in production technology.

FIPR 131 (3) Introduction to Screen Acting
   Fundamental techniques used to create emotionally engaged and narratively effective performances for film and digital media.

FIPR 133 (3) Introduction to Film and Media Production
   A hands-on introduction to Film and Multi/New Media production, focusing on fundamental techniques for creating effective presentations.

FIPR 230 (3) Introduction to Motion Picture Directing
   The role and methods of the motion picture director.

FIPR 233 (3) Film and Media Production I
   Camera operation, lighting, sounds, and editing for film and media production.

FIPR 234 (3) Production Planning and Professional Practices
   Planning of film productions from concept to completion.

FIPR 235 (3) Image Concepts for Filmmakers
   The theory and practice involved in creating images for film and media.

FIPR 269 (3/6) d Special Topics in Film Production
   A topic of current interest in film production. Topic will change from year to year.
FIPR 299 (3) Directed Studies: On-Campus Research
On-campus film production field research. Based on film project work on campus productions. Restricted to Film Production students except with permission. Contact department.

FIPR 330 (3) Intermediate Motion Picture Directing
Prerequisite: FIPR 230.

FIPR 333 (9) Film and Media Production II
Intermediate film and media production. Open only to students in the Film Production BFA Program. Students who have not already completed FIPR 337, FIPR 338 must complete them at the same time as FIPR 333.
Prerequisite: FIPR 233.
Corequisite: All of FIPR 337, FIPR 338.
Equivalency: FILM 333.

FIPR 337 (3) Cinematography and Lighting I
Introductory cinematography and lighting techniques and aesthetics for 16mm film and digital media.

FIPR 338 (3) Motion Picture Sound
An introduction to the technique and aesthetics of creating production and post-production sound for film and media.

FIPR 339 (3) Post-Production Techniques I
Open only to students in the Film Production BFA Program.
Equivalency: FILM 339.

FIPR 399 (3/6) Directed Studies: Off-Campus Research
Off-campus film production field research. Based on film project work outside the university.

FIPR 433 (9) Film and Media Production III
Advanced film and media production.
Prerequisite: One of FIPR 333, FILM 333.
Equivalency: FILM 433.

FIPR 434 (3/6) Producing for Film and Television
The creative and business aspects of producing for film and television.

FIPR 435 (3/6) Alternative Cinema Production
Experimental approaches to content, structure, technology and style in film and media production. Students who have not yet completed FIPR 233, 234, 337, 339, must complete them at the same time as FIPR 333.
Corequisite: All of FIPR 233, FIPR 234, FIPR 337, FIPR 339.

FIPR 436 (3/6) Documentary Development and Production
Documentary concept development, essential production techniques, and marketing.

FIPR 437 (3) Cinematography II
Advanced camera operation, lighting, and shot design. Open only to students in the FILM BFA Program.
Prerequisite: One of FIPR 333, FILM 333.
Equivalency: FILM 437.

FIPR 439 (3) Post-Production Techniques II
Advanced instruction in motion picture and sound editing practice. Open only to students in FILM BFA Production Program.
Prerequisite: One of FIPR 333, FILM 333.
Equivalency: FILM 439.

FIPR 469 (3-12) Special Projects
Advanced film production, including interdisciplinary projects.

FIPR 533 (3/6) Advanced Problems in Directing
Problems in directing narrative film. Explores problems in scripting, performance, shot design, and editing through seminars, workshops with acting students, and production exercisesThis course is not eligible for Credit/D/Fail grading.

FIPR 534 (3/6) Advanced Production for Film and Television
This course is not eligible for Credit/D/Fail grading.

FIPR 535 (3/6) Advanced Alternative Cinema Production
This course is not eligible for Credit/D/Fail grading.
FIPR 536 (3/6) d Advanced Documentary Development and Production
This course is not eligible for Credit/D/Fail grading.

FIPR 547 (3/6) d Directed Studies in Film Production
This course is not eligible for Credit/D/Fail grading.

FIPR 549 (6-18) d Thesis
This course is not eligible for Credit/D/Fail grading.

Faculty of Science

FISH: Fisheries Research

FISH 500 (3) Issues in Fisheries Research: Seminars - Fisheries Management
This course is not eligible for Credit/D/Fail grading.

FISH 501 (3) Issues in Fisheries Research: Ecosystem Modelling
This course is not eligible for Credit/D/Fail grading.

FISH 502 (3) Issues in Fisheries Research: Marine and Freshwater
This course is not eligible for Credit/D/Fail grading.

FISH 503 (3) Issues in Fisheries Research: Policy and Evaluation
This course is not eligible for Credit/D/Fail grading.

FISH 504 (3) Quantitative Analysis of Fisheries I
This course is not eligible for Credit/D/Fail grading.

FISH 505 (3) Quantitative Analysis of Fisheries II
This course is not eligible for Credit/D/Fail grading.

FISH 506 (3-6) d Current Topics in Fisheries
This course is not eligible for Credit/D/Fail grading.

FISH 507 (3) Grand Challenges in Ocean Leadership
This course is not eligible for Credit/D/Fail grading.

FISH 508 (3) Fisheries Economics and Management
This course is not eligible for Credit/D/Fail grading.

FISH 509 (3) Bayesian Methods for Fisheries Stock Assessment
This course is not eligible for Credit/D/Fail grading.

FISH 510 (3) Bayesian Decision Analysis for Fisheries Management
This course is not eligible for Credit/D/Fail grading.

FISH 520 (6) Fisheries Conservation, Governance, and Evaluation
This course is not eligible for Credit/D/Fail grading.

FISH 599 (18) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

FISH 699 (0) Doctoral Dissertation

Theatre and Film, Faculty of Arts

FIST: Film Studies

FIST 100 (3) Introduction to Film Studies
Basic aesthetic, economic, sociological, and technological aspects of film.

FIST 200 (3) Introduction to Canadian Cinema
History and aesthetics of Canadian cinema.
FIST 210 (3) Early Cinema
Aesthetics, economics, history, and technological characteristics of international early film.

FIST 220 (3) Hollywood Cinema 1930-1960
Analysis of the aesthetics, economics, history and technological characteristics of the Classical Hollywood period.

FIST 230 (3) Introduction to Asian Cinema
Overview of the cinemas of China, India, Japan, and Korea.

FIST 240 (3) Media Industries
Overview of today's film and media industries, and of the concepts governing their practices.

FIST 300 (3) Cult Cinema
Overview of world cult cinema.

FIST 331 (3) Studies in Film Theory
A seminar introducing the many theoretical approaches to film: formalist, historical, Marxist, psychoanalytic, semiotic, and structuralist.

FIST 332 (3) Studies in Genre or Period
A seminar examining one or more genres or periods, such as the Western, Film Noir, Science Fiction, Films of the 1980's. Also includes study of national cinemas.

FIST 334 (3) Seminar in Documentary
An analysis of the representational strategies and ethics of the form.

FIST 336 (3) Seminar in European Cinema
Topics may include a study of a European national cinema.

FIST 338 (3) Asian and Australasian Cinema
Topics may include an analysis of a national cinema, such as that of China, India, or Australia.

FIST 340 (3) Media Audiences
Overview of approaches for studying audiences and receptions of film and contemporary media.

FIST 343 (3) Studies in Auteurism
A seminar examining the work of one or more directors, such as John Ford, Francois Truffaut, Denys Arcand, Margarethe Von Trotta, or of a screenwriter over many films.

FIST 432 (3) Seminar in Motion Picture Forms
Animation, experimental, and/or multimedia.

FIST 434 (3/6) d Studies in Film
A seminar devoted to a topic of current interest in film. Topic will change from year to year. May be repeated for credit when topics differ.

FIST 436 (3) Seminar in American Cinema Since 1960
Topics may include an analysis of a specific period.

FIST 438 (3) Seminar in Canadian Cinema
Topics may include an analysis of the Canadian Governmental agencies supporting Film Production.

FIST 445 (3) Majors and Honours Seminar

FIST 449 (6) Honours Essay
A course allowing honours students to work with a faculty member on a major research paper.

FIST 500 (3) Research Methods
This course is not eligible for Credit/D/Fail grading.

FIST 510 (3) Advanced Theory, Film and Media
Current trends and topics in scholarship, based on an intensive look at a few key theorists and theories. This course is not eligible for Credit/D/Fail grading.

FIST 520 (3) Advanced Film and Media Criticism
Film and media criticism, with detailed interrogation of conceptual foundations and contemporary case-studies. This course is not eligible for Credit/D/Fail grading.
FIST 531 (3/6) d Seminar: Styles in Film
Studies in styles or film genres such as narrative, documentary, ethnographic, experimental, etc. Topics will vary from year to year. This course is not eligible for Credit/D/Fail grading.

FIST 532 (3/6) d Seminar: Study of Major Film Artists
Investigations into the biographical, social, and national backgrounds of two or three major artists, with attention to the specific nature of their work in its historical, psychological, and cultural contexts. Topics will vary from year to year. This course is not eligible for Credit/D/Fail grading.

FIST 534 (3/6) d Seminar in Film Studies
Topics to be arranged. This course is not eligible for Credit/D/Fail grading.

FIST 547 (3/6) d Directed Studies in Film
This course is not eligible for Credit/D/Fail grading.

FIST 549 (6-18) d Thesis
This course is not eligible for Credit/D/Fail grading.

FIST 649 (0) Directed Studies

Family Practice, Faculty of Medicine

FMPR: Family Practice

FMPR 562 (3) Health Promotion and Disease Prevention in Family Practice
Identification of preventive strategies in different age groups and their implementation in Family Practice. Examination of health belief models in caregivers and patients which inhibit or facilitate preventive measures. Admission to course at discretion of the Department of Family Practice. This course is not eligible for Credit/D/Fail grading.
Prerequisite: HCEP 502.

Sociology, Faculty of Arts

FMST: Family Studies

FMST 210 (3) Family Context of Human Development
The influence of family dynamics and social conditions on human development.

FMST 238 (3) Family Resource Management
Conceptual models of resource management as related to families.

FMST 312 (3) Parent-child Relationships
Parent-child interaction over the life span.
Prerequisite: One of SOCI 200, FMST 210.

FMST 314 (3) Relationship Development
The study of the development, course, and decline of personal relationships.
Prerequisite: One of SOCI 200, PSYC 100, PSYC 101, PSYC 102, SOCI 240.

FMST 316 (3) Human Sexuality
An examination of human sexual development and behaviour.
Prerequisite: One of SOCI 200, PSYC 100, PSYC 101, PSYC 102, SOCI 240.

FMST 441 (3) Social Context of Child Development
The ways in which the familial, physical, and social environment affects the life structures, opportunities and outcomes of epigenetic developmental processes.
Equivalency: SOWK 441.

FMST 524 (3) Family Development
An examination of research and theory on the timing and sequencing of the course of family life in North American families. This course is not eligible for Credit/D/Fail grading.
Faculty of Arts

FNEL: First Nations and Endangered Languages Program

FNEL 101 (3-12) d Introduction to a Salish Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures and listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of the language is assumed. This course is not eligible for Credit/D/Fail grading.

FNEL 102 (3-12) d Introduction to a Salish Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 101 in the same language.

FNEL 111 (3-12) d Introduction to an Algonquian Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures and listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of the language is assumed. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 101 in the same language.

FNEL 112 (3-12) d Introduction to an Algonquian Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 111 in the same language.

FNEL 121 (3-12) d Introduction to a Dene (Athapaskan) Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures and listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of the language is assumed. Not offered every year.

FNEL 122 (3-12) d Introduction to a Dene (Athapaskan) Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 121 in the same language.

FNEL 131 (3-12) d Introduction to a Tsimshianic Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures, listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of the language is assumed. Not offered every year.

FNEL 132 (3-12) d Introduction to a Tsimshianic Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 131 in the same language.

FNEL 141 (3-12) d Introduction to a Wakashan Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures, listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of the language is assumed. Not offered every year. This course is not eligible for Credit/D/Fail grading.

FNEL 142 (3-12) d Introduction to a Wakashan Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 141 in the same language.

FNEL 151 (3) Introduction to the Haida Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures, listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of this language is assumed. Not offered every year.

FNEL 152 (3) Introduction to the Haida Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 151.

FNEL 161 (3) Introduction to the Ktunaxa (Kootenay) Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures, listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of this language is assumed. Not offered every year.

FNEL 162 (3) Introduction to the Ktunaxa (Kootenay) Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 161.

FNEL 180 (3) Introduction to Endangered Language Documentation and Revitalization
Foundational concepts in the critical study of cultural, historical, social, and political factors that impact language loss, retention, and revival. Introducing strategies and practical methodologies for collaborative, interdisciplinary, community-based documentation and revitalization projects for First Nations and Indigenous languages. This course is not eligible for Credit/D/Fail grading.

FNEL 191 (3-12) d Introduction to an Indigenous Language I
Emphasis on accurate pronunciation, conversation, basic grammatical structures, listening and literacy skills, and the study of oral traditions in their cultural context. No prior knowledge of this language is assumed. Not offered every year.

FNEL 192 (3-12) d Introduction to an Indigenous Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: 3 credits of FNEL 191 in the same language.

FNEL 201 (3-12) d Intermediate Salish Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 102 in the same language.

FNEL 202 (3-12) d Intermediate Salish Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 201 in the same language.

FNEL 211 (3-12) d Intermediate Algonquian Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 112 in the same language.

FNEL 212 (3-12) d Intermediate Algonquian Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 211.

FNEL 221 (3-12) d Intermediate Dene (Athapaskan) Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 122 in the same language.

FNEL 222 (3-12) d Intermediate Dene (Athapaskan) Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 221 in the same language.

FNEL 231 (3-12) d Intermediate Tsimshianic Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 132 in the same language.

FNEL 232 (3-12) d Intermediate Tsimshianic Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 231 in the same language.

FNEL 241 (3-12) d Intermediate Wakashan Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 142 in the same language.

FNEL 242 (3-12) d Intermediate Wakashan Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 241 in the same language.

FNEL 251 (3) Intermediate Haida Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 152.

FNEL 252 (3) Intermediate Haida Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 251.

FNEL 261 (3) Intermediate Ktunaxa (Kootenay) Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 162.

FNEL 262 (3) Intermediate Ktunaxa Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year.
Prerequisite: FNEL 261.

FNEL 281 (3) Sounds of Endangered Languages: Conservation and Revitalization
Development of skills in the perception and transcription of speech sounds in endangered languages, focusing on the diversity within BC Aboriginal languages. Capacity-building techniques for digital recording, editing, analysis, and archiving; guided by community-based ethical protocols and conservation/revitalization goals. This course is not eligible for Credit/D/Fail grading.

FNEL 282 (3) Structures of Endangered Languages: Conservation and Revitalization
Development of skills in the documentation, transcription and analysis of grammatical structures in endangered languages.
focusing on the diversity within BC Aboriginal languages. Applied techniques in documentation, workflow and multi-media digital annotation, guided by community-based ethical protocols and conservation/revitalization goals.

This course is not eligible for Credit/D/Fail grading.

FNEL 291 (3-12) d Intermediate Indigenous Language I
Emphasis on increasing fluency in conversational ability, enhancing pronunciation and comprehension skills, expanding vocabulary, extending literacy and grammatical understanding, and further study of oral traditions in their cultural context. Not offered every year.
Prerequisite: FNEL 192 in the same language.

FNEL 292 (3-12) d Intermediate Indigenous Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 291 in the same language.

FNEL 301 (3-12) d Advanced Salish Language I
Emphasis on advanced comprehension and production skills. Extended focus on skills in oral traditions, transcription, literacy, and on deepening the understanding of grammatical structures and dialectal variation. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 202 in the same language.

FNEL 302 (3-12) d Advanced Salish Language II
Continued focus on the diverse range of language learning skills that advance competency in conversational fluency, pronunciation, comprehension, vocabulary, oral traditions, literacy, grammatical understanding, and the cultural contextualization of language use. Not offered every year. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNEL 301 in the same language.

FNEL 380 (3) Technologies for Endangered Language Documentation and Revitalization
Digital tools for endangered language documentation, conservation, and revitalization. Overview of best practices, introduction to community engagement and capacity-building, protocols and ethics, project design, cultural context, orthographies, use of audio, video and still photography, data management, archiving and web publishing. This course is not eligible for Credit/D/Fail grading.

FNEL 381 (3) Biocultural Diversity: Language, Community, and Environment
Critical exploration of the links between linguistic, biological and cultural diversity; including connections with linguistic relativity, linguistic identity, language and place; and strategies for collective, interdisciplinary action to promote and support the protection of languages, cultures, and the environment.

FNEL 382 (3) Lexicography for Endangered Languages
Foundational concepts in the discipline of compiling, editing, managing and hosting dictionaries, also known as lexicography. Special focus on the technical and ethical considerations for community-based lexicography projects for endangered and BC First Nations languages.

FNEL 389 (3) Collaborative Heritage Research in First Nations Languages: Practicum & Workshop
Hands-on experience planning and producing a Breath of Life Language Reclamation Workshop for endangered BC First Nations languages, during which community-based researchers access and interpret relevant heritage resources at UBC and other local institutions for the revitalization of their languages.
Corequisite: All of FNEL 281, FNEL 282. Corequisites can be taken either alongside or prior to FNEL 389.

FNEL 448 (3-12) c Directed Research in First Nations Languages
Supervised by a faculty member.
Prerequisite: Agreement of Supervisor and approval of Chair of FNEL program.

FNEL 480 (3-12) d Endangered Language Documentation and Revitalization
Critical study of the historical, social, cultural, political, and economic factors impacting on language loss, retention, and revival. Research on and application of methodologies for collaborative, trans-disciplinary, community-based documentation and revitalization of BC’s Indigenous linguistic heritage. This course is not eligible for Credit/D/Fail grading.

FNEL 481 (3) Heritage Resources in Endangered First Nations Language Revitalization
Examines the complementary and intersecting roles of libraries, archives, and museums in collections acquisition, development, curation, preservation, and access traditions pertaining to First Nations languages, to explore how each can contribute to endangered language and cultural heritage sustainability. This course is not eligible for Credit/D/Fail grading.
Corequisite: All of FNEL 281, FNEL 282. Corequisites can be taken either alongside or prior to FNEL 481.
FNEL 482 (3) Applied Research in Endangered Language Reclamation
Application of research skills and methodologies in the design and implementation of a research project relevant to endangered language conservation and/or revitalization. Project co-constructed in collaboration with a First Nations community, guided by community-based ethical protocols. FNEL 481 recommended. This course is not eligible for Credit/D/Fail grading.
Corequisite: All of FNEL 281, FNEL 282, FNEL 389. Corequisites can be taken either alongside or prior to FNEL 482.

FNEL 483 (3) Indigenous Languages of BC: Diversity and Vitality
Genetic affiliation, areal contact, typological diversity, and initiatives to sustain the vitality and diversity of BC First Nations Languages.

FNEL 489 (3/12) d Topics in First Nations and Endangered Languages
Selected topics will vary. Multiple versions of this course may be taken, under consultation with the FNEL program advisor, for up to a maximum of 12 credits. This course is not eligible for Credit/D/Fail grading.

Faculty of Land and Food Systems

FNH: Food, Nutrition and Health

FNH 200 (3) Exploring Our Food
Chemical and physical properties of foods; issues pertaining to safety, nutritive value and consumer acceptability; government regulations pertaining to food safety, quality and additives; preservation techniques and transformation of agricultural commodities to food products; foods of the future. [3-0-0]
Prerequisite: At least second year standing required.

FNH 250 (3) Nutrition Concepts and Controversies
Fundamental concepts and principles of human nutrition applied to current nutrition issues. [3-0-0]
Prerequisite: Either (a) one of BIOL 111, BIOL 112, BIOL 153, BIOL 155 or (b) all of KIN 190, KIN 191. At least second-year standing required.

FNH 290 (3) Introductory Topics in Food, Nutrition, and Health
Analysis and interpretation of current issues in food, nutrition, and health. Topics will vary from year to year.

FNH 300 (3) Principles of Food Engineering
Units and dimensions, mass balance, energy balance, steady state and transient heat flow, fluid handling and measurement. [3-0-1]
Prerequisite: One of PHYS 101, PHYS 107.

FNH 301 (3) Food Chemistry I
 Constituents of food and related chemical physical properties including water, carbohydrates, proteins, lipids, minerals, and vitamins. [3-0-1]
Prerequisite: Either (a) CHEM 201 or (b) CHEM 205; and either (a) CHEM 203 or (b) CHEM 233.

FNH 302 (3) Food Analysis
Principles of and procedures for analysis of the chemical and physical properties of food; proximate analysis; introduction to instrumental analysis; reporting and analysis of data. [3-0-1]
Prerequisite: Either (a) CHEM 201 or (b) CHEM 205; and either (a) CHEM 203 or (b) CHEM 233.

FNH 303 (3) Food Product Development
Introduction to and application of concepts involved in food product formulation and development. Prerequisite: One of LFS 252, BIOL 300, EPSE 482, FRST 231, STAT 200, FNH 301.

FNH 309 (3) Food Process Science
Preservation of tissue and fluid food systems by selected physical and chemical treatments with emphasis on product-process interactions. [3-0-1]

FNH 313 (3) Food Microbiology
Food microorganisms of importance in safety and spoilage of foods; factors affecting growth, survival and inactivation of microorganisms in foods; food processing plant cleaning and sanitation. Prerequisite: BIOL 112.

FNH 325 (3) Food Science Laboratory I
Integrated laboratory introducing techniques used in food processing and analysis. Enrolment restricted to Food Science
students. [0-3-1]
Prerequisite: All of FNH 300, FNH 301, FNH 302. These courses can be taken as corequisites.

FNH 326 (3) Food Science Laboratory II
Integrated laboratory encompassing the processing and analysis of foods. Enrolment restricted to Food Science students. [0-3-1]
Prerequisite: FNH 325.

FNH 330 (3) Introduction to Wine Science I
Principles of viticulture, enology, and wine microbiology and chemistry; marketing, regulation and classification of wines from selected regions of the world; social, economic and health aspects of wine consumption; wine appreciation. [2-1-0]
Prerequisite: Third-year standing.

FNH 335 (3) Introduction to Wine Science II
Review of diverse styles of wine with consideration of classic wine-producing areas. Concepts in wine microbiology/chemistry; overview of steps in grape processing for diverse wine styles. Comparison of regulations for Canadian VQA systems with international systems. Wine sensory analysis. [3-1-0]
Prerequisite: FNH 330 and third-year standing or higher.

FNH 340 (3) Food Theory
Principles of food preparation based on the physical and chemical properties of food. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: FNH 200 and either (a) all of CHEM 111, CHEM 113 or (b) all of CHEM 121, CHEM 123.
Corequisite: FNH 341.

FNH 341 (3) Food Theory Applications
Experimental and practical application of scientific principles and theories to problems of food preparation. Note: Course registrants are required to possess a Foodsafe I certificate. This course is not eligible for Credit/D/Fail grading. [0-3-0]
Corequisite: FNH 340.

FNH 342 (3) Critical Perspectives on Consumer Food Practices
Personal, collective, and policy factors affecting food choices, including perceptions of healthy eating, gender, identity, family structures, and economic, sociocultural, and political forces. [3-0-0]
Prerequisite: At least third year standing required.

FNH 350 (3) Fundamentals of Nutrition
Fundamentals of energy and macronutrient metabolism. [3-0-0]
Prerequisite: FNH 250 and one of BIOL 201, BIOC 202.

FNH 351 (3) Vitamins, Minerals, and Health
Vitamin and mineral nutrition and their role in maintaining and promoting health. [3-0-0]
Prerequisite: FNH 250 and one of BIOL 201, BIOC 202.

FNH 355 (3) International Nutrition
Conceptualization and scientific analyses of global problems in food and nutrition; complexities of food habits and malnutrition in various cultures around the world. [3-0-0]

FNH 370 (3) Nutrition Assessment
The use of dietary, anthropometric, biochemical, and related information for the assessment of nutritional status of individuals and populations. [3-0-0]
Prerequisite: FNH 250.

FNH 371 (3) Human Nutrition Over The Life Span
Nutritional requirements and dietary patterns of healthy individuals throughout the life span. 3-0-0
Prerequisite: FNH 250.

FNH 380 (3) Professional Dietetic Practice I
Introduction to the profession of dietetics in Canada. Restricted to students in the Dietetics Major.

FNH 381 (3) Professional Dietetic Practice II
Themes include: nutrition communications, professional practice, and dietetic practice environments. Restricted to students in the Dietetics Major. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNH 380.

FNH 398 (3) Research Methods in Human Nutrition
Process of research; principles and processes in utilizing research. Restricted to students in majors in the FNH program. [3-0-0]

**Prerequisite:** FNH 250 and either (a) LFS 252 or (b) BIOL 300 or (c) EPSE 482 or (d) FRST 231 or (e) STAT 200.

**FNH 402 (3) Functional Foods and Nutraceuticals**
Functional food and nutraceutical concepts related to ingredient safety and quality; examples of nutrient-disease relationships, requirements for standards of efficacy for health claims; market determinants of functional food and nutraceutical industries. [3-0-0]

**Prerequisite:** FNH 355.

**FNH 403 (3) Food Laws, Regulations and Quality Assurance**
Canadian and international laws governing food composition, grading, quality and safety; hazard analysis critical control points; statistical quality assurance.

**Prerequisite:** One of LFS 252, STAT 200, FRST 231, BIOL 300 or equivalent background in statistics.

**FNH 404 (3) Microbiology of Food and Beverage Fermentation**
Fermentation methods, mechanism and microbiology of nonalcoholic fermented foods and alcoholic fermented beverages (beer, cider, sake).

**Prerequisite:** One of MICB 201, MICB 202, BIOL 201, BIOL 203, BIOC 203. Third-year standing.

**FNH 413 (3) Food Safety**
Microbial and chemical factors that underlie public health challenges in the food supply chain; prevalence and nature of organisms which cause foodborne diseases; approaches and technologies for improvement of food safety.

**Prerequisite:** All of MICB 202, CHEM 233.

**FNH 415 (3) Business Concepts in Food, Nutrition, and Health**
Introduction to and application of business activities in food, nutrition, and health settings. Credit will only be granted for only one of FNH 415, FOOD 515, or FRE 515.

**Prerequisite:** At least third-year standing in the Faculty of Land and Food Systems.

**FNH 425 (6) Food Science Laboratory III**
Integrated course designed to illustrate principles of research and product development in the food industry. [0-3-1]

**Prerequisite:** All of FNH 325, FNH 326.

**FNH 430 (3) Enology and Wine Biotechnology**
Yeasts and bacteria involved in wine making, metabolic pathways leading to the production of flavour and spoilage compounds, genetic improvement of wine yeasts, and red and white wine fermentations. Approaches and technologies for the improvement of wine safety. Sensory evaluation of wines.

**This course is not eligible for Credit/D/Fail grading.** [3-0-0]

**Prerequisite:** One of BIOL 335, MICB 325.

**FNH 436 (3) Integrated Functional Genomics**
Global transcript, protein and metabolite profiling technologies, their integration, application, and furtherance of our understanding of how higher organisms function in general.

**Prerequisite:** BIOL 335.

**Equivalency:** BIOL 436.

**FNH 440 (3) Food Service Systems Management**
Management responsibilities in quantity food production with emphasis on menu planning, purchasing and service. Includes planning and equipping food services. Restricted to students in the Dietetics major. Note: Course registrants are required to possess a Foodsafe II certificate.

**This course is not eligible for Credit/D/Fail grading.** [3-0-0]

**Prerequisite:** FNH 340.

**FNH 451 (3) Nutrient Metabolism and Implications for Health**
Integration of nutrient and energy metabolism on a whole-body and individual tissue basis and the implication for health. Emphasis will be on regulation of nutrient metabolism. [3]

**Prerequisite:** All of FNH 350, CAPS 301, BIOC 302.

**FNH 454 (3) Fish Nutrition**
Physiology of digestion and excretion, nutrient requirements, sources of nutrients, diet formulation, feeding management. [3-0-0]

**Prerequisite:** FNH 350.

**FNH 455 (3) Applied International Nutrition**
Applying nutrition concepts and principles in addressing problems of malnutrition and food insecurity in international settings. Basics of developing culturally acceptable, sustainable nutrition intervention programs.

**This course is not eligible for Credit/D/Fail grading.** [3-0-0]
Prerequisite: FNH 355.

**FNH 460 (6) International Nutrition Field Studies**
Theoretical and practical application of international nutrition and food security knowledge and skills. International field placement for a minimum of 12 weeks with pre-departure sessions. Restricted to students in International Nutrition Major or by permission of instructor. This course is not eligible for Credit/D/Fail grading.

**FNH 470 (3) Foundations of Nutrition Care I**
Etiology and pathophysiology of and nutrition therapy for selected diseases and conditions, and skill development related to the Nutrition Care Process. Restricted to students in year 4 of the Dietetics Major. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of FNH 350, FNH 370.

**FNH 472 (3) Maternal and Fetal Nutrition**
Metabolic adaptations, nutrient metabolism, and special issues during pregnancy that may influence the maternal-fetal nutritional supply. [3-0-0]
Prerequisite: FNH 350. Third-year standing.

**FNH 473 (3) Applied Public Health Nutrition**
Theory and methods in public health nutrition and health promotion program planning to assess, plan, implement, and evaluate nutrition-related programs for communities and populations. Considers factors affecting behavior and the social determinants of health. [3-0-0]
Prerequisite: FNH 250 and fourth-year standing.

**FNH 474 (3) Sport Nutrition**
Nutritional needs of athletes, including energy, carbohydrate and protein; hydration; pre-and post-event nutrition, weight management and body composition issues; ergogenic aids; sports-specific guidelines; and special athlete populations. Prerequisite: All of FNH 350, FNH 351.

**FNH 475 (3) Foundations of Nutrition Care II**
Etiology and pathophysiology of and nutrition therapy for additional diseases and conditions, and further skill development related to the Nutrition Care Process. Restricted to students in year 4 of the Dietetics Major. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: FNH 470.

**FNH 477 (3) Nutrition and Disease Prevention**
Evidence-based examination of the role of nutrition in the prevention of chronic disease. [3-0-0]
Prerequisite: FNH 398.

**FNH 480 (3) Professional Dietetic Practice III**
Themes include practice-based research, clinical practice readiness, and orientation to internship. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing in the Dietetics Major.

**FNH 481 (9) Dietetic Internship I**
Full-time internship placements within British Columbia health authorities. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Fifth-year standing in the Dietetics Major.

**FNH 482 (9) Dietetic Internship II**
Full-time internship placements within British Columbia health authorities. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNH 481.

**FNH 483 (6) Dietetic Internship III**
Full-time internship placements within British Columbia health authorities. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: FNH 482.

**FNH 490 (3) Advanced Topics in Food, Nutrition, and Health**
Analysis and interpretation of current issues in food, nutrition and health. Prerequisite: 3rd year standing or higher.

**FNH 497 (2-6) c Directed Studies in Food, Nutrition and Health**

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FNH 499 (6) Undergraduate Thesis
Design and execution of an experimental/analytical research project leading to preparation of a thesis.
Prerequisite: Approval of a program advisor; consult before the end of classes in third year.

Faculty of Arts

FNIS: First Nations and Indigenous Studies

FNIS 100 (3/6) d Indigenous Foundations
The historical, cultural, political, economic and legal issues that inform the experiences of Indigenous peoples in Canada, examined from both Indigenous and non-Indigenous perspectives. Credit will be granted for only one of FNIS 100, FNSP 100, or FNSP 200.

FNIS 210 (3) Indigenous Politics and Self-Determination
The cultural, historical, political, economic, and gender dynamics that structure the relationship between Indigenous peoples and the state in Canada; Indigenous self-determination struggles in relation to constitutional recognition, self-government, land claims, and economic development. Credit will be granted for only one of FNSP 200, FNIS 210, or FNSP 210.
Prerequisite: FNIS 100 is recommended.

FNIS 220 (3) Representation and Indigenous Cultural Politics
Representation, identity, and cultural politics through Indigenous literature, film, and the visual arts; the relationship between these sites of cultural production and the self-determination struggles of Indigenous peoples. Credit will be granted for only one of FNSP 200, FNIS 220, or FNSP 220.
Prerequisite: FNIS 100 is recommended.

FNIS 260 (3-12) d Applied Learning: Collaborative Place-Based Research
Topic and community/location of instruction will vary from year to year. Applied, intense delivery experiential learning course designed and implemented in collaboration with faculty and Indigenous community partner(s). Examines the importance of Indigenous place-based research and learning for student and community empowerment. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the Instructor.

FNIS 300 (3) Writing First Nations
A writing-intensive course examining approaches to writing Indigenous research: Representation & the Other; Indigenous critiques of research & representation; Indigenous, feminist and cultural studies approaches to writing ethnography, oral history, and related research methods. Credit will be granted for only one of FNIS 300 or FNSP 300.
This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 310 (3) Critical Indigenous Theory Seminar
Adapting and integrating current conceptual paradigms in the humanities, social sciences, performing arts, and Indigenous studies into approaches in First Nations/Indigenous Studies, including identity construction, political and cultural self-determination, representation, essentialism/authenticity, ethics, and decolonization. Credit will be granted for only one of FNIS 310 or FNSP 310.
This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) FNSP 200 or (b) all of FNIS 210, FNIS 220 or (c) all of FNSP 210, FNSP 220.

FNIS 320 (3) Critical Indigenous Methodologies and Ethics
Responsible and community-based research from a critical Indigenous perspective; methods for identifying and assessing research materials, critical analysis, oral history/qualitative research interviewing and analysis, and research ethics in the design and implementation of community-based student research projects. Credit will be granted for only one of FNIS 320 or FNSP 320.
This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) FNIS 310 or (b) FNSP 310.

FNIS 360 (3-12) d Applied Learning: Collaborative Place-Based Research
Topic and community/location of instruction will vary from year to year. Applied, intense delivery experiential learning course designed and implemented in collaboration with faculty and Indigenous community partner(s). Examines the importance of Indigenous place-based research and learning for student and community empowerment. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220. And Permission of the Instructor.
FNIS 400 (6) Practicum/Advanced Research Seminar
Applied research/community oriented project designed and implemented in collaboration with student, faculty and Aboriginal community organization. Emphasis on examining ethical issues and developing culturally respectful and academically rigorous forms of research. Credit will be granted for only one of FNIS 400 or FNSP 400. This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) all of FNIS 310, FNIS 320 or (b) all of FNSP 310, FNSP 320. Students must pass FNIS 320 or FNSP 320 with a B- or higher or request program approval.

FNIS 401 (3-6) d Special Topics
Topics will vary from year to year. Consult the departmental website: http://fnsp.arts.ubc.ca. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 433 (3/6) c Directed Study

FNIS 451 (3) Indigenous Feminisms
The historical, cultural, political, and activist roots of contemporary Indigenous feminisms. Indigenous feminist methodologies, theory, and praxis in relation to contemporary Indigenous politics and social justice movements. Credit will be granted for only one of FNSP 401D, FNIS 451, or FNSP 451. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 452 (3) Indigenous Social Movements
Draws on Indigenous and non-Indigenous intellectual traditions to explore the theoretical, cultural, political, economic, and historical bases of Indigenous peoples decolonization struggles in Canada. Credit will be granted for only one of FNSP 401A, FNIS 452, or FNSP 452. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 453 (3) Indigenous Legal Traditions
Socio-historical, political and cultural context of Indigenous legal traditions and strategies for ethical engagement within state and Indigenous polities. Methods include oral history analysis, legal theory, literary/narrative studies, and philosophy from an Indigenous studies perspective. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 454 (3) Indigenous New Media
New media and digital storytelling works designed and implemented by Indigenous artists, authors, and programmers. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 455 (3) Indigenous Geographies: Our Home on Native Land
Indigenous people's place-based relations, colonial processes of de-territorialization, and spatial negotiations of settler colonialism. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of FNIS 100, FNSP 200, FNIS 210, FNSP 210, FNIS 220, FNSP 220.

FNIS 501 (3/6) d Special Topics
This course is not eligible for Credit/D/Fail grading.

FNIS 533 (3/6) c Directed Study
This course is not eligible for Credit/D/Fail grading.

FNIS 560 (3/6) d Applied Learning: Collaborative Place-Based Research
Applied, immersive experiential learning course designed and implemented in collaboration with faculty and Indigenous community partner(s). Emphasis on examining the importance of Indigenous place-based research and learning for student and community empowerment. Topic and community/location of instruction will vary from year to year. This course is not eligible for Credit/D/Fail grading. Prerequisite: Permission of the instructor

Faculty of Land and Food Systems

FOOD: Food Science
Undergraduate courses have been re-named as Food, Nutrition and Health (FNH). Please see this section.
FOOD 500 (3) M.Sc. Seminar
   This course is not eligible for Credit/D/Fail grading.

FOOD 510 (3) Advances in Food Science
   This course is not eligible for Credit/D/Fail grading.

FOOD 511 (3) Master of Food Science Workshops
   Honours/Pass/Fail. This course is not eligible for Credit/D/Fail grading.

FOOD 512 (3) Hazard Analysis and Critical Control Point and Food Safety Management
   This course is not eligible for Credit/D/Fail grading.

FOOD 515 (3) Fundamentals of Agri-Food Business
   Credit will be granted for only one of FNH 415, FOOD 515 or FRE 515. This course is not eligible for Credit/D/Fail grading.

FOOD 520 (3) Advances in Food Analysis
   This course is not eligible for Credit/D/Fail grading.

FOOD 521 (3) Advances in Food Biotechnology
   This course is not eligible for Credit/D/Fail grading.

FOOD 522 (3) Advances in Food Chemistry
   This course is not eligible for Credit/D/Fail grading.

FOOD 523 (3) Advances in Food Microbiology
   This course is not eligible for Credit/D/Fail grading.

FOOD 524 (3) Advances in Food Process Science
   This course is not eligible for Credit/D/Fail grading.

FOOD 525 (3) Advances in Food Toxicology
   This course is not eligible for Credit/D/Fail grading.

FOOD 526 (3) Research Methods in Food Science
   This course is not eligible for Credit/D/Fail grading.

FOOD 527 (3) Special Topics in Food Science
   This course is not eligible for Credit/D/Fail grading.

FOOD 528 (3) International Food Laws and Regulations
   This course is not eligible for Credit/D/Fail grading.

FOOD 529 (3) Laboratory Methods in Sensory Evaluation
   This course is not eligible for Credit/D/Fail grading.

FOOD 530 (2-6) c Directed Studies
   This course is not eligible for Credit/D/Fail grading.

FOOD 531 (6) Master of Food Science Practicum Project
   Honours/Pass/Fail. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: FOOD 511.

FOOD 549 (12/18) c Master's Thesis
   This course is not eligible for Credit/D/Fail grading.

FOOD 600 (3) Ph.D. Seminar
   This course is not eligible for Credit/D/Fail grading.

FOOD 649 (0) Doctoral Dissertation

Faculty of Forestry

FOPR: Forest Operations

FOPR 261 (2) Basic Geomatics for Natural Resources
   Techniques of measuring and surveying as they are applied in assessing and managing natural resources. [2-2-0]
FOPR 262 (3) Forest Access and Transportation
Introduction to the physical attributes of forest access and transportation and how they best integrate with the objectives of resource sustainability. [2-3-0]
Prerequisite: FOPR 261.

FOPR 264 (4) Geomatics, Forest Access and Transportation
Geomatics, the physical attributes of forest access and transportation and how they best integrate with the objectives of resource sustainability. [2-4-0]

FOPR 362 (3) Forest Harvesting Systems
The mechanics and productivity of a broad range of forest harvesting systems. [3-0-1]
Prerequisite: ECON 101.
Corequisite: FRST 318.

FOPR 388 (3) Analytical Methods in Forest Hydrology
Analytical methods in forest hydrology and their applications in the planning of forest operations with a focus on the hydrologic and hydraulic design procedures for stream crossings. [3-2]
Corequisite: FOPR 262.

FOPR 459 (3) Economics, Contracts, and Finances in Forest Operations
A capstone project-based course with applications of engineering economics, contract preparation, and financial planning in the context of Forest Operations. [2-2]
Prerequisite: FRST 318. Fourth-year standing.

FOPR 464 (3) Forestry Machines
A detailed examination of the performance of heavy trucks used in forestry plus highlights of particular aspects of the performance of hydraulic tracked machines and cable logging machines. [2-2-0]
Prerequisite: FOPR 262.

Faculty of Land and Food Systems

FRE: Food and Resource Economics

FRE 295 (3) Managerial Economics
Economic foundations of managerial decision-making. Organization of the firm, demand theory, cost and production, market structure, competitive strategy, welfare-economic foundations of business regulation. Credit may be obtained for only one of ECON 301, ECON 304, COMM 295.
Prerequisite: All of ECON 101, ECON 102 and MATH 105.

FRE 302 (3) Small Business Management in Agri-food Industries
Emphasizes the building of a business plan by exploring topics such as the planning process and financing, marketing and human resource concepts, as applied to an agri-food business, domestically and internationally. [3-0-1]
Prerequisite: One of ECON 101, ECON 310.

FRE 306 (3) Introduction to Global Food Markets
An overview of global food markets including recent trends (e.g., vertical coordination, strategic alliances, multinationals and small firms in niche markets), marketing and trade institutions such as state-trading enterprises and WTO regulations, issues specific to developing nations, and case studies. [3-0-1]
Prerequisite: One of ECON 101, ECON 310.

FRE 340 (3) International Agricultural Development
Characteristics, processes and sources of economic growth, role of agricultural and resource sectors in economic growth, analysis of output and input markets in those sectors, policy failures, tools for empirical analysis of rural markets, growth, and the environment.
Prerequisite: One of ECON 101, ECON 310.

FRE 374 (3) Land and Resource Economics
Willingness to pay, opportunity costs, externalities, and market failures in natural resource markets; dynamic efficiency; economic applications including mineral, marine, forest, land, water, and biodiversity. [3-0]
Prerequisite: One of ECON 101, ECON 310.
Equivalency: ECON 374.
FRE 385 (3) *Quantitative Methods for Business and Resource Management*
Spreadsheet modeling and analysis of business and resource management problems: decision analysis, forecasting, linear programming, simulation modeling, and inventory management. [2-1-0]
Prerequisite: One of ECON 101, ECON 310 and one of LFS 252, BIOL 300, FRST 231, STAT 200.

FRE 402 (3) *Market Research and Analysis in Agri-Food Industries*
Macro and micro aspects of agri-food market and industry analysis, market strategy, consumer behaviour, secondary market research, quantitative and qualitative market research. [3-0-0]
Prerequisite: One of ECON 101, ECON 310.

FRE 420 (3) *The Economics of International Trade and the Environment*
Market failure and gains from trade in the presence of natural resource externalities; the multilateral trading system and the environment; case studies in trade-related environmental impacts. [3-0]
Prerequisite: One of ECON 301, FRE 295, COMM 295 or 6 credits of upper-level FRE or ECON.

FRE 460 (3) *Economics of Food Consumption*
Microeconomics of consumer decisions and public policy in food contexts; foodborne illness; economic causes and consequences of obesity, sin taxes and prohibitions; information campaigns and advertising; labeling; food waste and ethics.
Prerequisite: One of ECON 101, ECON 310.

FRE 490 (3) *Current Issues in Food and Resource Economics*
[3-0]
Prerequisite: One of ECON 101, ECON 310.

FRE 501 (3) *Commodity Markets and Price Analysis*
This course is not eligible for Credit/D/Fail grading.

FRE 502 (3) *Food Market Analysis*
This course is not eligible for Credit/D/Fail grading.

FRE 504 (1.5) *Agricultural and Resource Policy Analysis*
This course is not eligible for Credit/D/Fail grading.

FRE 505 (1.5) *Agricultural and Resource Policy Analysis - Policy and Project Evaluation Tools*
This course is not eligible for Credit/D/Fail grading.

FRE 515 (3) *Agribusiness Management*
Credit will be granted for only one of FNH 415, FOOD 515 or FRE 515. This course is not eligible for Credit/D/Fail grading.

FRE 516 (3) *Financial and Marketing Management in Agri-food Industries*
This course is not eligible for Credit/D/Fail grading.

FRE 517 (1.5) *Futures Trading in Agricultural Commodities*
This course is not eligible for Credit/D/Fail grading.

FRE 518 (1.5) *Survey Design and Data Analysis*
This course is not eligible for Credit/D/Fail grading.

FRE 521 (1-3) *Topics in Food and Resource Economics*
This course is not eligible for Credit/D/Fail grading.

FRE 522 (1.5) *Environmental Externalities in the Global Economy*
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of FRE 502, FRE 526.

FRE 523 (1.5) *Resource Economics I*
This course is not eligible for Credit/D/Fail grading.

FRE 524 (1.5) *Resource Economics II*
This course is not eligible for Credit/D/Fail grading.

FRE 526 (1.5) *Environmental Economics and Policy: Theory*
This course is not eligible for Credit/D/Fail grading.

FRE 527 (1.5) *Environmental Economics and Policy: Empirical Analysis*
This course is not eligible for Credit/D/Fail grading.

FRE 528 (3) *Applied Econometrics*
This course is not eligible for Credit/D/Fail grading.

**FRE 529 (1.5) Estimating Econometric Models**
This course is not eligible for Credit/D/Fail grading.

**FRE 530 (1.5) Econometrics with Time Series Data**
This course is not eligible for Credit/D/Fail grading.

**FRE 541 (1.5) Project Monitoring and Evaluation in International Development**
This course is not eligible for Credit/D/Fail grading.

**FRE 547 (6) Graduating Project**
This course is not eligible for Credit/D/Fail grading.

**FRE 585 (3) Quantitative Methods for Business and Natural Resource Management**
This course is not eligible for Credit/D/Fail grading.

**French, Hispanic and Italian Studies, Faculty of Arts**

**FREN: French**

All French courses titled "Studies in ....", as well as FREN 348, FREN 349, FREN 495 and FREN 498, may be taken twice for credit with different content, to a maximum of 6 credits.

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**FREN 101 (3) Beginners' French I**
Grammar, composition, reading and oral practice. Not available to students with the prerequisite for FREN 102.

**FREN 102 (3) Beginners' French II**
Grammar, composition, reading and oral practice. Not available to students with prerequisite for FREN 111.
Prerequisite: FREN 101 or equivalent.

**FREN 111 (3) Intermediate French I**
Not available for credit to students with FREN 12, FREN 112 or equivalent.
Prerequisite: One of FREN 11, FREN 102 or equivalent.

**FREN 112 (3) Intermediate French II**
Not available for credit to students with FREN 12.
Prerequisite: FREN 111 or equivalent.

**FREN 122 (3) Contemporary French Language and Literature I**
A review of French grammar and an introduction to contemporary literature written in French, with emphasis on essay writing and textual analysis.
Prerequisite: One of FREN 12, FREN 112 or equivalent.

**FREN 123 (3) Contemporary French Language and Literature II**
Continuation of FREN 122 with emphasis on literature, essay writing and textual analysis.
Prerequisite: FREN 122 or assignment based on placement test.

**FREN 124 (3) Keeping Up Your French**
Task-based entry-level course for non-specialists. Credits from this course may not count towards a Major or Minor in French, nor as prerequisite to subsequent core courses in French.
Prerequisite: One of FREN 12, FREN 112 or equivalent.

**FREN 215 (6) Oral French Practice**
Opportunities for students already well-grounded in grammar to improve their oral skills. Credit will be granted for only one of FREN 215 or FREN 224 and FREN 225.
Prerequisite: One of FREN 123, FREN 124.

**FREN 220 (3) Introduction to Early French Literature and to Textual Analysis**
Students will familiarize themselves with techniques of literary analysis, as applied to representative works from the Middle Ages to the 17th century, including theatre, fiction, poetry and non-fiction prose. To be taken by all students intending to proceed to the Minor, Major or Honours program.
Prerequisite: FREN 123 or assignment based on placement test.

FREN 221 (3) Introduction to Modern Literature written in French and to Textual Analysis
Students will familiarize themselves with techniques of literary analysis, as applied to representative works from the 18th century to the present, including theatre, fiction, poetry and non-fiction prose. To be taken by all students intending to proceed to the Minor, Major or Honours program.
Prerequisite: FREN 123 or assignment based on placement test.

FREN 222 (3) French Language and Style I
Grammar, vocabulary, composition, language in context.
Prerequisite: FREN 123. Or assignment based on placement test.

FREN 223 (3) French Language and Style II
Grammar, vocabulary, composition, language in context.
Prerequisite: FREN 222. Or assignment based on placement test.

FREN 224 (3) An Interdisciplinary Approach to French I
French language for ex-immersion students. Credit will be granted for only one of FREN 215 or FREN 224. Not available for credit to anyone who has received credit for FREN 222.
Prerequisite: FREN 12.

FREN 225 (3) An Interdisciplinary Approach to French II
French language for ex-immersion students. Credit will be granted for only one of FREN 215 or FREN 225. Not available for credit to anyone who has received credit for FREN 223.
Prerequisite: FREN 224.

FREN 280 (3) Introduction to Québecois Literature in Translation
An overview of the novel and theatre of Quebec in the 1960s, 70s, and 80s.

FREN 328 (3) Selected Works of African and Caribbean Literature
Representative works from different genres, viewed in their historical, social, and cultural contexts.
Prerequisite: One of FREN 220, FREN 221.

FREN 329 (3) Selected Works of European French Literature
Representative works viewed in their historical, social, and cultural contexts.
Prerequisite: One of FREN 220, FREN 221.

FREN 330 (3) Selected Works of Québecois Literature
Representative works viewed in their historical, social, and cultural contexts.
Prerequisite: One of FREN 220, FREN 221.

FREN 333 (3) French Civilization I
A historically based approach to French civilization and culture from their origins to the Third Republic (1875).
Prerequisite: One of FREN 220, FREN 221, FREN 223. Or permission of the instructor.

FREN 334 (3) French Civilization II
A historically based approach to French civilization and culture from the Third Republic to the present, completed by a thematic study of contemporary French culture.
Prerequisite: One of FREN 220, FREN 221, FREN 223 or permission of the instructor.

FREN 335 (3) French-Canadian Civilization
A thematic approach to selected topics in French-Canadian culture and civilization.
Prerequisite: One of FREN 220, FREN 221, FREN 223 or permission of the instructor.

FREN 336 (3) The Francophone World in Images
A socio-cultural study of francophone communities of Canada, the Caribbean, Europe, and North and Sub-Saharan Africa as seen through their films and other visual forms.
Prerequisite: FREN 223.

FREN 344 (3) Techniques of Oral Expression in French I
Training in formal oral presentation in French. Emphasis on structured expression and oral delivery. Not available for credit toward a Major or Honours Program in French.
Prerequisite: One of FREN 215, FREN 225. 68% or better in FREN 215 is recommended.

FREN 345 (3) Techniques of Oral Expression in French II
Further training in formal oral presentation in French. Emphasis on structured expression and oral delivery. Not available for credit toward the Honours Program in French.

Prerequisite: FREN 344.

FREN 346 (3) French at Work
Communicative French for students preparing for a career in the francophone world. Not available for credit toward a Minor, Major, or Honours degree in French. Language of instruction is French. This course is not eligible for Credit/D/Fail grading.

Prerequisite: FREN 123.

FREN 348 (3-6) French Literatures in Translation I
Literary works from the Middle Ages to the French Revolution. Not available for credit towards a Minor, Major or Honours program in French.

Prerequisite: Second year standing or higher. At least 6 credits of English, or equivalent, is strongly recommended.

FREN 349 (3-6) French Literatures in Translation II
Literary works since the French Revolution. Topics may include literature from France, Quebec, Africa, the Caribbean. Not available for credit towards a Minor, Major or Honours program in French.

Prerequisite: Second year standing or higher. At least 6 credits of English, or equivalent, is strongly recommended.

FREN 351 (3) Corrective French Phonetics
Theory and practice of French pronunciation, corrective phonetics; foundation for the phonetic transcription of international French.

Prerequisite: One of FREN 220, FREN 221, FREN 223.

FREN 353 (3) French Grammar
Systematic study of the fundamental principles of French grammar.

Prerequisite: FREN 223 or equivalent.

FREN 355 (3) Advanced Composition
Development of essay writing skills in French.

Prerequisite: FREN 223 or equivalent.

FREN 357 (3) Translation I
Comparative study of French and English through translation.

Prerequisite: FREN 223 or equivalent.

FREN 360 (3) Introduction to Old French
The phonetics, grammar, and vocabulary of major Old French dialects; corpus of various literary texts (842-1300).

Prerequisite: FREN 223.

FREN 370 (3) Introduction to French Linguistics
A survey of basic terminology, methods, problems, and theoretical trends in French linguistics, specifically designed to provide students with a foundation for advanced language study in French.

Prerequisite: FREN 223.

FREN 371 (3) Introduction to French Literary Theory and Methodology
A survey of basic terminology, methods, problems, and theoretical trends in French literary criticism, specifically designed to provide students with a foundation for advanced study of literature in French.

Prerequisite: One of FREN 220, FREN 221.

FREN 380 (3) Foundations of French Cultural Identity (in English)
Aspects of French culture through a set of key concepts that cut across French history, politics, and social structures. Not available for credit toward a Minor, Major or Honours program in French.

Prerequisite: Second-year standing.

FREN 407 (3/6) Studies in Medieval French Literature
Literary texts from the eleventh to the fifteenth century. Topics may include the epic, Tristan texts, Arthurian texts, the short narrative, satirical texts, religious drama, secular drama, lyric poetry, didactic poetry, François Villon.

Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 408 (3/6) Studies in French Literature of the Sixteenth Century
Topics may include works by Rabelais, Montaigne, Scève, Labé, Ronsard, and DuBellay.

Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.
FREN 409 (3/6) d Studies in French Literature of the Seventeenth Century
Topics may include works by Corneille, Racine, Molière, Descartes, Pascal, La Fontaine, and Mme de la Fayette.
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 410 (3/6) d Studies in French Literature of the Eighteenth Century
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 413 (3/6) d Studies in French Literature of the Nineteenth Century
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 416 (3/6) d Studies in French Literature since 1900
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 418 (3/6) d Studies in African and/or Caribbean Literatures of French Expression
An introduction to representative works. Topics include Negritude, the evolution of post-colonial literature, and the socio-historical context of each work.
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 419 (3/6) d Studies in Women’s Writing
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 420 (3/9) d Selected Topics in French Literature and Culture
Course content will vary. May be taken up to 3 times, with different content, for a maximum of 9 credits.
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 423 (3/6) d Studies in Theatre
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 424 (3/6) d Studies in Prose Fiction
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 425 (3/6) d Studies in French Autobiography
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 427 (3/6) d Studies in Cinema
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 429 (3/6) d Studies in Non-fiction Prose
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

FREN 430 (3/6) d Studies in Quebecois Literature
Prerequisite: One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330, FREN 335.

FREN 457 (3) Translation II
Advanced translation.
Prerequisite: FREN 357.

FREN 460 (3/6) d Studies in Historical French Linguistics
Topics may include historical phonetics and phonology, morphology and syntax, lexicology.
Prerequisite: FREN 360.

FREN 470 (3/6) d Studies in Modern French Linguistics
Prerequisite: FREN 370.
Corequisite: FREN 370 may be taken concurrently with the permission of the instructor of FREN 470.

FREN 472 (3) Morphology of the French Language
The morphological markings of French (gender, number, tense, mode, person, etc) and their underlying semantic systems.
Prerequisite: All of FREN 353, FREN 370.
Corequisite: FREN 370 may be taken concurrently with the permission of the instructor.

FREN 473 (3) Syntactic Description of the French Language
The syntactic markings of French (word order, agreement, pronominalisation, etc) and their underlying semantic systems.
Prerequisite: All of FREN 353, FREN 370.
Corequisite: FREN 353 and 370 may be taken concurrently with the permission of the instructor.

FREN 474 (3) Synchronic Lexicology
An introduction to the study of the vocabulary of modern French, focusing on basic principles in lexical semantics, lexicology, phraseology, lexicography, terminology and new technologies, neology.

*Prerequisite:* All of FREN 353, FREN 370.

*Corequisite:* FREN 353 and 370 may be taken concurrently with the permission of the instructor of FREN 474.

**FREN 475 (3) Canadian French: A Descriptive Approach**

The phonetics, phonology, lexicon, and syntax of spoken and written Canadian French.

*Prerequisite:* All of FREN 351, FREN 353, FREN 370.

*Corequisite:* FREN 351 may be taken concurrently with the permission of the instructor.

**FREN 481 (3/6) d Studies in Literature and the Arts**

*Prerequisite:* One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

**FREN 482 (3/6) d Studies in Literature and Philosophy**

*Prerequisite:* One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

**FREN 483 (3/6) d Studies in Literature and History**

*Prerequisite:* One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

**FREN 484 (3/6) d Studies in Book Culture**

A historical approach to the social transformations of the book trade in France.

*Corequisite:* One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

**FREN 495 (3-6) d Research Seminar in French**

Research on critical topics related to selected literary works. Limited enrolment: required of honours, but open to majors students in French.

*Prerequisite:* One of FREN 320, FREN 321, FREN 328, FREN 329, FREN 330.

**FREN 498 (3-6) d Directed Reading**

For fourth-year students. Focus on a topic to be agreed upon by a member of the faculty and the student. Permission of the department head and of a supervisory faculty member is required.

**FREN 499 (3) Honours Essay**

**FREN 501 (3/6) c Studies in the Literature of Medieval France**

This course is not eligible for Credit/D/Fail grading.

**FREN 502 (3/6) c Studies in Sixteenth-Century Literature**

This course is not eligible for Credit/D/Fail grading.

**FREN 503 (3/6) d Studies in Seventeenth-Century Literature**

This course is not eligible for Credit/D/Fail grading.

**FREN 504 (3/6) d Studies in the Seventeenth-Century Novel**

This course is not eligible for Credit/D/Fail grading.

**FREN 505 (3/6) d Studies in Seventeenth-Century Drama**

This course is not eligible for Credit/D/Fail grading.

**FREN 506 (3/6) d Studies in the Eighteenth-Century Novel**

This course is not eligible for Credit/D/Fail grading.

**FREN 507 (3/6) c Studies in the French Enlightenment**

This course is not eligible for Credit/D/Fail grading.

**FREN 508 (3/6) d Studies in French Romantic Literature**

This course is not eligible for Credit/D/Fail grading.

**FREN 509 (3/6) d Studies in Post-Romantic Nineteenth-Century Literature**

This course is not eligible for Credit/D/Fail grading.

**FREN 510 (3/6) d Baudelaire and the Symbolists**

This course is not eligible for Credit/D/Fail grading.

**FREN 511 (3/6) d Studies in Contemporary French Literature**

This course is not eligible for Credit/D/Fail grading.

**FREN 512 (3/6) d Studies in Literary Criticism**
This course is not eligible for Credit/D/Fail grading.

FREN 513 (3/6) d Studies in French-Canadian Literature
This course is not eligible for Credit/D/Fail grading.

FREN 514 (3/6) d Problems Relating to the French Novel
This course is not eligible for Credit/D/Fail grading.

FREN 515 (3) Methods of Bibliography and Research
This course is not eligible for Credit/D/Fail grading.

FREN 519 (3/6) c The Language and Literature of Old Provençal
This course is not eligible for Credit/D/Fail grading.

FREN 520 (3-12) d Studies in French Literature
This course is not eligible for Credit/D/Fail grading.

FREN 521 (3/6) d Studies in the Literature of the French-Speaking World
This course is not eligible for Credit/D/Fail grading.

FREN 540 (3/6) d Studies in French and Comparative Stylistics
This course is not eligible for Credit/D/Fail grading.

FREN 548 (3) Major Essay
This course is not eligible for Credit/D/Fail grading.

FREN 556 (3-12) d Studies in French Language
This course is not eligible for Credit/D/Fail grading.

FREN 560 (3/6) d Studies in French Phonetics and Phonology
This course is not eligible for Credit/D/Fail grading.

FREN 561 (3/6) d Studies in French Morphology
This course is not eligible for Credit/D/Fail grading.

FREN 562 (3/6) d Studies in French Syntax
This course is not eligible for Credit/D/Fail grading.

FREN 564 (3/6) d Studies in French Lexicology
This course is not eligible for Credit/D/Fail grading.

FREN 566 (3/6) d Studies in French Semantics
This course is not eligible for Credit/D/Fail grading.

FREN 575 (3/6) d Studies in Canadian French
This course is not eligible for Credit/D/Fail grading.

FREN 576 (3/6) d Studies in Gallo-Romance Dialectology
This course is not eligible for Credit/D/Fail grading.

FREN 578 (3/6) d Studies in Romance Philology
This course is not eligible for Credit/D/Fail grading.

FREN 599 (6) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

FREN 699 (0) Doctoral Dissertation

Faculty of Forestry

FRST: Forestry

FRST 100 (3) Sustainable Forests
An overview of forests and forestry. Survey of the disciplines, areas of study, and values that frame sustainable management of forests in BC and the world. Assignments focus on critical thinking and written communication skills. [3-0-0]

FRST 101 (3) Principles of Microeconomics for Forestry and Land and Food Systems
Principles of microeconomics and their applications in forestry and land and food systems. The basic concept of the economy to focus on private and social decision making related to the use of lands especially in agriculture, forestry, and conservation. Credit will be granted for only one of FRST 101 or ECON 101. [3-0-1] 
Equivalency: LFS 101.

FRST 110 (3) Land One: First-year Integrative Seminar
Current issues and cases in Forestry and Land and Food Systems are examined with a focus on integration of first-year subjects and exposure to both First Nations and Western perspectivesThis course is not eligible for Credit/D/Fail grading. [1-0-1; 1-0-1] 
Equivalency: LFS 101.

FRST 150 (3) Scholarly Writing and Argumentation in Forestry
Communicating concepts of forestry and links to human and environmental activities through writing, elements of argumentation, evaluating evidence, and searching for and citing references to back up claims; small-class experience. This course is not eligible for Credit/D/Fail grading. [3-0-0] 
Equivalency: LFS 150.

FRST 200 (3) Forest Plant Biology I
The structure, diversity and development of trees and other plants, with emphasis on the angiosperms. [3-2-0] 
Prerequisite: BIOL 121.

FRST 201 (3) Forest Ecology
The structure and function of forest ecosystems, including: energetics; productivity; nutrient, carbon and water cycling; soils; the physical environment; population and community ecology; disturbance ecology; ecological succession; biological diversity and ecological resilience. [3-2-0] 
Corequisite: FRST 200.

FRST 202 (3) Forest Ecology
The Ecosystem concept; energy biomass and nutrient cycling; the physical environment; population and community ecology; succession, Biogeoclimatic classification and some coastal ecosystems. Available only through Distance Education. [3-2] 
Corequisite: FRST 200.

FRST 203 (3) Silvics of Forest Trees of Western Canada
Ecological and silvical characteristics of forest trees; assessment of ecological site quality and biogeoclimatic classification; application of silvics in silviculture. A plant herbarium of at least 50 species is required. Only available through Distance Education. [3-2] 
Prerequisite: FRST 202.

FRST 210 (3) Forest Plant Biology II
The functional biology of trees and other forest plants in their environment, with an emphasis on gymnosperms. [3-2-0] 
Prerequisite: FRST 200.

FRST 211 (3) Forest Classification and Silvics
Forest classification and the application of silvics in forest management, including world forest classification systems, the Biogeoclimatic Ecosystem Classification system, and ecosystem diagnosis in the field. [3-2-0] 
Prerequisite: FRST 201.

FRST 231 (3) Introduction to Biometrics
Basic theories of probability and statistics. Sampling distribution, methods of estimation and hypothesis testing; goodness of fit and tests for independence; analysis of variance, regression and correlation. Consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-2-0] 
Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 180, MATH 184, MATH 190.

FRST 232 (3) Computer Applications in Forestry
Techniques involved in solving forestry problems with microcomputers using word processing, spreadsheet, procedural language, and database management tools. [3-2]

FRST 239 (3) Tree and Stand Level Measurements
An introduction to measurement of individual trees and stands; use of aerial photographs, maps, and various measurement instruments. [3-2-0] 
Prerequisite: All of FRST 231, FRST 232.

FRST 248 (3) Co-operative Work Placement
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Orientation workshops required. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 270 (3) Community Forests and Community Forestry
Community forests and community forestry throughout the world, with special attention to participation by aboriginal peoples; emphasis is on forms of governance, public participation, and adaptive learning. [3-0-0]

FRST 302 (3) Forest Genetics
Population genetics and conservation of genetic resources; principles of genetics and their application to forestry. [2-2]

FRST 303 (3) Principles of Forest Science
Introduction to growth of trees and forests with emphasis on evolutionary, ecological and environmental aspects. Not available for credit to undergraduate students in the Faculty of Forestry. [3-0-0]

FRST 304 (3) The Science Underlying Forestry Issues
Examination of current forestry issues with specific reference to their scientific basis. Not available for credit to undergraduate students in the Faculty of Forestry. [3-0-0]

FRST 305 (3) Silviculture
Silviculture concepts and principles; stand dynamics; artificial and natural regeneration; cultural techniques for forest stand establishment and stand tending; silvicultural systems; decision making and development of prescriptions; connections to forest planning. [3-4*]

Prerequisite: FRST 201 and one of FRST 350, FRST 351, UFOR 400.

FRST 307 (3) Biotic Disturbances
Concepts of disturbance ecology with special reference to insects and diseases in the forests of British Columbia; forest health problems in the biogeoclimatic zones of BC; present management strategies and future potentials in a scenario of climate change. [3-3-0]

Prerequisite: All of FRST 210, FRST 211.

FRST 308 (2) Forest Entomology
An introduction to insects that cause damage to forests and forest products; how insects live; life cycles and attack symptoms of representatives of major groups of insects; principles for control and management. Available only through Distance Education.

FRST 309 (2) Forest Pathology
Biology and management of forest tree diseases. Available only through Distance Education.

FRST 310 (3) Soil Biology
The diversity and interactions of soil organisms (bacteria, protozoa, fungi, animals, plants) in natural and managed ecosystems; roles in primary production, nutrient cycling, decomposition and reclamation; responses to environmental change. [2-3-0]

Prerequisite: BIOL 121.

Equivalency: APBI 342.

FRST 311 (4) Plant Physiology I
Mechanisms and regulation of functional processes contributing to the assimilation, transport and utilization of water, mineral nutrients and carbon by plants. CHEM 203, CHEM 213, or CHEM 233 and CHEM 235 is recommended. [3-3-0]

Equivalency: BIOL 351, APBI 351.

FRST 318 (3) Forest and Conservation Economics
Practical problem solving of economic issues related to forestry and conservation, touching on investment analysis, capital budgeting, non-timber economics, ecosystem services, and forest certification. Completion of FRST 232 or intermediate knowledge of MS Excel essential. [2-3-0]

Prerequisite: ECON 101.

FRST 319 (3) Principles of Forestry Economics
Introduction to the economics of production, distribution and consumption of goods and services produced by, and dependent on, the forest resource. Available only through Distance Education.

Prerequisite: One of ECON 101, ECON 301.

FRST 320 (3) Abiotic Disturbances: Fire and Climate
Ecological effects of fire and climatic (wind, temperature, and snow) disturbances; fire danger rating, principles of fire management and prescribed fire use; windthrow risk modeling and management. [3-2-0]

Prerequisite: All of FRST 210, FRST 211.
FRST 339 (3) **Forest Level Measurement and Productivity**  
Obtaining and forecasting information for stands and forests. [3-2-0]  
Prerequisite: FRST 239.

FRST 346 (3) **Co-operative Work Placement**  
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 347 (3) **Co-operative Work Placement**  
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 348 (3) **Co-operative Work Placement**  
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 350 (2) **Foundational Field School**  
Field study concentrating on outdoor skills, forest measurements, site diagnosis, and an integrated overview of the ecological, social and economic basis for forest management. Fees will be assessed to meet expenses. Credit will be granted for only one of FRST 350 or 351. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: FRST 201.

FRST 351 (2) **Interior Field School**  
Field study at an interior BC location concentrating on land use, management and silviculture. Fees will be assessed to meet expenses. Students with FRST 351 and FRST 350 can only count 2 credits toward their program requirements.  
Prerequisite: FRST 201.

FRST 370 (3) **Community Forests and Community Forestry**  
Community forests and community forestry throughout the world, with special attention to participation by aboriginal peoples; emphasis is on forms of governance, public participation, and adaptive learning. [3-0-0]

FRST 385 (3) **Watershed Hydrology**  
Measurement and analysis of hydrological processes in response to forest management activities. [3-2-0]  
Prerequisite: Third- or fourth-year standing.

FRST 386 (3) **Aquatic Ecosystems and Fish in Forested Watersheds**  
Effects of forest management activities on fish and aquatic ecosystems. [3-2-0]  
Prerequisite: Third- or fourth-year standing in Forestry, Science or Applied Science.

FRST 395 (3) **Forest Wildlife Ecology and Management**  
Biology of important bird and mammal species resident in forested regions, with particular emphasis on the influences of silvicultural and logging practices. [3-2-0]  
Prerequisite: One of FRST 201, BIOL 230, BIOL 306.

FRST 399 (3) **Introduction to Research Methods**  
Lectures and seminars in research philosophies and the scientific method, with special emphasis on field research. [2-1]

FRST 402 (3) **Living Language: Science and Society**  
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance.  
Prerequisite: Fourth-year standing or permission of the instructor.  

FRST 403 (3) **The Sustainability of Production in Managed Forest Ecosystems**  
Study of the functional and dynamic characteristics of forest ecosystems and their response to forest management using ecosystem-level microcomputer simulation models. [3-2-0]  
Prerequisite: FRST 201.

FRST 404 (4) **Advances in Silviculture**  
Fundamental silvicultural problems; the application of research findings to the practice of silviculture. [4-0]  
Prerequisite: FRST 305.

FRST 406 (3) **Advanced Forest Pathology**  
Hereditary, physiological, anatomical, environmental, and microbiological factors influencing forest tree diseases. Given in
alternate years. [2-2]

FRST 408 (3) Advanced Forest Insect Ecology
Role of climate and climate change in the population dynamics, outbreak potentials and resultant impacts to forest ecosystems associated with herbivorous forest insects. [3-0-0]
Prerequisite: One of FRST 307, APBI 327, BIOL 327.

FRST 410 (3) Introduction to Landscape Ecology and Management
Current concepts, methods, and applications of landscape ecology with emphasis on spatial patterning, spatial heterogeneity, and dynamics; problem-solving approaches to natural resource issues through the application of landscape ecological principles and tools. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Fourth-year standing

FRST 411 (3) Complex Adaptive Systems, Global Change Science, and Ecology Sustainability
Concepts of complex adaptive systems (CAS); exploration of how CAS can be used to manage natural and social environments for multiple goals under changing climatic and socio-economic conditions. [3-0-0]
Prerequisite: Third-year standing

FRST 413 (3) Ecological Plant Biochemistry
The structure, biosynthesis, distribution and biological function of secondary plant metabolites. [3-0-0]
Prerequisite: Either (a) all of BIOL 200, BIOL 201 and one of BIOL 209, BIOL 210; or (b) all of FRST 200, FRST 210. 
Equivalency: BIOL 462.

FRST 415 (3) Sustainable Forest Policy
The development, implementation, and analysis of forest policy. [3-0-0]
Prerequisite: Third- or fourth-year standing.

FRST 421 (3) Quantitative Forest Management
Introduction to the quantitative tools necessary in forest management. Available only through Distance Education.

FRST 424 (10) Sustainable Forest Management
Integration of biophysical and socio-economic components of forest management. This course is not eligible for Credit/D/Fail grading. [0-0-20]
Prerequisite: Fourth year standing in the B.S.F. program.

FRST 430 (3) Advanced Biometrics
Analysis of variance, multiple regression and analysis of covariance. Design and analysis of experiments. [3-2]
Prerequisite: One of FRST 231, BIOL 300, STAT 200. Restricted to students with 4th year standing or by permission of instructor.

FRST 432 (3) Molecular Ecology
Use of molecular genetic tools to investigate ecological processes in natural population; DNA variation and its application in landscape genetics, phylogeography, behavioural ecology, conservation genetics, and association genetics. Emphasis placed on statistical and computational data analysis. [3-0-0]
Prerequisite: One of BIOL 234, FRST 302.

FRST 436 (3) Growth and Yield
Techniques of growth and yield projection and discussion of modelling approaches. Exploration of stand dynamics, quantitative implications of management treatments and environmental limitations to tree and stand growth. [2-2-0]
Prerequisite: FRST 339.

FRST 439 (3) International Forestry
The socio-economic, biological and technological aspects of forestry within the international frame, in both the developed and developing world. Regional studies and the role of national and international agencies. [2-2-0]

FRST 443 (3) Remote Sensing for Ecosystem Management
Basic biological concepts related to interpretation of remote sensing data for land management, including the use of films and filters, and interpretation of air photographs, and other imagery. [2-2-0]

FRST 444 (3) Agroforestry
Integration of farms and forests, including tropical agroforestry systems, non-timber forest products, forest farming, woodlot management, silvopastoralism, riparian buffers, windbreaks, soil fertility improvement and nutrient cycling. [3-2-0]
Prerequisite: One of FRST 201, APBI 260. 
Equivalency: APBI 444.
FRST 446 (3) Co-operative Work Placement
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 447 (3) Co-operative Work Placement
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 448 (3) Co-operative Work Placement
Supervised work experience in an approved organization for a minimum of 15 weeks. Restricted to students in the Co-operative Education Program in the Faculty of Forestry. Final work term report required. This course is not eligible for Credit/D/Fail grading.

FRST 449 (1-6) c Directed Studies in Forestry
In special cases and with the approval of the instructor concerned, a student may carry on directed studies of specific problems in forestry.

FRST 452 (2) Coastal Field School
Site diagnosis and preparation of management options in coastal forests. Extrasessional course; fees will be assessed to meet expenses.
Prerequisite: Third or fourth year-standing in the B.S.F. program.

FRST 470 (3) Forests and Society
Social aspects of forestry and forest communities. [3-0-1]
Prerequisite: Third- or fourth-year standing.

FRST 485 (3) Forest Watershed Management
Effects of land management on quality, quantity and timing of water flow. [3-2-0]
Prerequisite: FRST 385.

FRST 490 (3) Visual Resource Management and Planning for Aesthetics
Methodologies for visual analysis, perceptions, planning & management of urban, natural and working landscapes, and implications for sustainable land-use management & community engagement. Credit will be granted for only one of FRST 490 or FRST 551. [2-2]
Prerequisite: Third-year standing.
Equivalency: LARC 542.

FRST 491 (3) Visualization and Forest Design
GIS-based spatial planning and 3D landscape visualization for forest management. [3-0-1]
Prerequisite: Third- or fourth-year standing.

FRST 492 (3) Environmental Perception
How individuals perceive their environment. Emphasis will be given visual perception in the context of natural resource issues and the effects of those perceptions on individuals including issues of human wellbeing. [3-0-0]
Prerequisite: Third-year standing.

FRST 495 (3) Biological Diversity and Forest Management
Principles, problems, and practices of managing forests and nature reserves for biological diversity; integration of forestry and wildlife with particular emphasis on diversity of all life forms. [2-2-0]
Prerequisite: All of FRST 201, FRST 395.

FRST 497 (2) Graduating Essay or Technical Report
A technical description of a study or a detailed literature review of at least 4,000 words, developed under the guidance of a Faculty member. Available only to students in their graduating year.

FRST 498 (6) B.Sc. Thesis in Forestry
An independent study or research project of a subject of special interest to the student under the direction of a staff member. Available only to students in the BSFS Honours specialization.

FRST 499 (6) B.S.F. Thesis
An independent study or research project on an approved topic, developed under the guidance of a Faculty member. Available only to students in their graduating year.

FRST 502 (3) Tropical Rainforests: Evolution, Biology, Ecology
Evolution and current structure, functions and diversity of moist evergreen and semi-evergreen forests of the humid tropics. This
FRST 503 (3) Plant Molecular Biology Laboratory
Techniques of purification, cloning, sequencing, restriction-hybridization analysis of plant nucleic acids, in-vitro labeling of plant nucleic acids and proteins, and electrophoresis and immunodetection of plant proteins. Offered by the Biotechnology Teaching Laboratory in cooperation with the Department of Forest and Conservation Sciences. Admission to the course is limited and requires recommendation from the department head.

FRST 504 (3) Landscape Ecology
This course is not eligible for Credit/D/Fail grading.

FRST 505 (1-6) Directed Studies in Forest Science
This course is not eligible for Credit/D/Fail grading.

FRST 506 (3) Advanced Forest Pathology
Hereditary, physiological, anatomical, environmental, and microbiological factors influencing forest tree diseases. This course is not eligible for Credit/D/Fail grading.

FRST 507 (1-6) Topics in Forest Science
This course is not eligible for Credit/D/Fail grading.

FRST 508 (3) Advanced Forest Insect Ecology
Role of climate and climate change in the population dynamics, outbreak potentials and resultant impacts to forest ecosystems associated with herbivorous forest insects. This course is not eligible for Credit/D/Fail grading.

FRST 510 (3) Applied Population Genetics
This course is not eligible for Credit/D/Fail grading. Equivalency: BIOL 510.

FRST 512 (3) Belowground Forest Ecosystems
Review of current literature on specific topics in forest soil ecology, including bacterial endophytes, microbial diversity, nutrient cycling, and mycorrhizae. Students with either APBI 412 or CONS 412 will not be allowed to take FRST 512. This course is not eligible for Credit/D/Fail grading.

FRST 513 (3) Biotechnology in Tree Improvement
Advanced research topics and their application to forest genetics. Emphasis on molecular genetics and experimental protocols. This course is not eligible for Credit/D/Fail grading.

FRST 516 (3) Tree Physiology
Growth and development of woody plants; physiological responses to abiotic and biotic environmental factors; consequences of silvicultural practices on physiological processes. This course is not eligible for Credit/D/Fail grading. [3-2]

FRST 519 (3) Forests and Society
Emphasis on tropical and sub-tropical countries, where the majority of forest-dependent people live. This course is not eligible for Credit/D/Fail grading.

FRST 520 (3) Land and Forest Resource Economics
Applications of advanced theory and quantitative analysis to problems in forest resource and land economics; multiple land use; institutions for sustainable land use; optimal management and policy. This course is not eligible for Credit/D/Fail grading. [3-0]

FRST 521 (1-6) Topics in Forests and Society
This course is not eligible for Credit/D/Fail grading.

FRST 522 (4) Social, Community, and Indigenous Forestry
This course is not eligible for Credit/D/Fail grading.

FRST 523 (3) Forest and Environmental Policy
This course is not eligible for Credit/D/Fail grading.

FRST 524 (3) Environmental Perception
Perceptual processes mediating behaviour in humans, with special attention given to the emotional processing of visual stimuli. This course is not eligible for Credit/D/Fail grading.
FRST 525 (3) Visualisation Theory and Applications
   This course is not eligible for Credit/D/Fail grading.
FRST 526 (1-6) c Directed Studies in International Forestry
   This course is not eligible for Credit/D/Fail grading.
FRST 527 (3) People and Forests: An International Perspective
   Biodiversity loss, deforestation, desertification, salinization, air pollution and climate change facing world forests. Credit will be granted for only one of FRST 439 or FRST 527. This course is not eligible for Credit/D/Fail grading.
FRST 528 (3) Social Science Research Methods for Forestry and Conservation
   This course is not eligible for Credit/D/Fail grading.
FRST 529 (3) Ecological Economics
   Emphasis on forested ecosystems. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: ECON 301.
FRST 530 (3) Multiple Regression Methods
   Matrix algebra; algebra and inference of multiple linear and multiple curvilinear regressions for solution of problems in forestry and related fields. Non-linear regression. Methods of least squares for analysis of variance and covariance. This course is not eligible for Credit/D/Fail grading.
FRST 531 (3) Multivariate Statistical Methods
   Multivariate analysis of variance, cluster, principal components, factor, canonical and discriminant analysis. Theory and conceptual background are presented but emphasis is on selection of appropriate analysis and interpretation of results. Examples from forestry and related fields are analysed by computer programs at UBC. This course is not eligible for Credit/D/Fail grading.
FRST 532 (1-6) c Directed Studies in Forest Management
   This course is not eligible for Credit/D/Fail grading.
FRST 533 (1-6) c Problems in Statistical Methods
   Directed studies in problems of advanced statistical techniques as a tool in forest research. This course is not eligible for Credit/D/Fail grading.
FRST 534 (4) Natural Resources Economics
   This course is not eligible for Credit/D/Fail grading.
FRST 535 (3) Global Environmental Issues and Forests
   Socio-economic, biological, and technological problems affecting forests and forest-dependent communities. This course is not eligible for Credit/D/Fail grading.
FRST 536 (1-6) c Advanced Studies in Forest Mensuration
   Development and analysis of forest inventory systems; sequence and patterns of tree growth; analysis of crown development; improvement of stand growth and yield; methods of biomass analysis. This course is not eligible for Credit/D/Fail grading.
FRST 537 (1-6) d Topics in Forest Management
   This course is not eligible for Credit/D/Fail grading.
FRST 538 (3) Advanced Remote Sensing
   This course is not eligible for Credit/D/Fail grading.
FRST 539 (1-6) c Problems in Forest Sampling
   This course is not eligible for Credit/D/Fail grading.
FRST 540 (3) Application of Operational Research Methods in Forest Management
   Use of operational research methods in forest planning models; emphasis on algorithms, problem formulation and interpretation of results. This course is not eligible for Credit/D/Fail grading.
FRST 542 (4) Forest Policy and Law
   This course is not eligible for Credit/D/Fail grading.
FRST 543 (4) Development of Forestry Institutions
   This course is not eligible for Credit/D/Fail grading.
FRST 544 (3) Technical Communication Skills I
Principles and practice of oral presentations. *This course is not eligible for Credit/D/Fail grading.*

**FRST 545 (3) Technical Communication Skills II**
Theory and practice of technical communication necessary for preparation of effective scientific reports, reviews, grant proposals, journal articles and theses. *This course is not eligible for Credit/D/Fail grading.*

**FRST 546 (3) Research Methods and Philosophies in Science**
Lectures and seminars in research philosophies and methods with special emphasis on field and applied research. *This course is not eligible for Credit/D/Fail grading.* [3-0]

**FRST 547 (3) Forestry in British Columbia**
This course is not eligible for Credit/D/Fail grading.

**FRST 548 (3/6) c Major Essay**
For non-thesis master's degree programs. *This course is not eligible for Credit/D/Fail grading.*

**FRST 549 (6-18) c Master's Thesis**
This course is not eligible for Credit/D/Fail grading.

**FRST 550 (6-18) c M.A.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**FRST 551 (3) Landscape Planning for Sustainability**
Analysis, perception, planning of landscapes, and integration of social acceptability with sustainability. Credit will be granted for only one of FRST 490 or FRST 551. *This course is not eligible for Credit/D/Fail grading.* Equivalency: LARC 542.

**FRST 552 (3) Tropical Forests: Management and Conservation**
The use, management, and conservation of tropical and sub-tropical forests. *This course is not eligible for Credit/D/Fail grading.*

**FRST 553 (4) Forest Governance**
This course is not eligible for Credit/D/Fail grading.

**FRST 554 (3) Forest Products and Services**
Global trends in products and services. *This course is not eligible for Credit/D/Fail grading.*

**FRST 555 (3) Fundamentals of Sustainable Forest Land Management**
Concepts and principles at the site and landscape scale. *This course is not eligible for Credit/D/Fail grading.*

**FRST 556 (3) Land Information Acquisition and Analysis**
Principles and application of data acquisition and use. *This course is not eligible for Credit/D/Fail grading.*

**FRST 557 (6) Site-Level Forest Land Management**
Design and implementation of site-level plans that integrate ecological, social, and economic components: silviculture, forest operations, and forest health. *This course is not eligible for Credit/D/Fail grading.*

**FRST 558 (9) Landscape-Level Forest Land Management**
Preparation of landscape-level sustainable forest management plans that integrate ecological, social, and economic components. *This course is not eligible for Credit/D/Fail grading.*

**FRST 559 (4) Natural Resources Planning**
This course is not eligible for Credit/D/Fail grading.

**FRST 560 (4) Forest Business Enterprise**
This course is not eligible for Credit/D/Fail grading.

**FRST 562 (1) Topics in International Forestry**
Contemporary and emerging issues in international forestry. *This course is not eligible for Credit/D/Fail grading.*

**FRST 563 (3) Globalization and the Marketing of Wood Products**
This course explores globalization, its impact on developing and developed countries, what this means to world trade in forest products and emerging trends in globalization and the environment. *This course is not eligible for Credit/D/Fail grading.*

**FRST 570 (1-6) c Directed Studies in Wood Science and Forest Products**
This course is not eligible for Credit/D/Fail grading.

**FRST 572 (1-6) d Topics in Wood Science and Forest Products**
This course is not eligible for Credit/D/Fail grading.
FRST 573 (3) Advanced Wood Physics
This course is not eligible for Credit/D/Fail grading.

FRST 576 (3) Advanced Wood Mechanics
Analysis and design of structural wood products, influences of material inhomogeneity and variability; creep and time dependent fracture phenomena; structural performance of wood products such as panel products, lumber, glued laminated timber and I-Beams. Impact of codes on marketing of structural wood products.

FRST 578 (1-6) Directed Studies in Forest Business and Management
This course is not eligible for Credit/D/Fail grading.

FRST 580 (1-6) Topics in Forest Business and Management
This course is not eligible for Credit/D/Fail grading.

FRST 583 (3) Wood Physics and Mechanics
Wood-water interactions: thermal and electrical properties and heat transfer in wood; stress-strain relationships; fracture mechanisms (static and dynamic); the influence of material variability, changing resource characteristics, temperature, time and moisture content on mechanical properties and structural use of wood.

FRST 588 (3) Fluvial Ecohydrology
Hydrology, geomorphology and ecology of streams and their catchments; significance of stream processes within the fluvial network; management issues, particularly in the context of forest harvesting.

FRST 590 (3) Statistical Methods in Hydrology
This course is not eligible for Credit/D/Fail grading.

FRST 592 (3) Hydrological Modelling Applications in Forestry
This course is not eligible for Credit/D/Fail grading.

FRST 598 (3) Tracer Methods in Hydrology
Application and modelling of natural and artificial tracers in hydrological systems to study transport behaviour and watershed processes.

FRST 649 (0) Doctoral Dissertation

Faculty of Medicine

FSCT: Biochemistry and Forensic Science

The following UBC Senate approved courses are restricted to students enrolled in the Joint Degree Combined Honours Bachelor of Science in Biochemistry and Forensic Science. They are taught at the British Columbia Institute of Technology (BCIT) campus and show on the BCIT transcript under the BCIT course numbers.

FSCT 201 (3) Introduction to Forensic Science
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 7320.

FSCT 202 (3) Applied Ethics
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT LIBS 7002.

FSCT 203 (3) Report Writing and Communication for Forensic Investigation
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT COMM 7200.

FSCT 280 (0) Introductory Forensic Science I
Block registration for the introduction to forensic science course taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

FSCT 290 (0) Introductory Forensic Science II
Block registration for the applied ethics and report writing and communication for forensic investigation courses taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

FSCT 301 (3) Forensic Biology; DNA Typing Theory
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8150.
FSCT 302 (3) Quality Assurance for Forensic Science
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8370.

FSCT 303 (3) Business Management for Forensic Science
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8371.

FSCT 310 (3) Research Methodology and Measurement Models
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 7910.

FSCT 311 (3) Forensic Biology: Evidence Recovery
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8155.

FSCT 312 (3) Medico-Legal Aspects of Alcohol
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8230.

FSCT 313 (3) Crime Scene Investigation
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 7310.

FSCT 314 (3) The Science of Fingerprints - Theory
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8320.

FSCT 315 (3) Forensic Toxicology I
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8240.

FSCT 380 (0) Intermediate Forensic Science I
Block registration for the forensic biology: DNA typing theory, quality assurance, and business management for forensic science courses taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

FSCT 390 (0) Intermediate Forensic Science II
Block registration for the forensic biology: evidence recovery, research methodology, and elective courses taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

FSCT 401 (3) Forensic Biology: DNA Typing Applications
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8160.

FSCT 409 (3) Law for Forensic Science
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 7009.

FSCT 410 (2) The Expert Witness - Prepared for Court
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 7010. [2-0-0]

FSCT 411 (3) Population Genetics
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8305.

FSCT 412 (3) Forensic Chemistry and Toxicology
Credit limited to students in the Joint Degree Program in Biochemistry and Forensic Science. Same as BCIT FSCT 8156.

FSCT 480 (0) Advanced Forensic Science I
Block registration for the forensic biology: DNA typing applications, law and forensic science courses taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

FSCT 490 (0) Advanced Forensic Science II
Block registration for the expert witness testimony, population genetics, and forensic chemistry and toxicology courses taken in the Joint BCIT/UBC Degree in Biochemistry and Forensic Science. Registration is limited to students in the Joint Degree Program.

Chemical and Biological Engineering, Faculty of Applied Science

GBPR: Green Bioproducts

GBPR 500 (6) Building Blocks of Forest Biomass
Anatomy, physiology, composition, ultrastructure of the cell wall, molecular organization, and chemistry of forest biomass. This course is not eligible for Credit/D/Fail grading.
GBPR 501 (3) Biomass Fractionation Chemistry
Extraction of soluble compounds and macromolecules. Chemical and technical processes in production of pulp. Bleaching. Fiber production from woody and herbaceous biomass. Production of reactive intermediates. This course is not eligible for Credit/D/Fail grading.

GBPR 502 (3) Sustainable BioMaterial from Forest Biomass
Properties of biopolymers/chemical and physical characterization. Fundamentals of polysaccharide chemistry and derivatives with industrial examples. Wood composites and biocomposites and carbon fiber from lignin. Biomimicry inspired functional products. This course is not eligible for Credit/D/Fail grading.

GBPR 503 (3) Bioenergy and Biorefinery
Understanding technology of deriving biofuels and chemical feedstocks from forest biomass. Relating chemistry of biomass for production of liquid, solid and gaseous fuels. Processing options for value-added chemicals. This course is not eligible for Credit/D/Fail grading.

Faculty of Forestry

GEM: Geomatics for Environmental Management

GEM 500 (3) Landscape Ecology and Management
Current concepts and skills in ecological modelling and spatial analysis. This course is not eligible for Credit/D/Fail grading.

GEM 510 (3) Geographic Information Systems for Forestry and Conservation
Principles and practices of Geographic Information Systems (GIS). This course is not eligible for Credit/D/Fail grading. [2-2-0]

GEM 511 (3) Advanced Geographic Information Systems for Environmental Management
Advanced topics, techniques and functions in Geographic Information Systems. This course is not eligible for Credit/D/Fail grading. [2-2-0]

GEM 520 (3) Remote Sensing for Ecosystem Management
Capturing spatial data and the use of remote sensing systems to map, monitor and better manage forest, vegetation and ecosystem resources. This course is not eligible for Credit/D/Fail grading. [2-2-0]

GEM 521 (3) Advanced Earth Observation and Image Processing
Advanced topics and techniques in remote sensing and image processing. This course is not eligible for Credit/D/Fail grading. [2-1-0]

GEM 530 (3) Geospatial Data Analysis
Understanding geo-spatial data structures, databases and developing, maintaining and utilizing geo-spatial data. This course is not eligible for Credit/D/Fail grading. [2-2-0]

GEM 540 (3) Linear Regression Models and Introduction to Spatial Statistics
This course is not eligible for Credit/D/Fail grading. [3-2-0]

GEM 580 (3) Geoinformatics Seminar
Current events in geomatics applications in environmental management. This course is not eligible for Credit/D/Fail grading. [0-0-3]

GEM 599 (3) Project Proposal Development and Proof of Concept
Develop, write and present the components of an effective proposal focused on exploring an environmental issue. This course is not eligible for Credit/D/Fail grading. [1-0-1]

Faculty of Medicine

GENE: Genetics

GENE 501 (3) Genetics
A lecture series intended to acquaint graduate genetics students and those in related areas with advances in genetics and an overview of genetics in a variety of systems. The emphasis is on molecular genetics. Optional for students in the graduate genetics program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of BIOL 334, BIOL 335 or equivalent, and a third-year course in Biochemistry.

**GENE 502 (3) Genetics**
A lecture series intended to acquaint graduate genetics students and those in related areas with advances in genetics and an overview of genetics in a variety of systems. The emphasis is on eukaryotic genetics. Required of students in the graduate genetic program.

Prerequisite: All of BIOC 334, BIOC 335 or equivalent, and a third-year course in Biochemistry.

**GENE 549 (6/12) c M.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**GENE 649 (0) Doctoral Dissertation**

**Geography, Faculty of Arts**

**GEOB: Geographical Sciences**

All GEOB courses carry Science credit and therefore may not be used by B.Sc. students to satisfy the Faculty of Science requirements of 18 credits of Arts. Only Geography courses carrying the GEOG designation may be used to satisfy the Faculty of Science requirements of 18 credits of Arts.

**GEOB 102 (3) Our Changing Environment: Climate and Ecosystems**
Energy and water in the Earth-Atmosphere system, global climates and climate change, ecosystem properties and processes, human impacts. Please consult the Faculty of Science Credit Exclusion Lists:

www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-2*-0]

**GEOB 103 (3) Our Changing Environment: Water and Landscapes**
Physical processes acting at the Earth's surface; water cycle; landforms; human impacts. Please consult the Faculty of Science Credit Exclusion Lists:

www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-2*-0]

**GEOB 200 (3) Atmospheric Environments**
Physical principles underlying weather and climates. Thermal, moisture and wind climates at scales from valleys to the globe. Daily weather, air pollution, global change. Credit will be granted for only one of GEOB 200, GEOB 204, GEOG 200, GEOG 204, or AGRO 244. [3-2*-0]

Prerequisite: One of GEOG 102, GEOB 102 or first-year science.

**GEOB 204 (3) Introduction to Biomeeteorology**
Basic principles and processes of climatology. Energy and water balance concepts. Weather systems and climate change, microclimate of soils, crops, forests, and animals. Credit will be granted for only one of GEOB 200, GEOB 204, or APBI 244. [3-2-0]

Equivalency: APBI 244.

**GEOB 206 (3) Geomorphic Processes and Hazards**
Earth surface processes shaping the landscape; identification of hazards and hazardous areas associated with these processes; introduction to techniques for measurement and analysis at various spatial and time scales; field trips are required. [3-2*-0]

Prerequisite: One of GEOB 103, EOSC 110, PHYS 101, PHYS 107, PHYS 153, SCIE 001.

**GEOB 207 (3) Introduction to Biogeography**
Geographical ecology emphasizing plant distributions, abiotic-biotic interactions, effects of disturbance, succession, and human impacts across scales. Labs and field trips examine a local site. [3-2*-0]

Prerequisite: One of GEOG 102, GEOB 102 and one of GEOG 103, GEOB 103.

**GEOB 270 (3) Geographic Information Science**
Computer-based graphical methods of data input and analysis. Emphasis on data visualization techniques such as cartographic modelling and exploratory data analysis.

Preclusion: Not available to those who completed GEOG 370 before September 2005. [2-2-0]

**GEOB 300 (3) Microscale Weather and Climate**
Meteorology and climatology at the micro-, local, and meso-scales. Interactions between land surfaces and atmosphere. Basics of atmospheric turbulence and transfer processes. Microclimates on scales of a leaf to those of a large valley. [3-0-0]

Prerequisite: One of GEOB 200, GEOB 204, ATSC 201.
GEOB 304 (3) Synoptic Meteorology and Climatology
Analysis of meteorological fields, diagnostic analysis of synoptic weather systems, applications of synoptic meteorology. Requires participation in weekly weather map discussion. [2-2-0]
Prerequisite: One of GEOG 200, GEOB 200, ATSC 201.

GEOB 305 (3) Introduction to Hydrology
Principles of hydrology at site, watershed, and larger regional scales. Introduction to techniques of measurement and analysis. Emphasizes surface water hydrology of western North America. [3-2*-0]
Prerequisite: One of GEOB 200, GEOB 204, APBI 244, ATSC 201.

GEOB 307 (3) Biogeography and Global Change
Biogeographic concepts in understanding responses in ecosystems to environmental change at global, regional, and local scales. Conservation issues such as the loss of biodiversity and endangered species. [3-2*-0]
Prerequisite: One of BIOL 230, GEOB 207, FRST 202.

GEOB 308 (3) Quaternary and Applied Geomorphology
Quaternary landscape development emphasizing the history of glaciation with special reference to western North America; applications of geomorphology in resource development and land management; interpretation of quaternary materials. Weekend field trips required. [3-2*-0]
Prerequisite: One of EOSC 320, EOSC 330, GEOB 206.

GEOB 309 (3) Geographical Sciences Field Course
Field sampling, instrumentation, surveying, mapping techniques, and data analysis; mandatory multi-day field camp in April or May. Special fees and liability insurance are required. This course is not eligible for Credit/D/Fail grading. [0-3-0]
Prerequisite: One of BIOL 230, GEOB 207 and one of GEOB 200, GEOB 204.
Corequisite: One of GEOB 206, EOSC 330.

GEOB 370 (3) Advanced Geographic Information Science
Theoretical and practical aspects of Geographic Information Systems, including cartographic modeling, digital terrain models, management issues, and spatial interpolation. [2-2-0]
Prerequisite: GEOB 270. Or third-year standing in ENSC or GEOB specializations, with some introductory knowledge of GIS.

GEOB 372 (3) Cartography
Cartographic methods: development of cartography; projections; data ordering, compilation and symbolization; cartographic design, map reproduction. [2-2-0]
Prerequisite: 6 credits from GEOB 102, GEOB 103, GEOB 200, GEOB 204, GEOB 207.

GEOB 373 (3) Introductory Remote Sensing
Aerial photography; measurement from aerial photographs; photo-interpretation in geographic analysis; remote sensing of the earth's surface and atmosphere. [3-2*-0]
Prerequisite: GEOB 270. Or third-year standing in ENSC or GEOB specializations.

GEOB 400 (3) Global Change Science
Processes controlling the planetary cycles of elements like carbon, nitrogen and phosphorus, the human perturbation of these biogeochemical cycles, and the consequences for the atmosphere, terrestrial ecosystems, and aquatic ecosystems. [3-0-1]
Prerequisite: Either (a) all of BIOL 121, CHEM 111 or (b) all of BIOL 121, CHEM 121 or (c) SCIE 001. Fourth year standing is also required.

GEOB 401 (3) Urban Meteorology
The impact of urbanization upon atmospheric processes and climates. The energy and water balances of cities. Meteorological effects (urban heat island, precipitation modification, etc.) and their significance. Models of the urban atmosphere. [3-0-0]
Prerequisite: One of GEOG 204, GEOB 204, GEOG 300, GEOB 300, AGRO 244, APBI 244.

GEOB 402 (3) Air Pollution Meteorology
The nature of atmospheric pollutants. The ability of the atmosphere to disperse, transform, and remove pollutants. Air pollution dispersion models. Air quality monitoring, criteria, and standards. [3-0-0]
Prerequisite: One of GEOB 200, GEOB 300.

GEOB 403 (3) Catchment Hydrology
Hydrometeorology; runoff processes; streamwater chemistry in relation to runoff processes; effects of climate variations and land cover change on streamflow regimes; models of catchment hydrology. [3-0-0]
Prerequisite: One of GEOB 200, GEOB 204 and one of GEOB 305, FRST 385 and one of STAT 200, FRST 231, BIOL 300.
GEOB 405 (3) Fluvial Geomorphology
Introduction to open channel flow and sediment transport. River morphology and channel types. Palaeohydrology. The
development of channel networks. [2-3-0]  
Prerequisite: One of EOSC 320, EOSC 330, GEOB 206.

GEOB 406 (3) Watershed Geomorphology
Hillslope and stream channel processes and their rates of operation. Analysis and modeling geomorphic processes and
associated hazards at the watershed scale. Applications in geoscience and engineering. [2-2-0]  
Prerequisite: One of GEOB 206, EOSC 330.

GEOB 407 (3) Vegetation Dynamics: Disturbance, Climate and Human Impacts
Investigation of vegetation dynamics integrating theory and research to address contemporary issues of global environmental
change. Students will conduct fieldwork and learn to analyze data and interpret results. [2-3-0]  
Prerequisite: One of BIOL 230, GEOB 207, FRST 201.

GEOB 408 (3) Snow and Ice Processes
Formation of snow and ice masses and their evolution including snowpacks, glaciers, and ice sheets. Relationships between
snow, ice, and climate including glacier dynamics and avalanche forecasting. Weekend field trip. [3-0-0]  
Prerequisite: One of PHYS 101, PHYS 107, PHYS 153, SCIE 001 and one of GEOB 305, GEOB 308.

GEOB 409 (3) Self-Directed Field Studies in Physical Geography
Advanced research design, field sampling methods, instrumentation, surveying, mapping techniques, data analysis and
management; self-directed fieldwork; 1 lecture per week during term and a multi-day field camp in April or May. [2-0-0]  
Prerequisite: GEOB 309. Third-year standing in Geographical Biogeosciences Major.

GEOB 448 (3/4) c Directed Studies in Geographical Sciences
For fourth-year students in Geography to permit investigation of a topic to be agreed upon by a member of the faculty and the
student. Permission of the department head and of a supervisory faculty member is required. Credit will be granted for only one
of GEOB 448 or GEOG 448.

GEOB 449 (3/6) d Undergraduate Thesis
Original research on an approved topic, developed under the guidance of a faculty member. Open to 4th year students in
Geographical Biogeosciences with appropriate background courses related to the research topic, and permission of the directing
faculty member. The 3-credit option is only available to students who complete GEOB 449 in tandem with GEOB 409.

GEOB 472 (3) Research in Cartography
Use of cartography in primary research applications. Discussion of contemporary topics in cognitive, social, and technical
cartography and data visualization. [3-2*-0]  
Prerequisite: One of GEOB 270, GEOB 372.

GEOB 479 (3) Research in Geographic Information Science
Students use GIS in primary research applications in conservation biology, crime analysis, and health geography; theoretical and
practical aspects considered in a hands-on environment. [2-2-0]  
Prerequisite: GEOB 370.

GEOB 490 (3) Student Directed Seminar in Geographical Sciences
Self-directed, collaborative studies in physical geography, in a group-learning environment, initiated and coordinated by senior
undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply
with the "Handbook for Student Directed Seminars." This course carries science credit. Credit will be granted for only one of
GEOB 490 and GEOG 442.  
Prerequisite: Third-year standing in Geographical Sciences (GEOB).

GEOB 500 (3) Contemporary Research Trends in Physical Geography
This course is not eligible for Credit/D/Fail grading.

GEOB 501 (3) Processes in Geomorphology
This course is not eligible for Credit/D/Fail grading.

GEOB 503 (1-6) d Topics in Geomorphology and Hydrology
This course is not eligible for Credit/D/Fail grading.

GEOB 504 (1-6) d Topics in Climate Studies
This course is not eligible for Credit/D/Fail grading.
GEOB 505 (3) Permafrost
This course is not eligible for Credit/D/Fail grading.

GEOB 507 (3-6) c Directed Studies in Physical Geography
This course is not eligible for Credit/D/Fail grading.

GEOB 508 (3/6) d Advanced Seminar in Geomorphology
This course is not eligible for Credit/D/Fail grading.

GEOB 509 (3/6) d Advanced Seminar in Climatology
This course is not eligible for Credit/D/Fail grading.

Geography, Faculty of Arts

GEOG: Geography

Courses having Science credit in Geography are listed separately in the calendar under GEOB (Geographical Biogeosciences). Students seeking to obtain their Science requirement in the Faculty of Arts should consider GEOB102 and GEOB103. For detailed information about courses and topics within courses, see the departmental website (www.geog.ubc.ca).

GEOG 121 (3) Geography, Environment and Globalization
Human geography of the modern world with particular attention to human-environment relationships, urbanization, and regional growth; trade and communications; environment and war; environmental governance and sustainability.

GEOG 122 (3) Geography, Modernity and Globalization
The human geography of the modern world since 1945: global interdependence in economic geography, geopolitics, and cultural geography; consequences of modernization, including demography, urbanization and environmental effects; regional case studies; reactions to modernization.

GEOG 210 (3) Vancouver and Its Region
An integrated approach to the physical and human geography of the Lower Mainland of British Columbia. Field trips.

GEOG 211 (3) The State of the Earth
The demographic, economic, ecological, and technological factors that underlie current environmental challenges, considering their effects to date and their possible impact in the future.
Prerequisite: One of GEOB 102, GEOB 103. GEOG 121, GEOG 122 recommended. Second-year standing.

GEOG 220 (3) Geopolitics
Political geographic perspectives on todays interdependent world through three themes: borders, regions, and flows. This course is not eligible for Credit/D/Fail grading.

GEOG 250 (3) Cities
An interdisciplinary introduction to the city in the context of contemporary globalization. Analysis of urban patterns and processes from the theoretical perspectives of various disciplines and methodologies.
Equivalency: URST 200.

GEOG 281 (3) Geography of the Pacific Rim
An introduction to changing geographies (social, economic, and political) of the Pacific Rim, with special emphasis on the relationships between Canada and Japan.

GEOG 290 (3) Introduction to the Geography of Canada
Selected topics in human geography focusing on the regional distribution of natural resources, population, urban systems, and economic activities.

GEOG 310 (3) Environment and Sustainability
Concepts of environment, resources and sustainability; the roles of physical and human geography in understanding the interaction of humans and the environment; introduction to management of environment-resource systems.
Prerequisite: One of GEOB 102, GEOB 103. Or 6 credits in the Faculty of Science (BIOL, CHEM, EOSC, PHYS).

GEOG 311 (3) Urban Environments
The impact of urban development on the natural environment and vice versa. Study of the ecology and metabolism of cities and green urban design, using global and local case studies.

**GEOG 312 (3) Climate Change: Science and Society**
Climates over the geological, historical and instrument periods. Theories of climatic change. Monitoring and modelling the climate system. Impacts of change on environmental and socio-economic systems. 
*Prerequisite:* One of GEOG 102, GEOB 102, GEOG 200, GEOB 200, GEOG 204, GEOB 204, ATSC 201, EOSC 112. 3rd year standing.

**GEOG 313 (3) Environmental Justice and Social Change**
Economic, social, political and cultural structures and institutions that shape contemporary socioecological challenges. *This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* GEOG 121.

**GEOG 314 (3) Analysing Environmental Problems**
Concepts and techniques employed in environmental research; challenges in the areas of climate change, water use, knowledge translation and natural hazards. *This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* Two of GEOG 211, GEOB 102, GEOB 103.

**GEOG 315 (3) Human and Environmental Geography Field Course**
Engage in primary field-based research in British Columbia on important issues concerning intercultural understanding, engagement with local communities and sustainability. Focus will shift on a bi-annual basis in accordance with location and available community partners. Special fees and liability insurance are required. Third year standing is recommended.
*Prerequisite:* Permission of the instructor.

**GEOG 316 (3) Geography of Natural Hazards**
The role of geophysical events, human ecology, environmental perception, world social and political order in explaining the risk of natural disasters. Assessment of acceptable risk, disaster relief and reconstruction and contrasts between developed and developing nations.
*Prerequisite:* Either (a) GEOG 101 or (b) all of GEOG 102, GEOG 103 or (c) all of GEOG 102, GEOB 103.

**GEOG 317 (3) The Physical Environment of British Columbia**
The biophysical processes which are shaping and have shaped British Columbia; characteristic associations between landforms, climate, soil, and vegetation; biophysical constraints on air, land and water use. 
*Prerequisite:* 6 credits from GEOG 102 (or GEOG 200 or 204) or GEOB 102 (or GEOB 200 or 204), GEOG 101, 103, 205, 207 or GEOB 103, 205, 207.

**GEOG 318 (3) Sustainability in a Changing Environment**
Biophysical and human causes of short- and long-term environmental change at various spatial scales, including measurement, interpretation, and policy.
*Prerequisite:* GEOG 310.

**GEOG 319 (3) Environmental Impact Assessment**
The principles, implementation, and role of environmental impact assessment in environmental management, in Canada and internationally.
*Prerequisite:* GEOG 310.

**GEOG 321 (3) Historical Geography of Urbanization: Cities, Space, and Power**
From the origins of urbanism to the modern era.

**GEOG 327 (3) Creating Canada**
Canada from the beginning of European contact to the mid-19th century, stressing the changing geographical patterns of settlement, economy, and culture.

**GEOG 328 (3) Constructing Canada**
The construction of Canadian political space after Confederation, aboriginal-newcomer relations, regional development and conflict, industrialization, urbanization, and war.

**GEOG 329 (3) Political Geography**
The heritage of political geography; the spatial structure of political organization including regional and global structures.
*Prerequisite:* One of GEOG 121, GEOG 122. Or Major and Honours students in History, International Relations or Political Science.

**GEOG 345 (3) Theory and Practice in Human Geography**
A consideration of major intellectual issues and debates in the development of contemporary human geography, in relation to developments in other fields and changes in politics, culture and society.

**GEOG 350 (3) Urban Worlds**
City systems and theories of urban location; internal spatial structure of the city; commercial and industrial location; social areas; neighbourhood and land use change; urban trends and public policy.

**GEOG 352 (3) Urbanization in the Global South**
Urbanization in the developing countries of Latin America, Africa, and Asia; the role of cities in the development process and the features and problems of rapid urbanization.

**GEOG 353 (3) Geographies of Migration and Settlement**
International regimes regulating migration, changes in global demographics, immigration policies of nation states, international migration patterns, settlement policies and outcomes.

**GEOG 357 (3) Introduction to Social Geography**
The development of social and behavioural geography, focusing on how places, landscapes, and environments both reflect and shape social life.

**GEOG 361 (3) Introduction to Economic Geography**
History and methods of economic geography. Location of resource industries, manufacturing, and service activities with emphasis on British Columbia in its North American and world setting. Recommended for students with no previous exposure to Economic Geography, before taking other courses in the 36x and 46x series.  
*Prerequisite:* GEOG 122.

**GEOG 362 (3) Geography of Economic Development**
Geographical approaches to economic development; models of economic development and spatial change; influences on spatial economic change; case studies from the developed, third, and socialist worlds.  
*Prerequisite:* Either (a) GEOG 122 or (b) GEOG 260.

**GEOG 364 (3) Globalization, Cities, and Regions**
Forms of economic development; changing location of economic activities and functions; implications for government and politics; local strategies for growth and equity.  
*Prerequisite:* One of GEOG 121, GEOG 122. GEOG 361 is recommended.

**GEOG 371 (3) Research Strategies in Human Geography**
Formulating a research problem and selecting an appropriate research strategy. Research strategies range from social scientific survey methods to ethnography. Priority enrolment for honours and major students in Geography.  
*This course is not eligible for Credit/D/Fail grading.*

**GEOG 374 (3) Statistics in Geography**
Introduction to statistical techniques and their application to geographical problems. Priority enrolment for honours and major students in Geography. Consult the Faculty of Science Credit Exclusion Lists: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414.

**GEOG 379 (3/6) d Field Course in Human Geography**
As announced by the department a year in advance.  
*Prerequisite:* The relevant core course(s).

**GEOG 380 (3) Geography of Asia**
A comparative regional analysis stressing the historical development and changing cultural, economic, and political patterns of the area. Special reference to India, Indonesia, China, and Japan.

**GEOG 390 (3/6) d Geography of Selected Regions**
A geographical analysis of selected regions not regularly included in the Department's offerings in regional geography (e.g., tropical Africa, Oceania). Students should consult the Department regarding regions to be covered.

**GEOG 391 (3) Modern Europe: Places and Borders**
An introductory survey, focusing on the present-day human geography of the area between the Atlantic and the Ural Mountains.

**GEOG 395 (3) Culture, Nature, and Coloniality in Latin America**
Socio-ecologies in 1491; Spanish colonialism and biological imperialism; contemporary coloniality and neoliberalism; and social movements.

**GEOG 410 (3) Environment and Society**
Geographical analysis of society-environment relations. Relates resource management to environmental politics, political economy, and sustainable development. Perspectives drawn from political ecology and political economy, environmental history and environmental philosophy.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: GEOG 310.

**GEOG 412 (3) Water Management: Theory, Policy, and Practice**

Interdisciplinary analysis of critical water issues, in Canada and internationally. Focus on social science perspectives. Emphasis on presentation, research, and essay-writing skills.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: GEOG 310.

**GEOG 419 (3) Research in Environmental Geography**

Details available from Geography Undergraduate Advisor. Not necessarily offered each year.

Prerequisite: Major or Honours in Geography with at least 75 credits, or permission of the instructor.

**GEOG 423 (3) Development of Environmental Thought**

An examination of how attitudes toward human nature and non-human nature have changed from Mesolithic times to the present in Western society.

Prerequisite: GEOG 310.

**GEOG 424 (3) Feminist Geographies**

An introductory survey of contemporary feminist approaches to human geography.

**GEOG 426 (3) Historical Geography of British Columbia, I**

Colonialism, resistance, and land use in early British Columbia.

Prerequisite: GEOG 327 and GEOG 328 are recommended.

**GEOG 429 (3) Research in Historical Geography**

Details available from Geography Undergraduate Advisor. Not necessarily offered each year.

Prerequisite: Major or Honours in Geography with at least 75 credits, or permission of the instructor.

**GEOG 442 (3) Student Directed Seminar in Human Geography**

Self-directed, collaborative studies in human geography, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the "Handbook for Student Directed Seminars." Credit will be granted for only one of GEOG 442 or GEOG 443.

Prerequisite: Third-year standing in human geography.

**GEOG 446 (3) Topics in Geography**

See the departmental undergraduate adviser for details.

**GEOG 447 (3) Directed Studies: Off Campus Research**

Based on project work outside the university. Not available to co-op students. See the departmental undergraduate adviser for details.

Prerequisite: Permission of the department head and at least 15 credits of relevant 300- or 400- level Geography courses.

**GEOG 448 (3) Directed Studies in Geography**

For fourth-year students in Geography to permit investigation of a topic to be agreed upon by a member of the faculty and the student.

Prerequisite: Permission of the department head and supervising faculty member is required.

Equivalency: GEOG 444.

**GEOG 450 (3) Urban Research**

Individual or group primary research. Instructor and content vary and it may be offered over 2 terms. Details available from Geography Undergraduate Advisor from April 1 preceding the course. Not necessarily offered each year.

Prerequisite: Registered as Major or Honours in Geography with at least 75 credits completed.

**GEOG 453 (3) Political Geographic Analysis**

Political organization of space; territorial and spatial patterns of power and identity; contemporary geopolitical struggles.

Prerequisite: Fourth-year standing.

**GEOG 456 (3) Film and the City**

The complex interrelations between film and the city; dominant urban theories, film technologies and viewing practices and the intersections between them.

GEOG 457 (3) Social and Behavioural Geography

Theories of social change in the global city; labour markets; poverty and inequality; social polarization; housing markets; gentrification and housing affordability; immigration and segregation; diversity and multiculturalism; transnationalism; the entrepreneurial state; the convivial city.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of GEOG 350, GEOG 357.

GEOG 461 (3) Political-Economic Geographies

Principal theories and debates in contemporary political-economic geography, with particular emphasis on global and regional transformations.

Prerequisite: One of GEOG 361, GEOG 364.

GEOG 468 (3) Geography of International Economic Systems: Canada and the Pacific Basin

An introduction to the study of international economic systems illustrated by the study of Canada's relations with the countries located in the Pacific Basin. Normally alternates with GEOG 481. This course is not eligible for Credit/D/Fail grading.

GEOG 481 (3) Geography of Japan

A critical analysis of significant human adaptations to changing ecological conditions in the Japanese archipelago. Normally alternates with GEOG 468.

Prerequisite: GEOG 380 is recommended.

GEOG 484 (3) Geography of Southeast Asia

A critical analysis of significant features of political, economic, and cultural development in the region from pre-colonial times to the present.

Prerequisite: GEOG 380 is recommended.

GEOG 485 (3) Geography of China

An introduction to the changing cultural, social and economic geography of China. Normally alternates with GEOG 425.

Prerequisite: GEOG 380 is recommended.

GEOG 493 (3) Contemporary Europe: Identity and Geopolitics

Political, economic, and social geographies of post Cold War Europe with a special emphasis on east-central Europe: societal transformations in the formerly socialist states; European Union and NATO enlargement; the external relations of these two organizations.

Prerequisite: GEOG 391 is recommended.

GEOG 495 (3) Geographies of Social Movements in the Americas

The politics of North-South solidarity in theory and practice through community service learning models. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of LAST 100, GEOG 395.

GEOG 496 (3) Geography of Africa

A critical introduction to social, political and economic geographies of Africa from pre-colonial times to the present, with a focus on contemporary environmental and development issues.

Prerequisite: One of GEOG 329, GEOG 350. GEOG 362 is recommended.

GEOG 497 (3) The Arctic

Physical and biological characteristics of the circumpolar Arctic, emphasizing terrestrial environments and the impacts on and by humans, including: glacial history; climatology; biogeography/ecology of arctic tundra; human-environment interactions, settlement and exploration; and current environmental, social and economic problems.

GEOG 498 (3) Geographies of the Middle East

Critical analysis of economic, social, and political development and processes defining the modern Middle East region.

GEOG 512 (3) Climate Change in the 21st Century

Historical, methodological, and policy dimensions of climate change in the 21st century. Application of natural and social science literature to climate science, impacts on ecosystems and societies, and response options. This course is not eligible for Credit/D/Fail grading.

Equivalency: FRST 501.

GEOG 514 (3) Topics in Environmental Geography

This course is not eligible for Credit/D/Fail grading.

GEOG 515 (3) Satellite Remote Sensing Applications to Oceanography and Meteorology

A review of the many satellite-sensed data products used in both research and operational aspects of oceanography and
GEOG 517 (3) Environmental Sustainability
Environmental sustainability is examined through conceptual literature and empirical examples. Emphasis on resources and livelihoods in the South and North. Case studies are used to discuss sustainable development, and the distribution of costs and benefits associated with resource allocation, with perspectives drawn from political ecology and economy, environmental history and philosophy. This course is not eligible for Credit/D/Fail grading.

GEOG 519 (3) Environment, Development and Security
Analysis of environment-development-security linkages in relation to livelihoods and conflicts in poor countries, with a focus on Africa. This course is not eligible for Credit/D/Fail grading.

GEOG 520 (3) Themes and Interpretive Issues in Modern Human Geography
Themes and interpretive issues in modern human geography. Students from outside Geography require the permission of the Head of the department. This course is not eligible for Credit/D/Fail grading.

GEOG 521 (3) Philosophy, Social Theory, and Human Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 522 (3) Feminism and Geography
Feminist critiques of the discipline of geography and feminist reconstructions of geography. This course is not eligible for Credit/D/Fail grading.

GEOG 523 (3/6) Advanced Seminar in Human Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 524 (3/6) d Cultural Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 525 (3) Cultures of Nature in Contemporary Political Ecologies
This course is not eligible for Credit/D/Fail grading.

GEOG 527 (3) Remaking North America: Historical Geographies of Changing Environments
This course is not eligible for Credit/D/Fail grading.

GEOG 528 (3) Society and Environment in British Columbia
This course is not eligible for Credit/D/Fail grading.

GEOG 533 (3) Political Geography
Investigate how politics is bound with territorial definition. Examine how the management of political issues is intertwined with the ways in which these issues are understood in geographical and territorial terms. This course is not eligible for Credit/D/Fail grading.

GEOG 535 (3) International Migration and Settlement
This course is not eligible for Credit/D/Fail grading.

GEOG 545 (3/6) d Topics in Human Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 547 (3/6) d Directed Reading in Human Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 548 (0) Major Essay

GEOG 551 (3) Urban Social Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 552 (3) Urban Systems in Developed Countries
This course is not eligible for Credit/D/Fail grading.

GEOG 553 (3) Urbanization in Developing Countries
This course is not eligible for Credit/D/Fail grading.

GEOG 554 (3) Historical Urban Geography
This course is not eligible for Credit/D/Fail grading.

GEOG 560 (3/6) d Economic Geography

Equivalency: EOSC 582.
This course is not eligible for Credit/D/Fail grading.

GEOG 570 (3) Advanced Geographic Information Systems
This course is not eligible for Credit/D/Fail grading.

GEOG 571 (3) Research Methods in Human Geography
Pass/Fail. Restricted to Human Geography graduate students. This course is not eligible for Credit/D/Fail grading.
Prerequisite: GEOG 520.

GEOG 572 (3/6) Spatial and Cartographic Techniques
This course is not eligible for Credit/D/Fail grading.

GEOG 599 (15) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

GEOG 699 (0) Doctoral Dissertation

Central, Eastern and Northern European Studies, Faculty of Arts

GERM: German

GERM 100 (3) Beginners' German I
Introduction to the language. Ability to communicate accurately in a variety of everyday situations. See also GERM 433.

GERM 110 (3) Beginners' German II
Introduction to the language. Ability to communicate accurately in a variety of everyday situations, speak about past events and express ideas and hypotheses in German. See also GERM 433.
Prerequisite: GERM 100.

GERM 112 (3) German for Singers
Study of the German language in combination with the study of German lyric diction and musical culture. The course includes translation, phonetic transcription, and the performance of vocal music.
Prerequisite: GERM 100.

GERM 200 (3) Intermediate German I
Competence and fluency in everyday situations; ability to report and narrate past events fluently and to express opinions; familiarity with contemporary issues in the German-speaking societies.
Prerequisite: Either (a) GERM 110 or (b) GERM 12.

GERM 210 (3) Intermediate German II
Competence and fluency in everyday situations; ability to report and narrate past events fluently and to express opinions; familiarity with contemporary issues in the German-speaking societies; introduction to German for professional purposes.
Prerequisite: GERM 200.

GERM 213 (3) Refresher I
Grammar-based course for students with previous untutored exposure to German and students with a first-year knowledge in need of grammar review.

GERM 300 (3) Intermediate German III
Fluency in many relevant situations; competence in the most important areas of cultural life; familiarity with study resources and study skills. Review and expansion of grammar; fostering of speaking and writing skills.
Prerequisite: GERM 210.

GERM 301 (3) German Literature 1900 - 1945 (in English)
Reading and discussion of selected works against the background of literary, social, and political developments in twentieth-century Germany with special emphasis on plays and novels dealing with the First World War and Nazism.

GERM 302 (3) German Literature after 1945 (in English)
Reading and discussion of selected literary works from West, East, and the United Germany, as well as from Austria and Switzerland.

GERM 303 (3) German Literature Before 1900 (in English)
Reading and discussion of translated works from the German-speaking countries from the Middle Ages to 1900.
GERM 304 (3) German Cinema (in English)
Screening, discussion, and critical analysis of German cinema from the silent era to the 21st century.

GERM 305 (3) The Culture of Nazism (in English)
Literature, film and ideology in the Third Reich.

GERM 310 (3) Intermediate German IV
Fostering of the ability to discuss controversial issues, express ideas clearly in writing and write essays on selected topics in German. Ongoing grammar review and expansion.
Prerequisite: GERM 300.

GERM 313 (3) Conversational German II
Emphasis on the study of oral communication skills and strategies. Fluency in many situations, communicative competence in important areas of cultural life, ability to participate in discussions of current as well as controversial issues to express ideas clearly in spoken word.
Prerequisite: GERM 210 or equivalent.

GERM 314 (3) Business German
Review of the most important grammatical patterns in application to business geography, import-export trade, marketing, finance, accounting, taxation, workplace conditions and requirements; oral and written forms of presentation for work with German business.
Prerequisite: GERM 210.

GERM 318 (3) Introduction to German Linguistics
Basic theories and methodologies of modern German linguistics.
Prerequisite: GERM 210.

GERM 319 (3) Canadian German Cultural Dialogues
Analysis of intercultural theory; examination of Canadian and German print and video materials. Includes direct audio/visual intercultural online discussion with German-speaking students at the University of Kiel.
Prerequisite: GERM 210.

GERM 325 (3) German Translation
Theory, methodology, and practice of translation from German into English.
Prerequisite: GERM 210.

GERM 339 (3/6) d Third-Year Honours Tutorial

GERM 360 (3) Heaven and Earth: Studies in German Culture and Literature before 1700
Masterpieces and major trends of the German literature of the Middle Ages, Renaissance and Baroque against the larger background of the political and social developments of the period.

GERM 370 (3) Reason and Revolution: Studies in the 18th Century
Masterpieces and major trends of eighteenth-century German literature against the larger background of the political and social developments of the period.

GERM 380 (3) Tradition and Change: Studies in the 19th Century
Masterpieces and major trends of nineteenth-century German literature against the larger background of the political and social developments of the period.

GERM 390 (3) Progress and Disaster: Studies in the 20th and 21st Centuries
Masterpieces and major trends of 20th and 21st-century German literature against the larger background of the political and social developments of the period.

GERM 400 (3) Advanced German I
Near-native competence and thorough understanding of critical contemporary topics in a limited number of areas fostering study skills. All skills will be fostered but the course focuses on accurate writing and conversation in particular.
Prerequisite: GERM 310.

GERM 401 (3) The Cult of the Hero and its Parody in German Literature
The glorification and satirization of heroes and heroism in a variety of genres and periods. Works and authors to be studied might include Nibelungenlied, Faust, Gryphius, Kleist, Fontane, Brecht, Remarque.

GERM 402 (3) Words and Music in German Literature (in English)
Study of individual works and genres in which words and music together form a whole. Possible topics include the Lutheran
Hymn, the Volkslied, the Romantic Lied and Brecht songs, operas by Mozart, Wagner and Strauss, and music and the musician as a subject in literature. No musical training is necessary to take this course.

**GERM 403 (3/6) d Studies in Modern German Culture (in English)**
Topics of special interest, varying from year to year.

**GERM 405 (3) The Literature of Growing Social Consciousness**
Concentrates on the late 18th to the early 20th century. This course traces the reflections in German literature of changes in social, political, cultural and gender concepts. Readings are drawn from a variety of genres.

**GERM 406 (3/6) d Selected Topics in German Literature**
A study in depth of one topic of special interest, varying from year to year depending on interests of faculty and students. Possible topics: literature and film, the image of the outside world in German literature, individualism and conformism.

**GERM 407 (3) The German Lyric from Goethe to the Present**
Reading and discussion of selected texts against their cultural, social and political background.

**GERM 408 (3) Selected Issues in German Culture**
In depth study of one topic from German cultural history, varying from year to year. Possible topics: Germany of the New Europe; Gender and nation in German culture; topics from theory, such as the Frankfurt School.

**GERM 409 (3) Special Topics in German Cinema (in English)**
Themes, traditions and techniques specific to German cinema.

**GERM 410 (3) Advanced German II**
Development of capabilities to deal with a variety of authentic texts from and about Germany, Austria and Switzerland; fostering of communicative skills, cross-cultural analysis and critical thinking; effective and accurate communication in both spoken and written German.

**Prerequisite:** GERM 400.

**GERM 411 (3) Major Controversies in German Culture (in English)**
Selected debates and controversies in the German-speaking countries.

**GERM 412 (3) German Media Studies (in English)**
Major themes and methods in German media studies.

**GERM 414 (3) Business German**
Review of the most important grammatical patterns in application to business geography, import-export trade, marketing, finance, accounting, taxation, workplace conditions and requirements; oral and written forms of presentation for work with German business. Formerly GERM 314.

**Prerequisite:** GERM 300 or equivalent.

**GERM 420 (3) Advanced German III**
Near-native competence and an advanced and transferable understanding of contemporary issues.

**Prerequisite:** GERM 420.

**GERM 426 (3) German Representations of the Holocaust (in English)**
The German Nazi Holocaust in German literature and film.

**Prerequisite:** Third Year Standing or permission of instructor.

**GERM 430 (3) Advanced German IV**
Near-native competence and an advanced and transferable understanding of contemporary issues, intercultural comparisons and analyses in a variety of fields using German as the focus and means of communication.

**Prerequisite:** GERM 400.

**GERM 433 (3) German for Reading Knowledge I**
A multimedia introduction to reading skills in German leading to a second year reading knowledge in just one term. Students are expected to work largely independently. Course restricted to beginners or to students with no more than one term of beginner's German (or equivalent).

**GERM 434 (3) German for Reading Knowledge II (Languages for special purposes)**
Multimedia teaching of reading skills in German for special purposes. Students are expected to work largely independently. Focuses on specific topics of the student's choice in the humanities, the natural sciences, economics/business and music and enhances skills in technical reading.

**Prerequisite:** GERM 433 or no more than one year of beginner's German.
GERM 439 (3/6) d Fourth-Year Honours Seminar

GERM 449 (6) Honours Essay

GERM 500 (3/6) d German Studies Research Methods
   This course is not eligible for Credit/D/Fail grading.

GERM 501 (3/6) c Literary Theories
   This course is taught in English. This course is not eligible for Credit/D/Fail grading.

GERM 505 (3) The Acquisition of German as an Additional Language
   Foundations, methods, and findings of second-language acquisition research in the field of German as an additional language. Taught in German. An introductory 6-credit course in linguistics is recommended as preparation for this course. This course is not eligible for Credit/D/Fail grading.

GERM 506 (3/6) d Intercultural Competence
   This course is taught in English. This course is not eligible for Credit/D/Fail grading.

GERM 510 (3) German Literary History
   This course is not eligible for Credit/D/Fail grading.

GERM 511 (3/6) d Studies in Medieval Literature
   This course is not eligible for Credit/D/Fail grading.

GERM 512 (3/6) d Studies in Renaissance Literature
   This course is not eligible for Credit/D/Fail grading.

GERM 513 (3/6) d Studies in Baroque Literature
   This course is not eligible for Credit/D/Fail grading.

GERM 514 (3/6) d Studies in the Literature of the 18th Century
   This course is not eligible for Credit/D/Fail grading.

GERM 515 (3/6) d Studies in the Classical Period
   This course is not eligible for Credit/D/Fail grading.

GERM 516 (3/6) d Studies in Romanticism
   This course is not eligible for Credit/D/Fail grading.

GERM 517 (3/6) d Studies in the Literature of the 19th Century
   This course is not eligible for Credit/D/Fail grading.

GERM 518 (3/6) d Studies in Expressionism
   This course is not eligible for Credit/D/Fail grading.

GERM 519 (3/6) d Studies in the Literature of the Early 20th Century
   This course is not eligible for Credit/D/Fail grading.

GERM 520 (3/6) d Studies in Literature after 1945
   This course is not eligible for Credit/D/Fail grading.

GERM 521 (3) German Cultural Studies
   This course is taught in English. This course is not eligible for Credit/D/Fail grading.

GERM 522 (3) Topics in Media Studies
   This course is taught in English. This course is not eligible for Credit/D/Fail grading.

GERM 531 (3/6) d Special Topics
   This course is taught in English. This course is not eligible for Credit/D/Fail grading.

GERM 532 (3/6) d Genre Studies
   This course is not eligible for Credit/D/Fail grading.

GERM 547 (3/6) c Guided Research
   This course is not eligible for Credit/D/Fail grading.

GERM 548 (3) Major Essay
   This course is not eligible for Credit/D/Fail grading.
Faculty of Arts

GPP: Global Public Policy

GPP 501 (3) Microeconomic Analysis for Public Policy
Basics of supply and demand; fundamentals of decision making by consumers, households and firms; market structure and sources of market failure that necessitate policy interventions. This course is not eligible for Credit/D/Fail grading.

GPP 502 (3) International Macroeconomics
Introduces challenges of an interlinked global economy through modern macroeconomics. International linkages through labor, capital and goods markets, monetary and fiscal policy linkages, currency and debt crises. Theory and real-world applications. This course is not eligible for Credit/D/Fail grading.

GPP 503 (3) Measurement and Data Analysis for Policy
Fundamental quantitative tools for policy analysis and program evaluation, including measurement, data visualization, and regression analysis. Introduction of skills for the design and implementation of quantitative policy analysis. This course is not eligible for Credit/D/Fail grading.

GPP 504 (3) Policy Analysis and Evaluation
Fundamentals of policy analysis and program evaluation for a professional context. Standard tools of policy analysis, risk assessment, and evaluation to design policy interventions and implement monitoring and evaluation systems for effectiveness. Case studies for government, international organizations, and NGOs. This course is not eligible for Credit/D/Fail grading.

GPP 505 (3) Domestic and Global Policy Process
Theories and frameworks related to policy-making processes at domestic and global level. Agenda setting, policy formulation, decision-making, policy implementation, and policy evaluation. This course is not eligible for Credit/D/Fail grading.

GPP 506 (3) Public Management
Governmental implementation and delivery of public policy. Variations in international practice, the growing interdependence of governments, firms and non-government organizations. Complexities of multi-level governance including control and accountability of governments. This course is not eligible for Credit/D/Fail grading.

GPP 507 (3) Environmental Law and Policy Frameworks
Environmental law and policy creation, implementation, and enforcement at the international, national, and sub-national levels. Evolution of environmental law and policy, legal institutions, and major areas of law relating to ecological sustainability. This course is not eligible for Credit/D/Fail grading.

GPP 508 (3) Philosophical and Ethical Foundations for Public Policy
Inter-cultural communication skills, entrepreneurship, and effective community engagement in policy work. This course is not eligible for Credit/D/Fail grading.

GPP 509 (3) Communicating Policy
The role of media, especially new media, in effectively communicating policy to stakeholders, including issues of transparency and accountability. Focus on communications formats including written, oral, and multimedia policy communications. This course is not eligible for Credit/D/Fail grading.

GPP 520 (3) Economics of Poverty
Micro-scale processes of development, including the challenges posed by persistent poverty, and ground-level development solutions. Measurement and empirical evaluation of development interventions and outcomes. This course is not eligible for Credit/D/Fail grading.

GPP 521 (3) Development and Institutions
Introduction to macro-level long-term development processes by which societies improve their standards of living. Development theories, historical drivers; present debates; when and how public policies can best enable economic development. This course is not eligible for Credit/D/Fail grading.

GPP 522 (3) Development Discourses and Practices
The meaning of development and micro/macro aspects of policy planning and implementation for development. The rise of development thought; assessment of the outcomes of development for different countries and communities. This course is not eligible for Credit/D/Fail grading.

GPP 523 (3) Economic Change and Reforms in Asia
Trajectories and current puzzles in East Asian political economy in Japan, Korea, China, and South East Asia. Political economic institutions, dynamics and sustainability; integration of China and India into the world economy. This course is not eligible for Credit/D/Fail grading.

GPP 524 (3) Legal Change and Sustainability Challenges in Asia
Impact of legal reform efforts on political, socio-economic and cultural change in selected economies of Asia. Relationships between changes in legal institutions, doctrines, and processes. Addressing sustainability challenges in human, natural and built environment. This course is not eligible for Credit/D/Fail grading.

GPP 525 (3) Social Policy Responses to Rapid Development
Prevalent social issues in Asia. Policy responses in Asian countries have been formulated in education, housing, welfare, and public health in response to the social dislocation that accompanies rapid development. This course is not eligible for Credit/D/Fail grading.

GPP 526 (3) Challenges of Urbanization
Spatial development, housing, infrastructure and local environments and the administrative and regulatory implications of urbanization. Interactions between bio-physical requisites of urbanization and structures and processes of governance which shape their provision. This course is not eligible for Credit/D/Fail grading.

GPP 527 (3) Corporate Social Responsibility
Policy debates surrounding Corporate Social Responsibility including: voluntary regulation initiatives; responsibility to stakeholders in global supply chains; public-private partnerships; socially responsible investing; transparency; and protection of human rights. This course is not eligible for Credit/D/Fail grading.

GPP 540 (3) Tools and Techniques for Sustainability Assessment
Environmental and socio-economic outcomes of projects and policies including: systems modeling and dynamics; life-cycle and risk assessment; cost-benefit and decision analysis; valuation of ecosystem services; and critical appraisals of socio-economic valuation approaches that form the basis of policy assessments. This course is not eligible for Credit/D/Fail grading.

GPP 541 (3) Policy Dimensions of Energy Systems
Energy sources, markets, and impacts critical to energy policy, including oil, natural gas and coal markets; electricity and utilities policy; local and global environmental impacts; renewable energy; nuclear power and security; energy efficiency; technological innovation; and energy poverty. This course is not eligible for Credit/D/Fail grading.

GPP 542 (3) Science, Technology, and Public Policy
Role and influence of science and technology in society, and its relationship to public policy development including: history and economics of technological change. This course is not eligible for Credit/D/Fail grading.

GPP 543 (3) Sustainable Water Systems
Valuing, managing and sustaining water systems for agriculture, industry, the built environment, recreation and ecosystems including: service delivery, government intervention and policy responses; interrelationship between water and sanitation, resource recovery, and relationships between water systems and human development. This course is not eligible for Credit/D/Fail grading.

GPP 544 (3) Economic Foundations of Environmental Policies
Environmental and natural resource economics: externalities, property rights, public goods, market failure, inter-generational trade-offs, and optimal extraction of biological and depletable resources. Environmental regulation, industrial competitiveness, and distribution of income and welfare. This course is not eligible for Credit/D/Fail grading.

GPP 545 (3) Ecology for Policy
Ecological systems for diverse policy contexts including: health, agriculture, water, resource management, tourism, spatial planning, and conservation. Innovative progress from policies and policy frameworks that better reflect ecological dynamics, and the design of appropriate policy and governance response. This course is not eligible for Credit/D/Fail grading.

GPP 560 (3) Global Governance: Frameworks and Policy Debates
Policy-making at the global level, including theories and frameworks of global coordination and global governance. Global, regional, and sub-regional mechanisms. Trade, finance, climate, food regulation, developmental norms, and security. This course is not eligible for Credit/D/Fail grading.
GPP 561 (3) Impact of Globalization on Societies
Definitions of globalization and overview globalization theories; specific causes, effects, and responses of globalization in various Asian countries. Globalization in its political, social, and economic dimensions in migration and norm diffusion. This course is not eligible for Credit/D/Fail grading.

GPP 562 (3) Resource Governance, Environment and Human Security
International policy processes associated with themes of environmental security: disaster prevention; resource curse; institution building and conflict minerals and global expropriation. Issues to be considered include human rights advocacy and peacekeeping, food security and food sovereignty. This course is not eligible for Credit/D/Fail grading.

GPP 563 (3) Asia Pacific Human Migration and Social Change
Key concepts and theories of migration and social change. The role of the nation state and regulatory systems considering international institutions relevant to migration as concerns Asian demography and migration; connections between Asia and the Pacific Rim. This course is not eligible for Credit/D/Fail grading.

GPP 564 (3) Security Challenges for Asian States and People
Asian state policies on security threats that impact their national and human security including: civil-military relations, intrastate conflict, transnational crime, spread of disease, and environmental and natural disasters, geo-political power shift, defence modernization, resurgent nationalism, and historical legacies. This course is not eligible for Credit/D/Fail grading.

GPP 565 (3) Nationalism, Religion, and Ethnic Conflict in Asia
Ethnic and religious conflict in Asia related to historical and dialectic development of different forms of nationalism; the confluence between religion, ethnicity, and nationalist ideologies in the escalation of conflicts in different Asian societies. This course is not eligible for Credit/D/Fail grading.

GPP 566 (3) Asia Diplomacy and International Relations
Comprehensive and systematic assessments and analyses of political dynamics, policy behaviors, and diplomatic interactions of Asian countries. Major diplomatic issues, cross-cutting diplomatic challenges, and opportunities facing countries in the region. This course is not eligible for Credit/D/Fail grading.

GPP 567 (3) Human Rights and Justice
Linkages between human rights, development and justice and the policy interventions which flow from them. Human rights policy including: international organizations, national actors, non-governmental organizations and communities. This course is not eligible for Credit/D/Fail grading.

GPP 580 (3) Internet and Global Affairs
The impact of Internet on policy and global affairs structural changes to: economy with reduced transaction costs; media through new publishing forms; politics through new structures for collective action; law through limits of privacy and confidentiality; governance through e-government. This course is not eligible for Credit/D/Fail grading.

GPP 581 (3) Behavioural Foundations for Public Policy
Basic concepts in social and cognitive psychology, judgment and decision-making and behavioral economics in shaping policy formation and implementation. Application of experimental findings and concepts emanating from behavioral research to the design and implementation of policy. This course is not eligible for Credit/D/Fail grading.

GPP 582 (3) Public Engagement in Policy Decisions
Public engagement in policy-making processes including: stakeholder engagement in diverse sustainability policy debates; outcomes and how they influence policy; best practices and lessons learned in North America and Europe. This course is not eligible for Credit/D/Fail grading.

GPP 583 (3) Food Security
Global food security challenges including: biophysical, economic, nutritional, socio-political, and institutional aspects. Geography of agricultural production, role of price and supply shocks, causes of malnutrition, and environmental impacts. This course is not eligible for Credit/D/Fail grading.

GPP 584 (3) Policy Responses to Global Climate Change
Climate science and impacts including: carbon management options; mitigation and energy system changes; efficiency options; "end-of-pipe" solutions; vulnerability and adaptation to climate change; carbon economics and organization-level strategies in a carbon-constrained world. This course is not eligible for Credit/D/Fail grading.

GPP 590 (1-6) d Global Policy Project
Professional team-based project that incorporates training, feedback on project proposals, possible field work, engagement with client organizations, data gathering and analysis, and a major deliverable such as a policy report. This course is not eligible for
Credit/D/Fail grading.

GPP 591 (1-9) d Special Topics in Public Policy
Offerings respond to current policy debates, topics of emerging interest, availability of visiting scholars, and interest in non-traditional courses incorporating practitioner expertise, interest in particular disciplinary perspectives missing from core courses and electives, and interest in specific regions or countries. This course is not eligible for Credit/D/Fail grading.

Classical, Near Eastern and Religious Studies, Faculty of Arts

GREK: Greek

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

GREK 101 (3) First-Year Ancient Greek I
An introduction to Classical and Hellenistic Greek, Part I.

GREK 102 (3) First-Year Ancient Greek II
An introduction to Classical and Hellenistic Greek, Part II.
Prerequisite: GREK 101.

GREK 201 (3) Second-Year Ancient Greek I
Completion of the grammatical foundations of Ancient Greek, Part I.
Prerequisite: One of GREK 102, GREK 100.

GREK 202 (3) Second-Year Ancient Greek II
Completion of the grammatical foundations of Ancient Greek, Part II; introduction to the reading of unadapted passages of Greek literature.
Prerequisite: GREK 201.

GREK 351 (3) Intermediate Ancient Greek: Prose
Readings in the major authors in Greek Prose.
Prerequisite: One of GREK 202, GREK 200.

GREK 352 (3) Intermediate Ancient Greek: Verse
Readings in the major authors in Greek Verse.
Prerequisite: One of GREK 202, GREK 200.

GREK 401 (3-12) c Greek Prose
Studies in history, philosophy and/or oratory. It is recommended that the corequisite course be completed prior to GREK 401. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of GREK 301, GREK 351, GREK 352.

GREK 402 (3-12) c Greek Verse
Studies in epic, tragedy and/or comedy. It is recommended that the corequisite course be completed prior to GREK 402. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of GREK 301, GREK 351, GREK 352.

GREK 501 (3/6) c Greek Prose
History, philosophy and/or oratory. Credit will not be given for both GREK 401 and GREK 501. This course is not eligible for Credit/D/Fail grading.

GREK 502 (3/6) c Greek Verse
Epic, tragedy and/or comedy. Credit will not be given for both GREK 402 and GREK 502. This course is not eligible for Credit/D/Fail grading.

GREK 525 (3/6) d Seminar in Greek Literature
This course is not eligible for Credit/D/Fail grading.

GREK 535 (3/6) d Seminar in Greek History
This course is not eligible for Credit/D/Fail grading.

GREK 540 (3/6) d Seminar in Greek Palaeography
This course is not eligible for Credit/D/Fail grading.

**GREK 545 (3/6) d Seminar in Greek Epigraphy**
This course is not eligible for Credit/D/Fail grading.

**GREK 550 (3/6) c Directed Studies**
This course is not eligible for Credit/D/Fail grading.

**GREK 649 (0) Doctoral Dissertation**

### Faculty of Land and Food Systems

**GRS: Global Resource Systems**

**GRS 290 (2) Global Issues in Cultural Context**
Students interact face-to-face and on-line as a community of learners to discuss global issues in agriculture, food, and natural resources in cultural context. Typically taken prior to studying abroad. [0-0-2; 0-0-2]

*Prerequisite:* Open only to students in the B.Sc. (GRS) program.

**GRS 300 (3) Global Water and Energy Nexus**
Energy water nexus for sustaining ecological goods and services, and food security; significance in global resource systems.

*Prerequisite:* One of CHEM 111, CHEM 121, and one of BIOL 112, BIOL 121, BIOL 140.

**GRS 390 (2) Global Issues in Cultural Context**
Students interact face-to-face and on-line as a community of learners to discuss global issues in agriculture, food, and natural resources in cultural context. Typically taken while studying abroad. [0-0-2]

*Prerequisite:* GRS 290.

**GRS 397 (2-6) c Regional Directed Field Studies**
Participating students may be assessed a fee.

### Gender, Race, Sexuality and Social Justice, Faculty of Arts

**GRSJ: Gender, Race, Sexuality and Social Justice**

**GRSJ 101 (3) Introduction to Social Justice**
An overview of intersectional feminist debates and theoretical traditions. Credit will be granted for only one of WMST 100 or GRSJ 101.

**GRSJ 102 (3) Global Issues in Social Justice**
Intersectional feminist theory and practice, focusing on contemporary issues in a transnational context. Credit will be granted for only one of WMST 100 or GRSJ 102.

**GRSJ 200 (3) Gender and Environmental Justice**
An interdisciplinary and cross-cultural overview of contemporary environmental issues, as they relate to gender equality and social justice challenges and initiatives that respond to ecological crises.

*Prerequisite:* GRSJ 101.

**GRSJ 201 (4) Connecting with Computer Science**
Fundamentals of computer science and their connections with the arts, psychology, and biology. Historical, cultural, and gender perspectives of important contributions to the field will be discussed. No prior computing background required.

*Equivalency:* CPSC 101.
GRSJ 205 (3) Gender, Race and Colonialism in Canada
The historical foundations of colonialisms in Canada from just prior to the establishment of New France to the end of World War One.

GRSJ 210 (3) Gender, Race and Colonialism in the Americas
Interdisciplinary exploration of the ways gender, class, sexuality and race shape modern histories in Canada, and transnationally, from 1920 to the present.

GRSJ 224 (3/6) d Gender, Race, Sexuality, and Social Justice in Literature
Techniques of literary study, with emphasis on intersectionality and the ways in which gender is represented in literature and contributions of feminism and gender studies to literary studies.

GRSJ 230 (3) Gender, Race, Sexuality, and Representation in Modern Asia
The complex relationships between mechanisms of power, gender, and representation in Asia in different spaces examined through an interdisciplinary lens.

GRSJ 235 (3) Gender, Race, Sexuality, and Social Structures in Modern Asia
Situates "Asia" in a global context and explores the complex relationships between gender, social structures, and social change.

GRSJ 300 (3) Intersectional Approaches to Thinking Gender
Interdisciplinary exploration of the multiple intersections between gender and (neo)colonialism, racism, poverty, ableism, and heterosexism in a globalized world; historical and cross-cultural aspects, and the social construction of sex and gender, masculinities and femininities.

GRSJ 301 (3) Gender, Race and Indigeneity in Canada
Gender and indigeneity in the documented histories and narrated lives of Indigenous people in Canada.
Prerequisite: All of GRSJ 101, GRSJ 102 or third-year standing.

GRSJ 302 (3) Pedagogies of Social Justice
The intersections of gender, education, and work using sociological and economic frameworks.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 303 (3) Gender, Race, Social Justice and the Law
A survey of feminist legal thought and recent developments in feminism and law, with a focus on Canada.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 305 (3) Social Justice Issues in Community and International Organizing
Critical examination and practical applications of concepts, theories, methods, and strategies of gender-aware organizing at the community and international levels.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 306 (3) Globalization and Social Justice: Gender, Race, and Sexuality in International Politics
Critical examination of the gender dimension of globalization and the theories, discourse, and practices in international politics using gender analysis.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 307 (3) Gender, Race, Sexuality, and Popular Culture
Critical examination of mainstream and alternative media images of gender, race, and sexuality in the context of networked social media, film, music, and television.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 310 (3) Gender, Race, Social Justice and Health
Interdisciplinary introduction to gender and health issues using selected theoretical frameworks.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 311 (3) African/Black Women in the Americas
An interdisciplinary survey of gender studies and histories of African/Black women in the Americas from the beginning of the slave trade to the present.
Prerequisite: Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

GRSJ 315 (3) Critical Racial Theories
Critical theories of racial and cultural difference. Initial formulations of theses against "scientific racism" and their later transformation by historical, social, and global-historical accounts of racial subjugation.

GRSJ 316 (3) Queer and Trans of Colour Theorizing
The intellectual and political interventions of queer of colour theorizing in the gender and sexual politics of racial and imperial projects, including its engagements with women of colour feminisms, settler colonial and indigenous studies, and immigration and diaspora studies.

**GRSJ 320 (3) Feminist Anti-Racist Pedagogies**
Feminist pedagogies and feminist debates about pedagogy in formal, nonformal, and informal educational settings.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 325 (3) Anti-colonial and Feminist Qualitative Methodologies**
Data collection techniques, the politics of interpretation, and the formulation of a research proposal using a feminist, anti-racist framework.  
*Prerequisite:* All of GRSJ 101, GRSJ 102 or third-year standing.

**GRSJ 326 (3) The Politics of Gender, Families, and Nation-Building**
Investigation of historical and contemporary scholarship on the diversity of families, focusing on differences of gender, sexuality, race/ethnicity, and social class within and across national borders.  
*Prerequisite:* All of GRSJ 101, GRSJ 102 or third-year standing.

**GRSJ 327 (3) Theories of Representation and Difference**
Feminist scholarship emphasizing languages and processes of representation and the construction of difference in cultural discourses and institutions.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 328 (3) Theories of Subjectivity**
How feminist scholarship has shaped and reinterpreted accounts of the subject, drawing on such traditions as structuralism, poststructuralism, psychoanalysis, postcolonialism, postmodernism, and Queer Theory.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 401 (3) Body, Gender and Society**
An interdisciplinary examination of the body, exploring how social relations and space are implicated in the constitution and experience of gendered bodies and identities, with an emphasis on feminist analyses of body-societal relations.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 410 (3) Religious Feminism**
Examines religious feminism from three Abrahamic traditions. An in-depth study of challenges various doctrinal discourses and practices pose for feminist projects.  
*Prerequisite:* All of GRSJ 101, GRSJ 102.

**GRSJ 415 (3) Critical Racial and Anti-Colonial Feminist Approaches**
Critical anti-colonial and feminist analyses of colonial and racial subjugation, as well as the many modalities of indigenous and minority resistance.

**GRSJ 422 (3) Advanced Research Seminar**
Critical theories, methodologies, ethics and practices appropriate for advanced feminist research.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 425 (3/12) c Special Topics in Gender, Race, and Sexuality**
Examination in depth of selected topics in gender, race, and sexuality. Consult the Student Service Centre course schedule for course offerings. May be repeated for credit.  
*Prerequisite:* Either (a) all of GRSJ 101, GRSJ 102 or (b) all of WMST 101, WMST 102 or third-year standing.

**GRSJ 450 (3/6) c Directed Studies**
General reading and/or a research undertaking, with the agreement, and under supervision of, a faculty member selected by the student and approved by the GRSJ Undergraduate Advisor. A written paper or equivalent will be required. Open to GRSJ majors or minors.

**GRSJ 480 (3/6) d Decolonizing Praxis: A Practicum in Social Justice**
Connects feminist and critical race theory and practice through placement in a community organization. As is the case with all UBC practice-related courses, this course requires a Criminal Record Check. Open to GRSJ Majors or Minors. This course is graded Pass/Fail. This course is not eligible for Credit/D/Fail grading.  
*Prerequisite:* Either (a) two of GRSJ 325, GRSJ 326, GRSJ 327, GRSJ 328 or (b) two of WMST 325, WMST 326, WMST 327, WMST 328. Consult the department.

**GRSJ 500 (3) Intersectional Issues in Social Justice and Equality Studies**
This course is not eligible for Credit/D/Fail grading.

GRSJ 501 (3) Issues in Decolonizing and Feminist Methodologies
This course is not eligible for Credit/D/Fail grading.

GRSJ 502 (3) Issues in Gender, Sexuality, and Critical Race Theories
This course is not eligible for Credit/D/Fail grading.

GRSJ 503 (3-9) d Special Topics in Feminist Studies
This course is not eligible for Credit/D/Fail grading.

GRSJ 504 (3-6) c Decolonizing Praxis for Social Justice and Equality Studies: A Practicum
This course is not eligible for Credit/D/Fail grading.

GRSJ 505 (1-6) c Directed Reading in Advanced Feminist Studies
This course is not eligible for Credit/D/Fail grading.

GRSJ 506 (3) Gender, Islam, Modernity, and the West
This course is not eligible for Credit/D/Fail grading.

GRSJ 510 (3) Extended Essay
This course is not eligible for Credit/D/Fail grading.

GRSJ 520 (6-9) c M.A. Thesis
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

GRSJ 606 (0) Doctoral Dissertation
Pass/Fail.

Faculty of Science

GSAT: Genome Science and Technology

GSAT 501 (3) Intensive Laboratory Course
Theory, application, and operation of instrumentation employed in modern genomics research: data analysis. This course is not eligible for Credit/D/Fail grading.

GSAT 502 (3) Advanced Concepts in Genome Science and Technology
Current approaches to high-throughput, system-wide analysis, and manipulation of biological systems. This course is not eligible for Credit/D/Fail grading.

GSAT 503 (3) Directed Studies in Genome Science and Technology
Advanced study under the direction of a faculty member composed of laboratory sessions and/or directed readings related to selected areas of genome science and technology. This course is not eligible for Credit/D/Fail grading.

GSAT 540 (1-3) d Statistical Methods for High Dimensional Biology
This course is not eligible for Credit/D/Fail grading. Equivalency: STAT 540, BIOF 540.

GSAT 599 (18) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

GSAT 699 (0) Doctoral Dissertation

Classical, Near Eastern and Religious Studies, Faculty of Arts

HEBR: Hebrew

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

HEBR 101 (3) Elementary Biblical Hebrew Part I
Introduction to Biblical Hebrew grammar. Includes translation of prose and poetry from the Hebrew Bible.
HEBR 102 (3) Elementary Biblical Hebrew Part II
A continuation of HEBR 101: Introduction to Biblical Hebrew grammar. Includes translation of prose and poetry from the Hebrew Bible.
Prerequisite: HEBR 101.

HEBR 201 (3) Intermediate Biblical Hebrew I
The second year of Biblical Hebrew with emphasis on rapid reading of poetry and prose along with grammar.
Prerequisite: HEBR 102.

HEBR 202 (3) Intermediate Biblical Hebrew II
The second year of Biblical Hebrew with emphasis on rapid reading of poetry and prose along with grammar.
Prerequisite: HEBR 201.

HEBR 479 (3/12) c Supervised Study in Classical Hebrew
This course is not eligible for Credit/D/Fail grading. Prerequisite: HEBR 405.

HEBR 509 (3/12) c Advanced Readings in Classical Hebrew
Credit will not be given for both HEBR 479 and HEBR 509. This course is not eligible for Credit/D/Fail grading.

Faculty of Arts

HESO: Health and Society

HESO 400 (3/6) d Sociocultural Determinants of Health
Methods for analyzing population health data and medical research reporting.

HESO 449 (3/6) d Topics in Health and Society

Faculty of Forestry

HGSE: Haida Gwaii Semesters

HGSE 310 (3) First Nations and Canada: (Re)writing History
A survey of the history of Indigenous peoples in relation to the Canadian colonial state contrasting the Indigenous historical experience with conventional accounts of Canadian history.
Corequisite: All of HGSE 311, HGSE 312, HGSE 313, HGSE 314.

HGSE 311 (3) Law and Governance: Indigenous and European Traditions
Background on sources of Aboriginal and Canadian law; detail on section 35 of the Constitution Act; a review of relevant Canadian case law; insight on the importance of international law; and literature on governance.
Corequisite: All of HGSE 310, HGSE 312, HGSE 313, HGSE 314.

HGSE 312 (3) Perspectives on Reconciliation
Notions of reconciliation and restitution that have emerged in Canada across space and time; key principles, discourses, legal and Constitutional mechanisms, actions and actors.
Corequisite: All of HGSE 310, HGSE 311, HGSE 313, HGSE 314.

HGSE 313 (3) Reconciliation and Resource Management
Relationships and reconciliation processes between First Nations and other governments in the context of land and sea governance.
Corequisite: All of HGSE 310, HGSE 311, HGSE 312, HGSE 314.

HGSE 314 (3) Reconciliation and Communities
In-depth exploration of the communities of Haida Gwaii through community-based experiences and community service learning.
Corequisite: All of HGSE 310, HGSE 311, HGSE 312, HGSE 313.

HGSE 350 (3) Case Studies in Haida Gwaii
Integration of concepts of history, politics, First Nations, rural development, and forest ecology in natural resources management in Haida Gwaii. A core element of the Haida Gwaii Semester.

HGSE 351 (3) History and Politics of Resource Management
Historical examination of resource management in Canada and conflicts arising therefrom, with emphasis on forests. A core element of the Haida Gwaii Semester.

Corequisite: All of HGSE 350, HGSE 352, HGSE 353, HGSE 354.

HGSE 352 (3) First Nations Governance and Natural Resource Management
The political, economic, and legal environment of Aboriginal-Canadian relations and its influence on resource use and management; review of historic relationships, emerging case law, and new reconciliation frameworks. A core element of the Haida Gwaii Semester.

Corequisite: All of HGSE 350, HGSE 351, HGSE 353, HGSE 354.

HGSE 353 (3) Rainforest Ecology and Management

Corequisite: All of HGSE 350, HGSE 351, HGSE 352, HGSE 354.

HGSE 354 (3) Diversifying Resource-Dependent Communities
Examination of the forces that restructure local economies, both historically and contemporarily; link between rural economic development and the legacy of resource development in Aboriginal communities across British Columbia. A core element of the Haida Gwaii Semester.

Corequisite: All of HGSE 350, HGSE 351, HGSE 352, HGSE 353.

HGSE 355 (3) Applied Ecology of Coastal Terrestrial Ecosystems
Processes that shape coastal terrestrial ecosystems through time and applications to current ecological reality. Part of the Haida Gwaii Fall Semester.

Prerequisite: Third-year standing.

Corequisite: All of HGSE 356, HGSE 357, HGSE 358, HGSE 359.

HGSE 356 (3) Biophysical Dynamics of the Marine-Terrestrial Interface
Nutrient cycling between the marine environment and coastal forest ecosystems; how the physical characteristics of this interface affect inputs; which species play a pivotal role in driving interactions. Part of the Haida Gwaii Fall Semester.

Prerequisite: Third-year standing.

Corequisite: All of HGSE 355, HGSE 357, HGSE 358, HGSE 359.

HGSE 357 (3) Ecology and Management of Island Wildlife
Unique biological attributes of island wildlife, such as subspecies, isolated populations, and distinct evolutionary pathways, with a focus on endemic species on Haida Gwaii. Part of the Haida Gwaii Fall Semester. Credit will be granted for only one of FRST 395 or HGSE 357.

Prerequisite: Third-year standing.

Corequisite: All of HGSE 355, HGSE 356, HGSE 358, HGSE 359.

HGSE 358 (3) Systems Thinking for Resource Management
Introduction to systems thinking and resilience to understand dynamics of social change and innovation; use of case studies to demonstrate applications of different types of ecological knowledge, including traditional knowledge and experiential knowledge. Part of the Haida Gwaii Fall Semester.

Prerequisite: Third-year standing.

Corequisite: All of HGSE 355, HGSE 356, HGSE 357, HGSE 359.

HGSE 359 (3) Ecosystem-Based Management Seminar
History, definitions, and applications of EBM; challenges of achieving both economic and environmental well-being with a focus on resource use and management on Haida Gwaii. Part of the Haida Gwaii Fall Semester.

Prerequisite: Third-year standing.

Corequisite: All of HGSE 355, HGSE 356, HGSE 357, HGSE 358.

Asian Studies, Faculty of Arts

HINU: Hindi-Urdu

HINU 100 (3) Introductory Hindi-Urdu I
Spoken Hindi and Urdu, and written Hindi. Credit will be granted for only one of HINU 100 or 102.

HINU 101 (3) Introductory Hindi-Urdu II
Continuation of HINU 100. Credit will be granted for only one of HINU 101 or 102.
Prerequisite: HINU 100.

HINU 102 (6) Introductory Hindi-Urdu
Spoken Hindi and Urdu, and written Hindi. As of 2011W, credit will be granted for only one of HINU 100/101 or HINU 102.

HINU 200 (6) Intermediate Hindi-Urdu
Conversation and grammar; an introduction to Hindi literature; an introduction to the Urdu script. As of 2011W, credit will be granted for only one of HINU 201/202 or HINU 200.
Prerequisite: One of HINU 101, HINU 102.

HINU 201 (3) Intermediate Hindi-Urdu I
Conversation and grammar; an introduction to Hindi literature; an introduction to the Urdu script. Credit will be granted for only one of HINU 200 or 201.
Prerequisite: HINU 101.

HINU 202 (3) Intermediate Hindi-Urdu II
Continuation of HINU 201. Credit will be granted for only one of HINU 200 or 202.
Prerequisite: HINU 201.

HINU 205 (1) Introduction to the Devanagari Script
The writing system of Hindi for those with some background in the spoken language. May be taken at the same time as HINU 200.

HINU 300 (6) Advanced Hindi-Urdu
Further study of the grammar of Hindi and Urdu; advanced conversation; literary readings in Hindi and Urdu; Hindi film. As of 2011W, credit will be granted for only one of HINU 301/302 or HINU 300.
Prerequisite: One of HINU 200, HINU 202.

HINU 301 (3) Advanced Hindi-Urdu I
Further study of the grammar of Hindi and Urdu; advanced conversation; literary readings in Hindi and Urdu; Hindi film. Credit will be granted for only one of HINU 301 or HINU 300.
Prerequisite: HINU 202.

HINU 302 (3) Advanced Hindi-Urdu II
Continuation of HINU 301. Credit will be granted for only one of HINU 302 or HINU 300.
Prerequisite: HINU 301.

HINU 305 (2) Introduction to the Perso-Arabic (Urdu) Script
The writing system of Urdu for those with some background in the spoken language.
Corequisite: One of HINU 300, HINU 400.

HINU 400 (6) Introduction to Hindi and Urdu Literature
Readings of various literary genres in Hindi, Urdu and their medieval equivalents. Modern fiction from India and Pakistan; the Urdu ghazal; medieval Hindi bhakti poetry; readings from the Adi Granth of the Sikhs Hindi film. Discussion in Hindi-Urdu of all materials.
Prerequisite: HINU 300.

HINU 450 (3) Hindi Film
Regional, religious, and historical dialects of Hindi and Urdu as represented in films.
Prerequisite: HINU 200. Or fluency in Hindi.

History, Faculty of Arts

HIST: History

HIST 101 (6) World History to Oceanic Contact
Origins and diffusion of the world's great religions; cultural contact along overland trade routes; emergence of civilizations such as the Inca, Chinese, and Christian European; ordering of societies and their political development.

HIST 102 (6) World History from 1500 to the Twentieth Century
The civilizations of Asia, Europe, Africa and the Americas, with emphasis on the political, economic, ecological and cultural links among them, and the impact of oceanic contact, imperialism, warfare, migration, and globalization.
HIST 103 (6) World History Since 1900
International relations; changes in the nation-state system; the emergence and impact of major political ideologies; genocide; decolonization; the globalization of trade; and the dynamics of economic, social, cultural, and environmental change in a global context.

HIST 104 (3) Topics in World History
Thematically-organized topics will explore global aspects of human experience across time. Each section will examine a single theme. Check with the department for course offerings.

HIST 105 (3) Contemporary Global Issues in Historical Perspective
Places issues and problems of current relevance such as disease, terrorism, drugs, or ethnic conflict in historical perspective. Each section will explore a single theme. Check with department for course offerings.

HIST 106 (3) Global Environmental History
The impact humans have had on the environment, and the ways in which the physical environment has shaped human history: climate, agriculture, energy use, and urbanization.

HIST 107 (3) Global Indigenous Histories
An introduction to the experiences of Indigenous peoples and the nature of colonialisms around the world since 1500, and an introduction to historical practices and perspectives. This course is not eligible for Credit/D/Fail grading.

HIST 108 (3) Global History of Capitalism
The history of capitalism in its global dimension from the beginnings to the age of industrialization. An investigation of economies - in both their practices and cultures - around the world and across the ages from ancient times to the modern era.

HIST 109 (3) Cultural Histories of Media: From Writing to Tweeting
The history of different forms of media in global perspective, with particular attention to audiovisual electronic media.

HIST 200 (6) Asia and the World
The political, economic, social, cultural, and human interactions between Asia and the world, inter-Asian relations, Asian diaspora, colonialism, war and the social consequences of conflict, decolonization, industrial growth, and developing world issues.

HIST 202 (3/6) Gateway to the Middle Ages
Problems and themes of medieval European History through the close study of the people and cultures that produced them.

HIST 205 (3) Introduction to Historical Archaeology
An introduction to the study of medieval and modern material culture, with special emphasis on Canada, using archaeological evidence to illustrate the principles, aims, and techniques of historical archaeology and related disciplines.

HIST 220 (3/6) History of Europe
Selected themes and historical approaches in European history; may include Europe's history of religious conflict, state formation, colonialism, nationalism, industrialization, revolution, total war, globalization, genocide, or environmental change.

HIST 235 (3) History of Canada: Moments that Matter
An introduction to major turning points in Canadian history. Exploration of the social, political, cultural, and environmental transformations/revolutions that have shaped Canada from early European colonialism to the twenty-first century.

HIST 236 (3) Public History in Canada: Memory, Representation, and Interpretation
An introduction to public history in Canada. An exploration of the politics and practice of representing the past in a variety of sites, and questions of historical interpretation, memory, and audience.

HIST 237 (3/6) History of the United States
Survey from colonial period to present examining political system, slavery, Civil War, race relations and civil rights, westward expansion, industrialization, feminism, expanding international presence, Cold War, and modern culture.

HIST 250 (3/6) Latin American History
Exploring themes of colonialism, indigenous life, national imaginaries, dictatorships and transitions to democracy through different forms of telling Latin American history. Includes epistolary writing, maps, eyewitness accounts, chronicles, actions, novels, films, built environment and city plans, testimonios, and plays.

HIST 252 (3) Modern Caribbean History
A survey of social, cultural and political history of Anglophone, Francophone and Spanish Caribbean from the Haitian Revolution to the present.
HIST 256 (3) History of Africa  
An introduction to selected themes and historical approaches in African history. These may include African geography and identities, sources and methodology, pre-modern state formation, gender relations, world religions, labour systems, colonialism, and post-colonialism.

HIST 259 (3) Science, Medicine, and Technology in the Ancient and Medieval Worlds  
The history of science, medicine, and technology, emphasizing networks, exchanges, and encounters in a global context.

HIST 260 (3) Science and Society in the Contemporary World  
An introduction to the historical development, conceptual foundations, and cultural significance of contemporary science. 
Themes will vary from year to year.
Equivalency: PHIL 260.

HIST 270 (3/6) d China in World History  
The history of China in a global context, from the earliest times to the most recent past; how China has changed the world and how engagement with the world has changed China.
Equivalency: ASIA 270.

HIST 271 (3) Japan and Global History, 1550 - 1900  
Thematic study of comparisons and relations between Japan and the world outside (primarily Europe and China). Commercial expansion, systems of world order, social institutions, religious and ideological expression, and state organization.

HIST 273 (3) History of India  
Societies, cultures, and politics of the Indian subcontinent from its ancient civilizations to the formation of the modern nation-states of South Asia.

HIST 280 (3) Islamic World History  
The history of the Islamic world in its global dimensions from its origins to the present day through the themes of religion, law, politics, culture, and modernity.

HIST 302 (6) History of the Indigenous Peoples of North America  
Indigenous peoples from pre-contact to the present in Canada and the U.S. Topics include colonial frontiers, disease, fur trade, government policies, environment, gender, religion, oral narratives, activism, urbanization, and identity.

HIST 303 (6) History of the Canadian West  
Selected topics in the history of the Canadian West with an emphasis on the prairie west: the Indian and the fur trade, Louis Riel, prairie settlement, and western social and political protest.

HIST 304 (3) Researching Local History from the Ground Up  
Sources and methods for reconstructing local history that can be used by Social Studies teachers in B.C. The aim is to develop an appreciation of the formative processes and past experiences that created one's familiar community.

HIST 305 (3) History of British Columbia  
The social, political, cultural, environmental, and economic transformations that have made British Columbia. Topics include the histories of Indigenous and settler peoples, the modern state, migration, activism, and identity.

HIST 306 (6) History of France, 1461-1715  
The development of absolute monarchy in France, with emphasis on change and conflict in French society; spiritual and intellectual "crisis"; the place of France in the emerging European state system; and opposition to the monarchy.

HIST 307 (3) French North America to 1803  
Historical background for understanding the French-speaking peoples of North America: Acadians, Franco-Quebecois, French-Canadians and Cajuns. It also deals extensively with French-Indigenous relations and introduces the student to the historiography of French North America.

HIST 308 (3) Quebec from the End of the 18th Century to the Present  
Relations between the English and the Canadians prior to the Rebellions of 1837-38, the emergence of French Canadian nationalism after 1840, the impact of State formation and industrialization in Quebec, the Quiet Revolution, and the independence movement.

HIST 309 (3) Topics in Sub-Saharan African History  
Examination of a major theme in the history of Sub-Saharan Africa.

HIST 310 (3) The British Empire to 1850  
Rise of the British imperial system within a global context from its beginnings to 1850. Focuses on economic and social themes.
with emphasis on settlements in the southern hemisphere as well as the West Indies.

HIST 311 (3) The British Empire after 1850
Transformation of the British imperial system from the mid-nineteenth century to de-colonization and neo-colonialism after the second World War.

HIST 312 (3) Southern Africa
Pre-colonial, colonial, and contemporary, emphasizing South Africa.

HIST 313 (3) Africa from Imperialism to Independence
The history of Africa in the 19th and 20th Centuries: the growth of Islam and Christianity, the impact of European colonialism, the development of nationalism, and the variety of different political and social outcomes after independence.

HIST 314 (6) Early Modern Britain
The social, economic, political, religious, cultural, and intellectual history of Britain between the Reformation and the Industrial Revolution, emphasizing the rise of modern industrial society.

HIST 315 (3) Britain 1750-1850
Emergence of the world's first industrial society, and the political, economic, and cultural struggles accompanying this transformation.

HIST 317 (3) Britain, 1850-1918
Britain from the Great Exhibition to the Great War: the creation of a mass electorate, the "New Imperialism," the "New Woman," and the ways that class, race, gender, and sexuality shaped modern Britain.

HIST 318 (3) Early Twentieth-Century Britain
British society and politics in the era of the two world wars: the liberal reforms before the Great War, war experiences, the Great Depression, and the impact of new political movements.

HIST 319 (3) Britain, 1945 to the Present
Survey of recent British history, with emphasis on de-colonization, emergence of the welfare state, new social movements and patterns of immigration, and Britain's changing relationship with Europe.

HIST 321 (6-12) d Honours Tutorial
This course is not eligible for Credit/D/Fail grading.

HIST 322 (6-12) d Honours Tutorial

HIST 323 (3) Empires, Wars, and Revolutions in Europe and the Americas, 1763-1838
Political, social, cultural, and intellectual transformations that reshaped the Atlantic world between 1763 and 1838; special attention will be given to the American, French, and Haitian Revolutions, the Latin American Wars of Independence and Canadian rebellions.

HIST 324 (3) Inventing Canada, 1840-1896
An examination of political, cultural and national developments within the British North American colonies in the second half of the nineteenth century. Credit will not be granted for both HIST 324 or 326, if 326 was taken before 2007W.

HIST 325 (3) Canada 1896-1945: Boom, Bust and War
Includes Aboriginal policy, immigration and national identity; Canada, Britain and the US; World Wars; economic modernization; the Great Depression; regionalism; political and social movements; and the creation of 'Canadian' culture. Credit will only be granted for one of HIST 325 or 426, if 426 was taken before 2007W.

HIST 326 (3) Canada Since 1945: Affluence and Anxiety in the Atomic Age
Includes immigration policy; the welfare state; Aboriginal peoples; the Cold War; resource economies and national politics; continentalism and free trade; constitutional crises; conflicting nationalisms; and new social movements. Credit will only be granted for one of HIST 326 or 426, if 426 was taken before 2007W.

HIST 327 (3) Colonial America: Encounter and Settlement, 1607 - 1763
Encounters between European, African, and Indigenous North American peoples as well as the history of the colonies within the Atlantic world, from the late sixteenth century to the eve of the American Revolution.

HIST 328 (3) Rebels in America: Revolution to Civil War, 1763 - 1865
Issues in U.S. history from the colonial era through the Civil War, including the causes of the American Revolution; slavery; aboriginal peoples; labour, gender, and industrialization.

HIST 329 (6) Canadian Lives: A Social and Cultural History
A survey of Canadian society from colonial times to post-industrialization through the lenses of race, class, and gender. Topics include colonialism, slavery, immigration, religion, industrialization, citizenship, sexuality, social movements, and moral regulation.

HIST 331 (3) The United States, 1865-1900: Labour, Race, Gender, and Empire
The complicated political, economic and social history of the United States in the three decades following the Civil War.

HIST 333 (3/6) d Third-Year Honours Seminar
This course is not eligible for Credit/D/Fail grading.

HIST 334 (3) Senegambia to South Carolina, Ghana to Georgia: African-American History, 1450 - 1850
The history of African Americans from the beginnings of the African slave trade in the 15th Century through the mid-1800s and the coming of the U.S. Civil War.

HIST 335 (3) From Slavery to Citizenship and Beyond: African-American History, 1850 to the Present
The history of African-Americans from the Civil War and emancipation through the present. Topics include the "Jim Crow" system; the Harlem Renaissance; the Civil Rights Movement; and the current economic and political status of Americans of African ancestry.

HIST 338 (3) American Modernity: The United States, 1890-1945
U.S. emergence as an industrial powerhouse and, eventually, a global superpower; responses to industrial society, meaning of "modern times," economic upheaval and social change, U.S.'s role as a world power, and politics of race, ethnicity, and gender.

HIST 339 (3) The United States Since 1945: The Limits of Power
American military and geo-political power during and after Cold War; wars in Korea, Vietnam, and Middle East; domestic issues including McCarthyism, social movements (blacks, women, youth, gays and lesbians, and Native Americans), consumerism, immigration, and rise of New Right.

HIST 341 (3) Medieval Jewish History
A survey of the political, social, economic, and cultural history of the Jews from the time of the Christianization of the Roman Empire to the expulsion of professing Jews from Spain and Portugal at the end of the fifteenth century.

HIST 344 (3) Ancient Regime France
The political, social and/or cultural history of early modern France before the Revolution. Topics may include: the changing significance of the monarchy; the Enlightenment critique of the Catholic Church and religion; the 'pre-revolution'. Credit will only be granted for one of HIST 344 or 406.

HIST 347 (3) Medieval and Imperial Russian History, 998 to 1800
Russian politics, society, culture, and empire, beginning with the medieval period extending through the era of Peter the Great's modernization efforts and the Enlightenment.

HIST 349 (3) Imperial Russian History, 1800 to 1917
History of Russia from the time of Catherine the Great to the Russian Revolution with particular focus on social and cultural history.

HIST 355 (3) Nineteenth Century Germany
The political, social, and cultural history of modern Germany during the "long nineteenth century" (1780s to the early twentieth century).

HIST 356 (3) Twentieth-Century Germany
The political, social, and cultural history of Germany in the twentieth century.
HIST 357 (3) History of Mexico
Examines themes in the last five hundred years of Mexican history, with an emphasis on the critical reading of primary sources and the use of a variety of texts that may include letters, diaries, paintings, photographs, novels, and movies.

HIST 358 (3) State and Society in 20th century Cuba
The history and historiography of 20th century Cuba, with particular attention to changing state structures and their impact on everyday life.

HIST 359 (3) A History of Brazil: From Colony to Nation
The cultural and political history of Brazil, from the earliest arrival of the Portuguese to Brazil's emergence as one of the economic powerhouses of the twenty-first century.

HIST 363 (3) Europe in the Early Middle Ages
A survey of the development of institutions, ideas and the economy in Europe from about 400 through about 1000 CE.

HIST 364 (3) Europe in the Late Middle Ages
A survey of the development of institutions, ideas and the economy in Europe from about 1000 CE through the fourteenth century.

HIST 365 (3) Europe During the Renaissance
The interplay between new and traditional ideas, styles, and institutions from the fourteenth to the mid-sixteenth century, with emphasis upon the relationship of social, economic, and political factors to intellectual and cultural change.

HIST 366 (3) Europe During the Reformation
An examination of European history that place both the Protestant Reformation and the Catholic Reformation in the broader context of the political, social, cultural, and economic changes during the early modern era.

HIST 367 (3) Europe in the Age of the Enlightenment
Europe during the age of the Enlightenment, from the end of the religious wars to the French Revolution, with emphasis on political, social, cultural, and intellectual changes in their global context.

HIST 368 (3) Europe in the 19th Century
An investigation of main themes in European history from the French Revolution to the beginning of the 20th century. Topics of particular importance are: domestic politics; the interaction of states; the formation of new states; social and economic transformations affecting the whole civilization; major cultural expressions of the century.

HIST 369 (3) Europe, 1900-1950
Europe in the first half of the twentieth century. Themes include the imperialist system, two world wars and their aftermaths, political and social movements of the interwar years, the Depression, and the crisis of liberal democracy. Credit will only be granted for one of HIST 369 or 462.

HIST 370 (3) Europe Since 1950
Europe since the middle of the twentieth century. Themes include the Cold War, the development of separate social and political systems in Western and Eastern Europe, the emergence of the welfare state, and the problems of European integration.

HIST 373 (3) History of Hong Kong
History, culture, and identities of Hong Kong from the early 1800s to the present. 
Equivalency: ASIA 373.

HIST 376 (6) Modern Japanese History Since 1800
The building of a modern state, its crisis in the 1930s, and its postwar recovery; topics include business institutions, politics, imperialism, intellectual syncretism, social change, and Japan's growing influence in the world.

HIST 377 (3) History of Cantonese Worlds
The history, culture, languages, and identities of the multi-faceted Cantonese worlds, in the context of Chinese history and the Cantonese diaspora. This course is not eligible for Credit/D/Fail grading. 
Equivalency: ASIA 323.

HIST 378 (3) History of Early China
History of China from the earliest times to the disintegration of the Tang Empire. Students will acquire the analytical skills and tools to understand the origins and foundations of Chinese society. 
Equivalency: ASIA 320.

HIST 379 (3) History of Later Imperial China
History of China from the end of Tang to the eve of its modern transformation. Students will acquire the analytical skills and tools
to understand the political, socio-economic, and cultural changes in imperial China.

Equivalency: ASIA 340.

HIST 380 (3/6) d The Making of Modern China: Nationalism, War, Revolution
The history of China from 1800 to the present including the decline of the Qing empire, the rise of modern nationalism, foreign invasion, and China's multiple revolutions.

HIST 381 (3) Imperialism and Nationalism in Southeast Asia
The history of European imperial rule, the forms of resistance to it, and the formation of nationalist movements in Southeast Asia. The countries studied include Vietnam, Indonesia, the Philippines, Burma, and Thailand.

HIST 382 (3) Post-Colonial Southeast Asia
The history of the Japanese occupation, wars of independence, international relations of the independent nation-states, and internal armed conflicts. Special attention will be paid to the wars in Vietnam, Indonesia, and East Timor.

HIST 385 (3) India from Raj to Republic
Exploration of the rise of the East India Company as territorial power, the formation of a colonial society in India, competing responses to British rule, the struggle for independence, and the legacies of partition.

HIST 386 (3/6) d Korea Since 1860
An examination of the political, economic, social, and cultural transformations of Korea since the late nineteenth century. Topics include the end of the Choson Dynasty, the history of Japanese colonial rule, the Korean war, and the two Koreas in the international system. This course is not eligible for Credit/D/Fail grading.

HIST 387 (3) Voices from Medieval India
History of medieval India explored through different stories from and about India's pre-modern past. Studies trends in society, religion, politics, and material life to reveal the dynamism of this period and to challenge simplified narratives of Hindu-Muslim confrontation.

HIST 388 (3) India in the Early Modern World: Mughals, Merchants, and Marauders
History of India during the period of Mughal rule (roughly 1500-1750). Studies the role of India and the Mughals within the global dynamics of the early modern world.

HIST 389 (6) The Sikhs: History, Religion and Society
A historical study of the social and cultural forces that helped shape Sikh religious beliefs and ritual practices over the past four centuries. In dealing with the evolution of Sikh identity, attention will be given to Sikh ideals, social organization, religious institutions and sacred literature.

HIST 390 (3) Topics in History
Small-group instruction in a seminar format on a variety of historical topics. Check with the department for course offerings. This course does not satisfy the History Majors Research Seminar (490) requirement. This course is not eligible for Credit/D/Fail grading.

HIST 391 (3) Human Rights in World History

HIST 392 (3) Scientific Revolution: Circulation of Knowledge in the Early Modern World
The profound transformation of knowledge about the world in the context of the first global encounter of civilizations between 1450 and 1800. Explores the foundations for modern science.

HIST 393 (3) Introduction to History and Philosophy of Science
An examination of historical, conceptual, and methodological conditions of scientific knowledge through detailed consideration of important episodes in the history of science.
Equivalency: PHIL 360.

HIST 394 (3) Darwin, Evolution, and Modern History
Darwin and the science of evolution in nineteenth and early twentieth century.
Equivalency: PHIL 364.

HIST 395 (3) The Nuclear Century: Scientists, Atoms, and the World Order Since 1900
Science and the military-industrial complex; quantum and relativistic revolutions in physics; nuclear energy and weapons of mass destruction; international tensions, environmental damage, and global perils.

HIST 396 (3) Environmental History of North America
Overview of land use and environmental change in Canada and the United States; examines ideas and practices that shaped indigenous and non-indigenous resource exploitation, management, and activism to the end of the twentieth century.

HIST 398 (3) The History of Modern Medicine
The history of health and disease in the modern world, focusing in particular on the emergence and history of modern biomedicine.

HIST 399 (3/6) d Theory and Practice of History
Approaches to the history of historical inquiry, with particular attention to theoretical and methodological debates among historians. Recommended for history majors. Not open to Department of History honours students.

HIST 401 (3) Seafaring in the Age of Sail
Humankind's encounter with its ocean frontier through exploration, trading, fishing, whaling, piracy, and naval warfare from 1400 to 1850.

HIST 402 (3) Problems in International Relations
Selected topics such as trade, migration, diplomacy, war, migration, colonialism, and post-colonialism. Priority for registration to majors in History or International Relations.

HIST 403 (3) Seminar in the History of International Relations
Selected topics in the history of international relations. Priority for registration will be given to fourth-year majors in the International Relations and History programs. This course is not eligible for Credit/D/Fail grading.

HIST 405 (3) Diplomacy and Conflict in the Middle East, 1914 to the Present
International relations in the Middle East in the aftermath of the Ottoman Empire, with special attention to the conflicts between Jews of Palestine/Israel and their Arab neighbours.

HIST 408 (3) U.S. Foreign Relations from Independence to World War II
U.S. foreign policy and international history. Examines the American rise to power and political, economic, and cultural relationships between the United States and other peoples, organizations, and states worldwide. This course is not eligible for Credit/D/Fail grading.

HIST 409 (3) U.S. Foreign Relations since 1945
U.S. foreign policy and international history. Political, economic, and cultural relationships between the United States and other peoples, organizations, and states worldwide.

HIST 411 (3) Development of Canadian External Policy Since Confederation
Examines the history of Canada's external relations since Confederation with particular emphasis on Canada's changing international status and role in the twentieth century.

HIST 412 (6) The American Impact on Canada
An examination of the influence of the United States' rise to continental, hemispheric, and world power upon Canada in the areas of economics, defence, and foreign policy.

HIST 413 (3) Imagining the Nation: 19th- and 20th-Century Canada
The political and intellectual history of the concept of the nation in French and English Canada, and the different forms of nationalism it inspired from the middle of the nineteenth century to the 1995 Quebec Referendum.

HIST 414 (3) Constitutions in Canadian History: From Pre-Contact to the Charter of Rights
European precedents, Colonial self-government, Canadian Confederation, and issues such as gay rights, abortion, and First Nations land rights.

HIST 418 (3) The 1960s in Global Perspective
The history of the 1960s from a transnational perspective: culture, social change, student activism, and global conflict.

HIST 419 (3) Crime and Punishment in Canadian History
The relationship between law and society; the development of legal institutions and the evolving character of crime in Canada.

HIST 420 (3-6) Topics in Canadian History
May include immigration, French-English relations, the growth of the state, health and welfare, or the family.

HIST 421 (6-12) d Honours Tutorial
This course is not eligible for Credit/D/Fail grading.

HIST 423 (3) Economic and Business History of Modern Japan
From 1800 to the present; emphasis on the business strategies of Japan's largest companies; attention also to broader economic
topics such as international trade, government policy, social impact of industry, business and politics, labour, and post-1971 multi-nationalism.

HIST 424 (3) Economic History of Pre-Modern Europe
This course traces the roots of the "Rise of the West" through long-term economic, social, and political developments in European and global history.

HIST 425 (6) War and Society
Continuity and change in the relations of war and society, the connections between the economy, society, the military, and government in peacetime as well as war; not a course in military history.

HIST 432 (6) International Relations in the Twentieth Century
History of international relations from the beginning of the twentieth century to the present. Questions of war, peace, balance of power, and the evolution of the international system in global economic, cultural, and social contexts.

HIST 433 (6) Fourth-Year Honours Seminar
This course is not eligible for Credit/D/Fail grading.

HIST 435 (3) Gender and Sexuality in the Modern U. S
Gender roles and gender relations from the Gilded Age to the present day. Topics include political movements such as suffrage and feminism; labour and recreation; marriage, family, and children's socialization; sexuality; and popular culture.

HIST 436 (6) European Social History
A study of the changes in economic activity, social structure, family life, religious attitudes, and popular behaviour which accompanied the transformation of Europe from a pre-industrial to an industrial society.

HIST 439 (3) Politics and Culture in Fin-de-Siècle Europe (1890-1914)
Explores relationships between politics, culture, and social change in Europe. Topics include the changing role of intellectuals: literary aestheticism, painting, design and the city, origins of psychology.

HIST 440 (3) History of Health in the Modern West
Changing conditions of health in Europe and North America from the beginning of the modern mortality decline to the recent past.

HIST 441 (3) History of the Holocaust
A study of the systematic attempt to destroy European Jewry during the Nazi regime, 1933-1945. Topics of special importance include: the motivations and behaviour of the perpetrators; the reactions of the victims; the roles of bystanders.

HIST 443 (3) History of North American Children and Youth
Children's history from settler days to the present. Topics include education, work and play, ideologies of childhood and adolescence, children's material and popular culture, and differences of identity based on region, class, race, and gender.

HIST 444 (3) Slave Societies in the Americas
A comparative analysis of the institution of chattel slavery, its growth, its effects on slaves and masters, its relation to the larger society, and the causes of its decline, in the various cultures of the Americas.

HIST 446 (3/6) d Topics in U.S. Cultural History
HIST 447 (3) Selected Topics in United States History
Examines in depth a significant period, theme, or topic in the history of the United States. Possible subjects include The West, the Great Depression, the Sixties, and Class, Race, and Gender.

HIST 449 (12) Honours Essay
This course is not eligible for Credit/D/Fail grading.

HIST 450 (3/6) d Selected Topics in Latin American History
A study in depth of one major topic (such as the Cuban Revolution or Peronismo) in the recent history of Latin America.

HIST 451 (3) Family and Community in Latin America
The role of family and community from the colonial period to the present. Emergence of the nation state as it affected community and family structures.

HIST 453 (3) Class and Culture in Latin America
The relationship between culture and class formation from the late colonial period to the present.

HIST 455 (3) Gender and Sexuality in Latin America
The construction of gender ideologies and gendered and sexual identities, including masculine, feminine, and transgendered, in
modern Latin America. [3-0-0]

HIST 456 (3) Race in the Americas
Legacies of African, European, and Asian migrations, and colonial encounters with indigenous peoples in the Americas. Includes the creation of racial categories, the making of transnational and transracial families, and the emergence of race-based social and cultural movements.

HIST 460 (3) Revolution and Resistance in the Third World
Revolutionary movements in the Third World during the second half of the twentieth century; the radicalisation of anticolonial nationalism; the impact of anticolonial radicalism in the developed world; the decline of Marxism as a revolutionary inspiration.

HIST 464 (3) First Contacts in the Pacific
An interdisciplinary history of early European contact with the Indigenous peoples of the northwest coast of North America and the Pacific Islands.

HIST 466 (3) Topics in Indigenous History of Canada
Selected interdisciplinary topics in the history of Canada's Indigenous peoples after European contact, including historical demography, economic interdependency, missionary encounters, gender relations, and interactions with colonial powers and the nation state. Recommended: HIST 302 or other background in the field. This course is not eligible for Credit/D/Fail grading.

HIST 467 (3) Topics in Indigenous History of the United States
Interdisciplinary topics in the history of the United States' Indigenous peoples from before European contact. HIST 302 or other background in the field is recommended. This course is not eligible for Credit/D/Fail grading.

HIST 468 (3) Topics in Comparative Indigenous History
Comparative interdisciplinary analysis of selected topics in Indigenous history in North America and beyond. HIST 302 or other background in the field is recommended. This course is not eligible for Credit/D/Fail grading.

HIST 469 (3) Aboriginal Title in British Columbia: History and Legacy
Colonial land policy, Indigenous resistance and organizing, treaties, and court decisions. Some previous knowledge of Indigenous history is strongly recommended.

HIST 470 (6) Seminar in Medieval History
Annually changing topics of medieval studies with special attention to research methods on primary sources.

HIST 473 (3) Women in the Middle Ages
A study of women's roles in the family, society, law, religion, the economy, and literature from about 500 to 1500 CE.

HIST 474 (3) Ideas and Religions of the Middle Ages
A survey and exploration of the development, interpenetration, conflict, and transformation of various intellectual and religious traditions during the Middle Ages.

HIST 476 (3) Law and Society in the Middle Ages
The history of law in the Middle Ages, including English common law, civil (Roman) law, and canon law, and how changes in both medieval law and society affected the development of each.

HIST 477 (3) Constitutional History of Medieval Europe
The evolution of political institutions, the emergence of royal governments as well as representative assemblies and urban republic and conflicts within and among them leading to the emergence of modern structures.

HIST 478 (3) Medieval Portraits and Personalities
The lives of leading and controversial figures in the Middle Ages and the means by which they have portrayed themselves and been portrayed by others.

HIST 479 (3/6) Cultural History of Imperial China
An in-depth examination of the construction, transmission, and transformation of Chinese culture(s) prior to 1800. Credit will be granted for only one of HIST 479 or ASIA 440.

HIST 480 (6) Social History of Modern China
Changes and continuities in Chinese society and culture from the late imperial period to the present; rural and urban life, social stratification, social movements and ideology, family and community, popular beliefs and cultural values.

HIST 481 (3) Education and Society in Modern China
The relationship between education and society in China since 1600; classical learning and the civil service examination system; popular literacy; sino-foreign interactions in education; education and gender; nationalism and education; the education revolution in China after 1949.
HIST 482 (3) Chinese Migration
This history of Chinese migrations from the founding of the state to the present day. Migration is used as a focus through which to examine some key themes of Chinese history; ethnicity, boundary creation, economic growth and international relations.

HIST 483 (3) Asian Migrations to the Americas
Examines both the historical and contemporary contexts for migration from Asia to Canada and the Americas.

HIST 484 (3) East Asian Military systems and warfare China
Confucian societies are often thought of as ones in which the brush is mightier than the sword. In fact the military has been a crucial factor in East Asia, and warfare has been the engine which has driven many of the most significant changes in East Asian history. This course will look at the evolution of East Asian military systems, and at the impact of recurrent warfare on East Asia societies.

HIST 485 (3) Asian Migrant Communities in Vancouver
This course will examine the history of Asian migration to Vancouver and British Columbia, focusing on the development of local communities and provide a background in historical research methods that will enable the students to conduct research on the history of these communities.

HIST 487 (3) History of Alternative and Complementary Medicine: Acupuncture to Yoga
Alternative and complementary healing in history, including Traditional Chinese Medicine (TCM), yoga, meditation, and alternative drug therapies. Specific themes may vary from year to year.

HIST 488 (3/6) d Special Topics in Asian History

HIST 490 (3) Seminar for Majors in History
Selected problems in the theory and practice of historical work. Check with the department for course offerings. Restricted to fourth year students majoring in History or in the History and Philosophy of Science. Also open to History Honours students. This course is not eligible for Credit/D/Fail grading.

HIST 491 (3) Science and the Enlightenment
Examines the relationship between science and society in the long eighteenth century. Topics include empiricism, classification, academies, print culture, and voyages of exploration.

HIST 493 (3) History and Social Relations of Modern Sciences
Science and society in the 19th to 21st Centuries. [3-0-0]

HIST 494 (3) Machines, Media, and Modernity: Frankenstein to Cinema
The cultural contexts and consequences of science and nineteenth century technology. European and North American developments.

HIST 495 (3) Evolution and the Sciences of Mind, Brain, and Behaviour
Examines how Darwin's theory of evolution changed the investigation of human nature. Questions will be historical and scientific, but will also concern the social, ethical, and existential stakes raised by the human mind as a product of evolution.

HIST 500 (3) Readings in Canadian History
This course is not eligible for Credit/D/Fail grading.

HIST 505 (3) Readings in American History
This course is not eligible for Credit/D/Fail grading.

HIST 510 (3) Readings in British History
This course is not eligible for Credit/D/Fail grading.

HIST 520 (3) Readings in Medieval History
This course is not eligible for Credit/D/Fail grading.

HIST 525 (3) Readings in Renaissance-Reformation History
This course is not eligible for Credit/D/Fail grading.

HIST 530 (3) Readings in French History
This course is not eligible for Credit/D/Fail grading.

HIST 535 (3) Readings in Central European History
This course is not eligible for Credit/D/Fail grading.

HIST 540 (3) Readings in Russian and East European History

This course is not eligible for Credit/D/Fail grading.
This course is not eligible for Credit/D/Fail grading.

HIST 547 (3-12) d Readings: Special Topics in History
This course is not eligible for Credit/D/Fail grading.

HIST 548 (3-12) d Historiography
This course is not eligible for Credit/D/Fail grading.

HIST 549 (12) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

HIST 550 (3) Readings in Early Modern European History
This course is not eligible for Credit/D/Fail grading.

HIST 554 (3) Readings in Modern European History
This course is not eligible for Credit/D/Fail grading.

HIST 558 (3) Readings in Comparative Asian History
This course is not eligible for Credit/D/Fail grading.

HIST 560 (3) Readings in Chinese History (to 1911)
This course is not eligible for Credit/D/Fail grading.

HIST 561 (3) Readings in Chinese History (post-1911)
This course is not eligible for Credit/D/Fail grading.

HIST 563 (3) Methodology and Sources in Chinese History
This course is not eligible for Credit/D/Fail grading.

HIST 566 (3) Readings in 20th-Century Japanese History
This course is not eligible for Credit/D/Fail grading.

HIST 568 (3) Readings in Early Modern Japanese and World History
This course is not eligible for Credit/D/Fail grading.

HIST 569 (3) Methodology and Sources in Japanese History
This course is not eligible for Credit/D/Fail grading.

HIST 570 (3) Seminar in Japanese History
This course is not eligible for Credit/D/Fail grading.

HIST 573 (3) Readings in Southeast Asian History
This course is not eligible for Credit/D/Fail grading.

HIST 575 (3) Readings in International and Global History
This course is not eligible for Credit/D/Fail grading.

HIST 577 (3) Readings in South Asian History
This course is not eligible for Credit/D/Fail grading.

HIST 580 (3) Readings in Latin American History
This course is not eligible for Credit/D/Fail grading.

HIST 581 (3-12) d Topics in Science, Technology, and Society
Advanced seminar on a specific theme or themes of interest to both STS and History. This course is not eligible for Credit/D/Fail grading.

HIST 585 (3-12) d Topics in Cultural History
This course is not eligible for Credit/D/Fail grading.

HIST 586 (3-12) d Topics in Intellectual History
This course is not eligible for Credit/D/Fail grading.

HIST 589 (3) Readings in Environmental History
This course is not eligible for Credit/D/Fail grading.

HIST 594 (3) Readings in Aboriginal History
This course is not eligible for Credit/D/Fail grading.
HIST 595 (3-6) d Public History
This course is not eligible for Credit/D/Fail grading.

HIST 596 (3) Oral History
This course is not eligible for Credit/D/Fail grading.

HIST 597 (3-12) d Topics in Comparative History
This course is not eligible for Credit/D/Fail grading.

HIST 599 (3) M.A. Research Seminar
This course is not eligible for Credit/D/Fail grading.

HIST 649 (0) Doctoral Dissertation

HIST 699 (3) Ph.D. Research Seminar
This course is not eligible for Credit/D/Fail grading.

High Performance Buildings, Faculty of Applied Science

HPB: High Performance Buildings

HPB 501 (3) Green Building Contemporary Practice
Enhanced building environmental performance and the integration of green building principles, strategies and technologies. This course is not eligible for Credit/D/Fail grading.
Equivalency: ARCH 574.

HPB 502 (3) Regenerative Development
The relationship between human and natural systems in the context of regenerative design. Provides an understanding of how regenerative approaches differ from green design and how they can offer new insights and directions for design. This course is not eligible for Credit/D/Fail grading.
Equivalency: ARCH 575.

HPB 503 (3) Whole Building Energy Modelling and Simulation
Modelling energy in a high performance building. Introduction to indoor space requirements. Heat and mass transfer through building envelopes. Climate. Fenestration, daylighting, solar energy. Introduction to major energy models. Modelling project. Credit will be granted for only one of HPB 503 or MECH 474. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of MECH 375, MECH 327.

HPB 504 (3) Building Energy Systems Design
Designing the energy system for a high performance building. Heating, cooling and ventilation load estimation. Heating and cooling using solar, electrical and chemical energy. Air, water, and refrigerant distribution systems. Energy storage. System design project. Design performance assessment. This course is not eligible for Credit/D/Fail grading.
Equivalency: MECH 473.

HPB 505 (3) Capstone: Greening Existing Buildings
Students will analyze the performance and design data of an existing building and propose design changes that will improve performance, considering the real priorities of the client, a building owner or operator. This course is not eligible for Credit/D/Fail grading.

HPB 506 (3) Capstone: New Building Energy Systems Design
Students will take a building under design and work with the designers towards a high performance energy system. The project will be a proposed high performance building with a client, a design team, and energy performance objectives. This course is not eligible for Credit/D/Fail grading.

Faculty of Land and Food Systems

HUNU: Human Nutrition

Most of the undergraduate courses have been renamed as Food, Nutrition and Health (FNH). Please see this section.
HUNU 500 (3) Research Methods in Human Nutrition
Experimental design, methods of survey research, nutritional epidemiology, clinical research, and laboratory animal research. Issues such as animal models, ethics in animal and human research, statistical methods, and preparation of written reports and manuscripts, etc., will be addressed. Required of all M.Sc. and Ph.D. students in Human Nutrition. This course is not eligible for Credit/D/Fail grading. [3-0]

HUNU 503 (3) Current Issues in Nutrition and Metabolism
This course is not eligible for Credit/D/Fail grading.

HUNU 505 (3) Current Issues in Applied Nutrition
This course is not eligible for Credit/D/Fail grading.

HUNU 531 (3) M.Sc. Seminar
This course is not eligible for Credit/D/Fail grading.

HUNU 547 (2-6) c Directed Studies
In special cases, directed studies on certain aspects of nutrition may be arranged for graduate students in attendance. This course is not eligible for Credit/D/Fail grading.

HUNU 549 (18) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

HUNU 631 (3) Ph.D. Seminar
This course is not eligible for Credit/D/Fail grading.

HUNU 649 (0) Doctoral Dissertation

Faculty of Arts

IAR: Institute of Asian Research

IAR 500 (6) Perspectives and Methods in Asia Pacific Policy Studies
This course is not eligible for Credit/D/Fail grading.

IAR 505 (3) The New Institutionalism in Asia
This course is not eligible for Credit/D/Fail grading.

IAR 506 (3) Culture & Globalization in Asia-Pacific
Interdisciplinary investigation of the idea that globalization is not limited to the economic sphere but also includes popular culture, communications, travel, food and desire of the other. This course is not eligible for Credit/D/Fail grading.

IAR 507 (3) East Asian Organizations in Comparative Perspective
Contemporary theories of organizational behavior applied to economic organizations in Japan, with some comparisons to South Korean, Taiwanese and Chinese firms. Historical and theoretical conceptualizations of business organizations with empirical applications as applied to East Asian firms. This course is not eligible for Credit/D/Fail grading.

IAR 508 (3) The City and the National Imagination
Examines relations between the idea of the nation and its embodiment in the spaces of the city through visual, spatial, and architectural representations. This course is not eligible for Credit/D/Fail grading.

IAR 511 (3) Cross-National Comparisons in the Social Sciences
The methodological and epistemological underpinnings of cross-national comparative research across the social sciences. Focused on but not limited to Northeast Asia. This course is not eligible for Credit/D/Fail grading.
Equivalent: SOCI 511.

IAR 512 (3) Multinational Firms and Policy Issues in Asia-Pacific
This course is not eligible for Credit/D/Fail grading.

IAR 515 (3-9) d Topics in Asia Pacific Policy Studies
This course is not eligible for Credit/D/Fail grading.

IAR 516 (3) Issues in East Asian Diplomacy
Political, transnational, and bilateral diplomatic issues. *This course is not eligible for Credit/D/Fail grading.*

**IAR 520 (12) Master's Thesis**  
*This course is not eligible for Credit/D/Fail grading.*

**IAR 525 (12) Practicum in Asia Pacific Policy Studies**  
*This course is not eligible for Credit/D/Fail grading.*

### Faculty of Arts

**IEST: European Studies**

**IEST 500 (0) Pro-Seminar European Studies**

**IEST 501 (3) Internship/European Exchange**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 502 (3-9) d Directed Reading**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 505 (3-6) d Topics in European Studies**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 511 (3) Extended Essay**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 512 (9) M.A. Thesis**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 521 (3) The Economics of European Integration**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 531 (3) External Relations of the European Union**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 541 (3) Political and Legal Foundations of the European Union**  
Credit will not be given for both IEST 541 and LAW 341. *This course is not eligible for Credit/D/Fail grading.*

**IEST 551 (3-6) d Politics and Culture in Europe**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 561 (3) Citizenship and Migration in Contemporary Europe**  
*This course is not eligible for Credit/D/Fail grading.*

**IEST 591 (3) Geography of Europe**  
Credit will not be given for both IEST 591 and GEOG 493. *This course is not eligible for Credit/D/Fail grading.*

### Integrated Engineering, Faculty of Applied Science

**IGEN: Integrated Engineering**

**IGEN 201 (3) Integrated Technical Communication**  
Written and oral communication in business correspondence, engineering design methods, report preparation, and oral presentations of technical material. Restricted to students in second year of the Integrated Engineering Program. *This course is not eligible for Credit/D/Fail grading.*  
**[1-0-2; 1-0-2]**  
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.  
Corequisite: IGEN 230.  
Equivalency: APSC 201.

**IGEN 230 (6) Introduction to Engineering Design**  
Introduction to engineering design methods, problem solving, working individually and in teams, and methods of communication of results. Engineering design projects will be assigned. Restricted to students in the second year of the Integrated Engineering Program.
IGEN 330 (6) Intermediate Engineering Design
Intermediate level engineering design projects involving material in the curriculum of the Integrated Engineering program. This course is not eligible for Credit/D/Fail grading. [1-4-0;1-4-0]

Prerequisite: Third-year standing in the Integrated Engineering program.

IGEN 340 (3) Technology Entrepreneurship
Theory and skills needed for engineers to capitalize on the opportunities that exist in commercializing technology, including the relationships between ideas and opportunities, customers and competition, and products and solutions. This course is not eligible for Credit/D/Fail grading. [1-4-0;1-4]

IGEN 430 (6) Advanced Engineering Design Projects
Projects involving all material in the curriculum of the Integrated Engineering Program. Students will be expected to propose a project and complete the design and construction of a prototype. Restricted to students in the fourth year of the Integrated Engineering program. This course is not eligible for Credit/D/Fail grading. [1-4-0;1-4-0]

IGEN 450 (3) Pipeline Engineering
Pipeline materials and material selection; fracture mechanics; manufacturing and processing; welding and corrosion; soil-pipe interactions; surveying and site investigations; slope stability; natural hazards; pipeline loads and response. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Either (a) MECH 221 or (b) APSC 278 and one of CIVL 215, MTRL 263 and one of CIVL 230, MECH 260.

IGEN 451 (3) Pipeline Systems and Infrastructure
Energy infrastructure; pipe flows; equipment and facilities including compressors, pumping stations, coolers, and controls; terminals; pipeline integrity; corrosion control. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Either (a) MECH 221 or (b) APSC 278 and one of CIVL 215, MTRL 263 and one of CIVL 230, MECH 260.

IGEN 452 (3) Pipeline Design
Pipeline and pipeline system design reflecting technical, regulatory, environmental, societal, professional, and economic aspects; pipeline design project. This course is not eligible for Credit/D/Fail grading. [2-0-2]

Prerequisite: IGEN 450.

Faculty of Medicine

INDE: Interdepartmental Medicine

INDE 451 (0) Clinical Skills IV
Final examination for third year encompassing all clinical subjects.

INDE 453 (6) Preparation for Medical Practice
Diagnostics; therapeutics; information management; evidence-based practice; professionalism and ethics; cultural competence; advanced communication skills; patient safety; health and wellness; and the health care team. This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

INDO: Indonesian

INDO 100 (3) Introductory Indonesian I
Spoken and written Indonesian. Credit will be granted for only one of INDO 100 or INDO 102.

INDO 101 (3) Introductory Indonesian II
Continuation of INDO 100. Credit will be granted for only one of INDO 101 or INDO 102.

Prerequisite: INDO 100.

INDO 102 (6) Introductory Indonesian
Spoken and written Indonesian. As of 2011W, credit will be granted for only one of INDO 100/101 or INDO 102.

INDO 200 (6) Intermediate Indonesian
Study of the grammar and introduction to Indonesian literature. As of 2011W, credit will be granted for only one of INDO 201/202 or INDO 200.

Prerequisite: One of INDO 101, INDO 102.

INDO 201 (3) Intermediate Indonesian I
Study of the grammar and introduction to Indonesian literature. Credit will be granted for only one of INDO 201 or INDO 200.

Prerequisite: INDO 101.

INDO 202 (3) Intermediate Indonesian II
Continuation of INDO 201. Credit will be granted for only one of INDO 202 or INDO 200.

Prerequisite: INDO 201.

Faculty of Graduate and Postdoctoral Studies

INDS: Interdisciplinary Studies

INDS 501 (0) Instructional Skills Workshop
Introduction to concepts and practice in higher education instruction; emphasis on lesson planning, student participation and instructional aides; includes video-taped practice teacher/peer feedback 28 classroom hours.

INDS 502 (1-6) d Interdisciplinary Studies: Thematic Seminars
Seminars, lectures, and discussions of topics involving several faculties. Contact the Interdisciplinary Studies Program for specific topics (www.isgp.ubc.ca). This course is not eligible for Credit/D/Fail grading.

INDS 530 (3-6) c Directed Studies
A series of directed readings related to student's area of interdisciplinary studies. This advanced course may be taken upon approval of the Program head. This course is not eligible for Credit/D/Fail grading.

INDS 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

INDS 649 (0) Doctoral Dissertation

Library, Archival and Information Studies, Faculty of Arts

INFO: Information Studies

INFO 250 (3) Networks, Crowds, and Communities
Introduces network concepts and methods for exploring social and organizational connectivity for work, socializing, and knowledge production. Examines impact of social media on connections that span space and place; peer production on authority structures; ubiquitous mobile connectivity on daily life.

INFO 419 (3) Information Visualization
Basic theory and practice required to visually represent information. Introduces design principles and practical skills to create effective information visualizations. Examines effect of different visual representations on understanding and meaning. Prerequisite: INFO 250.

INFO 456 (3) Information Policy and Society
Develops capabilities required to assess the need for information policies in professional contexts, evaluate relevant socio-technical dimensions and envision likely implications for specific communities and practice settings. Prerequisite: INFO 250.

Faculty of Science

ISCI: Integrated Sciences

ISCI 300 (1) Interdisciplinary Seminar
Critical analysis of recent scientific literature that combines disciplines that students are integrating in their Integrated Sciences
Curriculum. This course is not eligible for Credit/D/Fail grading. [0-0-1.5]
Prerequisite: Registration in Integrated Sciences Program

ISCI 311 (3) The Size of Things
Scaling as a general approach to laws governing the geometry, kinematics and dynamics of systems. Dimensional analysis, isometry and allometry applied to topics from Biology, Physics, Earth Science and Economics. Priority to students in the Integrated Sciences Program. [2-0-2]
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 320 (3) Research Development Project
Retreat to develop skills in writing scientific research proposals. Emphasis on formulating and testing hypotheses to explain observations. Course location will vary; fee payable prior to retreat.
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 322 (3) Science of Measurement and Instrumentation
Interactive course integrating diverse aspects of science: semi-quantitative overview of physical principles underlying modern measurement technology; philosophy of measurement; accuracy and limits to measurement, and resultant scientific, sociological and economic consequences. Priority to students in the Integrated Sciences Program.
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 330 (3-6) d Topics in Integrated Sciences
Interactive examination of a theme common to all areas of science. Themes will change from year to year. Priority to students in the Integrated Sciences Program. [3-0-0]
Prerequisite: Third-year standing in the Faculty of Science

ISCI 344 (3) Theory and Practice of Games in Economics and Evolution
Exploration of human and animal interactions: integrating evolutionary and economic perspectives to investigate individual and social behaviour. Credit will be granted for only one of ECON 221 or ISCI 344. [3-0-0]
Prerequisite: Third-year standing.

ISCI 345 (3) Integrative Bioinformatics
Storage and processing of information in biological systems. Computational methods for recovering and interpreting stored genetic information. Priority to students in the Integrated Sciences Program. [2-0-2]
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 350 (3) Darwinian Medicine
Using the Darwinian theory of natural selection to explore explanations of infectious diseases, allergies, cancer, mental illness, and other human diseases. Priority to students in the Integrated Sciences Program. [2-0-2]
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 360 (3) Systems Approaches to Regional Sustainability
Application of systems science encompassing geological, hydrological, ecological, atmospheric sciences, and energy systems approaches to study regional sustainability. [3-0-0]
Prerequisite: Third-year or higher standing in the Faculty of Science.

ISCI 361 (3) Field Course: Systems Approaches to Regional Sustainability
Systems science approaches encompassing geological, hydrological, ecological, atmospheric sciences, and energy systems to investigate a selected region of the world. Course location will vary; fee payable prior to field course.
Prerequisite: ISCI 360.

ISCI 398 (3) Co-operative Work Placement I
Industrial or academic work experience for a minimum of 4 months. Normally taken in Winter Session of third year or Summer Session after third year. Technical report required. Restricted to students in the ISP Co-op program.
Prerequisite: One term in ISP.

ISCI 399 (3) Co-operative Work Placement II
Industrial or academic work experience for a minimum of 4 months. Technical report required. Restricted to students admitted to the Co-op Program in ISP.
Prerequisite: ISCI 398.

ISCI 422 (3) Models in Science
Meaning, nature, use, strengths and limitations of models as investigative tools in all scientific disciplines. Detailed investigation of selected model systems from different scientific disciplines. Priority to students in the Integrated Sciences Program. [2-0-2]
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 433 (3) Ethical Issues in Science
Theoretical and practical consideration of ethics in the practice, reporting, public impact and accountability of science. [3-0-0]
Prerequisite: Third-year standing in any faculty.

ISCI 448 (3-6) Directed Studies
Permission of the Director is required.

ISCI 490 (3) Student Directed Seminars
Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment and delivery methods will comply with the Handbook for Student Directed Seminars. [3-0-0]
Prerequisite: Third-year standing in the Faculty of Science.

ISCI 498 (3) Co-operative Work Placement III
Industrial or academic work experience for a minimum of 4 months. Technical report required. Restricted to students admitted to the Co-op Program in ISP.
Prerequisite: ISCI 399.

ISCI 499 (3) Co-Operative Work Placement IV
Industrial or academic work experience for a minimum of 4 months. Technical report required. Restricted to students admitted to the Co-op Program in ISP.
Prerequisite: ISCI 498.

French, Hispanic and Italian Studies, Faculty of Arts

ITAL: Italian

Students with Italian 11 or 12 or exposure to the Italian language or dialects must consult the Italian undergraduate advisor for placement in appropriate courses. Some 400-level ITAL courses may be taken as ITST courses and be conducted in English (see details below). Minors, Majors, and Honours students in Italian must take such courses as ITAL and will be expected to do their reading and assignments in the Italian language. Supplementary tutorials in Italian will be provided as needed for such courses. Credit in ITAL will preclude credit in ITST and vice versa.

ITAL 101 (3) First-Year Italian I
Grammar, reading, writing, and oral practice for beginners without previous exposure to the Italian language or dialects.

ITAL 102 (3) First-Year Italian II
Grammar, reading, writing and oral practice for beginners without previous exposure to the Italian language or dialects.
Prerequisite: ITAL 101. Or permission of the instructor.

ITAL 104 (3) Italian for Singers
The study of the Italian language with the study of Italian lyric diction and musical culture; practice in translation, phonetic transcription and the performance of vocal music.
Prerequisite: ITAL 101.

ITAL 201 (3) Second-Year Italian I
Reading, writing and oral practice, with constant and systematic reference to the grammatical structure of the language.
Prerequisite: ITAL 102. Or permission of the instructor.

ITAL 202 (3) Second-Year Italian II
Reading, writing and oral practice, with constant and systematic reference to the grammatical structure of the language.
Prerequisite: ITAL 201. Or permission of the department.

ITAL 206 (3) Conversational Italian for Intermediate Learners
The development of spoken proficiency. Contemporary Italy will be presented and discussed through a variety of multimedia resources in this highly interactive environment.
Prerequisite: ITAL 201.
ITAL 301 (3) Third-Year Italian I
Reading, writing, speaking, comprehension. Special emphasis on oral practice and on composition.
Prerequisite: One of ITAL 202, ITAL 203, ITAL 206. Or permission of the department.

ITAL 302 (3) Third-Year Italian II
Reading, writing, speaking, comprehension. Special emphasis on oral practice and on composition.
Prerequisite: ITAL 301. Or permission of the department.

ITAL 303 (3) Italian Literature and Culture of the Medieval and Early Modern Period
A thematic approach to Italian literary works from the origins to the end of the sixteenth century considered in a broad cultural context. Alternates with ITAL 304.
Corequisite: ITST 231. Or permission of the Departmental Undergraduate Advisor in Italian.

ITAL 304 (3) Italian Literature and Culture of the Modern and Contemporary Age
The development of modern and contemporary Italian literature and culture against the background of social and historical events. Alternates with ITAL 303.
Corequisite: ITST 232. Or permission of Departmental Undergraduate Advisor in Italian.

ITAL 325 (3) Italian Translation
A task-based introduction to the theory and practice of translation as applied to Italian and English texts: word choice, semantic correspondence, cultural adaptation, communicative purpose, target readerships. Languages of instruction are English and Italian.
Prerequisite: ITAL 202.

ITAL 342 (3) Introduction to Italian for Senior Students I
An intensive course in spoken and written Italian. Grammar, conversation, reading of literary texts. Prerequisite: proficiency in another Romance language or Latin. Not considered a third-year course for purposes of satisfying Italian program requirements.
Prerequisite: Proficiency in another Romance Language or in Latin

ITAL 343 (3) Introduction to Italian for Senior Students II
An intensive course in spoken and written Italian. Grammar, conversation, progressive reading of various texts. Prerequisite: Proficiency in another Romance language or Latin. Not considered a third-year course for purposes of satisfying Italian program requirements.

ITAL 401 (3) Advanced Studies in Italian Language and Style I
Advanced reading, writing, speaking, comprehension. Special emphasis on oral practice. Alternates with ITAL 402.
Prerequisite: ITAL 302.

ITAL 402 (3) Advanced Studies in Italian Language and Style II
Advanced reading, writing, speaking, comprehension. Special emphasis on composition. Alternates with ITAL 401.
Prerequisite: ITAL 302.

ITAL 403 (3) Dante Alighieri’s Divine Comedy
A close reading of Dante’s masterpiece, along with excerpts from some of his other works: Vita Nuova, Convivio, Monarchia, Epistles. Precludes credit for ITST 413.

ITAL 404 (3) Italian Literature of the Middle Ages
Italian literature of the Middle Ages in its intellectual, socio-political and cultural context. Dante and his contemporaries and/or immediate followers (may include Petrarch and Boccaccio). Precludes credit for ITST 414.

ITAL 405 (3) Topics in the Italian Literature and Culture of the Renaissance
Masterpieces of the Italian Renaissance in literature and the other Arts. Authors and artists studied range from Pico to Ariosto and Machiavelli, from Botticelli to Leonardo and Michelangelo. Credit will be granted for only one of ITAL 405 or ITAL 415.

ITAL 406 (3/6) d Topics in Seventeenth-Century Italian Literature and Culture
Classics of the Italian literature of the Mannerist and Baroque age in their intellectual, socio-political, and cultural context. Credit will be granted for only one of ITAL 406 or ITST 416.
Equivalency: ITST 416.

ITAL 407 (3/6) d Topics in Eighteenth-Century Italian Literature and Culture
Classics of the Italian literature of the age of the Enlightenment in its intellectual, socio-political, and cultural context. Credit will be granted for only one of ITAL 407 or ITST 417.
Equivalency: ITST 417.
ITAL 408 (3) Topics in Nineteenth-Century Italian Literature and Culture
Italian literature of the 19th century in its intellectual, socio-political and cultural context. Precludes credit for ITST 418.

ITAL 409 (3) Topics in Modern and Contemporary Italian Literature and Culture
Italian literature of the 20th century in its intellectual, socio-political and cultural context. Precludes credit for ITST 419.

ITAL 420 (3) d Special Topics in Italian Language, Literature and Culture
Course content will vary. May be taken twice for a total of 6 credits.

ITAL 430 (3) Italian Cinema in its Cultural Background
A survey of major films in their intellectual, socio-political, and cultural context. Auteurs may range from De Sica, Rossellini, Pasolini, and Visconti to Bertolucci, Rosi, the Tavianis, and Moretti. Precludes credit for ITST 432.

ITAL 495 (3) Research Intensive Seminar in Italian Literature and Culture
Credit will be granted for only one of ITAL 495 or ITST 495.

ITAL 499 (3) Honours Essay

ITAL 501 (3/6) d Dante: The Minor Works
This course is not eligible for Credit/D/Fail grading.

ITAL 502 (3/6) d Dante: The Divine Comedy
This course is not eligible for Credit/D/Fail grading.

ITAL 505 (3/6) d Studies in the Literature of the Renaissance
This course is not eligible for Credit/D/Fail grading.

ITAL 507 (3/6) d Studies in Romanticism
This course is not eligible for Credit/D/Fail grading.

ITAL 508 (3/6) d Studies in Modern Italian Literature
This course is not eligible for Credit/D/Fail grading.

ITAL 515 (3/6) d Topics in Italian Language
This course is not eligible for Credit/D/Fail grading.

ITAL 520 (3/12) d Italian Language and Literature
A maximum of 6 credits is available in any one topic. This course is not eligible for Credit/D/Fail grading.

ITAL 548 (3) Graduating Essay
This course is not eligible for Credit/D/Fail grading.

ITAL 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

French, Hispanic and Italian Studies, Faculty of Arts

ITST: Italian Studies

All Italian Studies courses are conducted in English.

ITST 110 (3) Introduction to Italian Literature and Culture

ITST 231 (3) Introduction to Italian Culture I: From the Middle Ages to the Early Modern Period

ITST 232 (3) Introduction to Italian Culture II: From the Modern to the Post-Colonial Age

ITST 234 (3) Introduction to Italian Cinema

ITST 333 (3) Masterpieces of the Novella in Italian Literature
A study of the genre of the novella as an expression of social and political contexts within and across cultures from its inception in feudal times to the post-modern age.

ITST 345 (3) Italian Fascism in Interdisciplinary Perspective
The cultural, literary, philosophical roots of Fascism and its evolution: its policies in literature, sports, cinema, architecture, racial
legislation, and colonial adventures.

**ITST 385 (3) Italian Cinema: Neorealism**

**ITST 413 (3) Dante Alighieri's Divine Comedy in Translation**

A close reading of Dante’s masterpiece, along with excerpts from some of his other works: *Vita Nuova, Convivio, Monarchia, Epistles*. Precludes credit for ITAL 403.

**ITST 414 (3) Topics in the Italian Literature and Culture of the Middle Ages in Translation**

Italian literature of the Middle Ages in its intellectual, socio-political and cultural context. Dante and his contemporaries and/or immediate followers (may include Petrarch and Boccaccio). Precludes credit for ITAL 404.

**ITST 415 (3) Topics in the Italian Literature and Culture of the Renaissance in Translation**

Masterpieces of the Italian Renaissance in literature and the other arts. Authors and artists studied range from Pico to Ariosto and Machiavelli, from Botticelli to Leonardo and Michelangelo. Precludes credit for ITAL 405.

**ITST 416 (3) Classics of Seventeenth-Century Italian Literature and Culture**

Classics of the Italian literature of the Mannerist and Baroque age in their intellectual, socio-political, and cultural context. Credit will be granted for only one of ITST 416 or ITAL 406. *Equivalency: ITAL 406.*

**ITST 417 (3) Classics of Eighteenth-Century Italian Literature and Culture**

Classics of the Italian literature of the age of the Enlightenment in its intellectual, socio-political, and cultural context. Credit will be granted for only one of ITST 417 or ITAL 407. *Equivalency: ITAL 407.*

**ITST 418 (3) Topics in Nineteenth-Century Italian Literature and Culture in Translation**

Italian literature of the 19th century in its intellectual, socio-political, and cultural context. Precludes credit for ITAL 408.

**ITST 419 (3) Topics in Modern and Contemporary Italian Literature and Culture in Translation**

Italian literature of the 20th century in its intellectual, socio-political and cultural context. Precludes credit for ITAL 409.

**ITST 421 (3) Special Topics in Italian Studies**

Course content will vary. May be taken twice for a total of 6 credits.

**ITST 432 (3) Italian Cinema and Its Cultural Background**

Films with English subtitles. Precludes credit for ITAL 430. Course content will vary. May be taken twice for a total of 6 credits.

**ITST 495 (3) Research Intensive Seminar in Italian Literature and Culture**

Credit will be granted for only one of ITAL 495 or ITST 495.

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**Chemical and Biological Engineering, Faculty of Applied Science**

**IWME: Integrated Water Management Engineering**

**IWME 501 (3) Environmental Fluid Mechanics**

Governing equations for incompressible, non-rotating flows of variable density; equations of motion for stratified fluids; selective withdrawal; flow over topography; estuarine and exchange flows; hydrodynamic stability. *This course is not eligible for Credit/D/Fail grading.*

**IWME 502 (3) Engineering Hydrology**

Water cycle and role of water in the environment and environmental engineering. Physical and statistical prediction methods for design related to hydrologic systems; precipitation; evaporation; snow hydrology; infiltration and base flow; surface runoff; channel and storage routing; unit hydrograph methods. *This course is not eligible for Credit/D/Fail grading.*

**IWME 503 (3) Chemical and Biological Industrial Water Treatment Design**

Fundamental principles of process design for chemical and biological systems to treat water used in and effluents generated from industrial processes. Industry application examples: mining, oil sands, oil and gas, pulp and paper, agriculture, food and beverage. *This course is not eligible for Credit/D/Fail grading.*

**IWME 504 (3) Water and Wastewater Management Strategies**

Chemical and microbiological quality and contaminations, techniques and analytical procedures for assessing and monitoring chemical and microbiological water quality; water and wastewater quality standards, pollution prevention strategies and policies;
risk analysis; asset management. This course is not eligible for Credit/D/Fail grading.

IWME 505 (3) Water Resources Systems Planning and Management
Art and science of modelling for integrated water resources planning and management; practice of developing and deploying simulation and optimization models to solve water problems; risk informed decision making frameworks and stakeholder processes for analysis of water resources systems. This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

JAPN: Japanese

For each academic session (W and S), prior to registration in any JAPN course, students are required to review the Japanese Registration Guidelines at http://asia.ubc.ca/undergraduate/placement-tests/registration-guide-for-japanese-language-courses/ to determine if a Japanese Placement Test at http://asia.ubc.ca/undergraduate/placement-tests/ is required. Note: Students must obtain a minimum grade of 60% to advance to the next level of language. This applies to all students in JAPN language courses, not just language majors.

JAPN 100 (3) Beginning Japanese IA
An introduction to modern spoken and written Japanese with emphasis on both form (grammar and syntax) and functions. (Non-intensive). Not available for credit to students with JAPN 11 and/or JAPN 12. Credit will be granted for only one of JAPN 100 or JAPN 160. This course is not eligible for Credit/D/Fail grading.

JAPN 101 (3) Beginning Japanese IB
Continuation of JAPN 100 (Non-intensive). Not available for credit to students with JAPN 12. Credit will be granted for only one of JAPN 101 or JAPN 160. This course is not eligible for Credit/D/Fail grading.
Prerequisite: JAPN 100.

JAPN 160 (6) Intensive Beginning Japanese I
An introduction to modern spoken and written Japanese with emphasis on both form (grammar and syntax) and functions. Offered in Term 1. Not available for credit to students with JAPN 12. Students are recommended to complete JAPN 160 and 260 in the same year. Credit will be granted for only one of JAPN 160 or JAPN 150 or both JAPN 100, JAPN 160. This course is not eligible for Credit/D/Fail grading.

JAPN 200 (3) Beginning Japanese II A
Continuation of JAPN 101 (Non-intensive). Credit will be granted for only one of JAPN 200 or JAPN 102 or JAPN 260. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 101, JAPN 150, JAPN 160.

JAPN 201 (3) Beginning Japanese II B
Continuation of JAPN 200 (Non-intensive). Credit will be granted for only one of JAPN 201 or JAPN 103 or JAPN 260. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 102, JAPN 200.

JAPN 204 (6) Basic Japanese Grammar
Emphasis on grammar, writing and reading. Intended for students with a background in spoken Japanese. Credit will be granted for only one of JAPN 204 or JAPN 104. This course is not eligible for Credit/D/Fail grading.

JAPN 260 (6) Intensive Beginning Japanese II
Continuation of JAPN 160. Offered in Term 2. Students are recommended to complete JAPN 160 and 260 in the same year. Credit will be granted for only one of JAPN 260 or JAPN 151 or both JAPN 102, JAPN 103 or both JAPN 200, JAPN 201. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 101, JAPN 150, JAPN 160.

JAPN 261 (9) Enriched Summer Intensive Beginning Japanese
An integrated language course developing communicative competence in speaking, listening to, reading, and writing modern Japanese. Credit will be granted for only one of JAPN 261 or JAPN 161. This course is not eligible for Credit/D/Fail grading.

JAPN 320 (3) Intermediate Japanese I A
Integrated coverage of topics on culture and cross-cultural communication designed to develop competencies in speaking,
listening, reading, and writing. It is strongly recommended that JAPN 320 and JAPN 321 be taken in the same year. Credit will be granted for only one of JAPN 320 or JAPN 210 or JAPN 360. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 103, JAPN 151, JAPN 201, JAPN 260.

**JAPN 321 (3) Intermediate Japanese I B**

Continuation of JAPN 320. It is strongly recommended that JAPN 320 and JAPN 321 be taken in the same year. Credit will be granted for only one of JAPN 321 or JAPN 211 or JAPN 360. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 210, JAPN 320.

**JAPN 322 (3) Intermediate Japanese II A**

It is strongly recommended that students plan to complete both JAPN 322 and JAPN 323 within one year. Credit will be granted for only one of JAPN 322 or JAPN 212 or JAPN 361. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 211, JAPN 250, JAPN 321, JAPN 360.

**JAPN 323 (3) Intermediate Japanese II B**

A continuation of JAPN 322. It is strongly recommended that students plan to complete both JAPN 322 and JAPN 323 within one year. Credit will be granted for only one of JAPN 322 and JAPN 212 or JAPN 361. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 212, JAPN 322.

**JAPN 342 (6) Reading Course in Japanese for Honours Students**

**JAPN 360 (6) Intensive Intermediate Japanese I**

Integrated coverage of topics on culture and cross-cultural communication designed to develop competencies in speaking, listening, reading, and writing. Offered in Term 1. It is strongly recommended that students plan to complete both JAPN 360 and JAPN 361 within one year. Credit will be granted for only one of JAPN 322 or JAPN 212 or both JAPN 210, JAPN 211 or both JAPN 320, JAPN 322. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 103, JAPN 151, JAPN 201, JAPN 260.

**JAPN 361 (6) Intensive Intermediate Japanese II**

Continuation of JAPN 360. It is strongly recommended that students plan to complete both JAPN 360 and JAPN 361 within one year. Credit will be granted for only one of JAPN 361 or JAPN 251 or both JAPN 212, JAPN 213 or both JAPN 322, JAPN 323. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 211, JAPN 250, JAPN 321, JAPN 360.

**JAPN 400 (3) Advanced Modern Japanese: Reading and Writing I**

Selected texts covering various aspects of Japanese cultural history and contemporary Japanese culture/society; emphasis on grammatical analysis and development of advanced competencies for reading and writing. It is strongly recommended that students plan to complete both JAPN 400 and JAPN 401 within one year. Credit will be granted for only one of JAPN 400 or JAPN 300. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 213, JAPN 251, JAPN 323, JAPN 361.

**JAPN 401 (3) Advanced Modern Japanese: Reading and Writing II**

Continuation of JAPN 301. It is strongly recommended that students plan to complete both JAPN 400 and JAPN 401 within one year. Credit will be granted for only one of JAPN 401 or JAPN 301. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 300, JAPN 400.

**JAPN 402 (3) Advanced Modern Japanese: Conversation and Composition I**

Improvement of speaking and writing skills through readings and discussions on a variety of social and cultural issues; emphasis on appropriate language use in formal situations. It is strongly recommended that students plan to complete both JAPN 402 and JAPN 403 within one year. Credit will be granted for only one of JAPN 402 or JAPN 302. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** One of JAPN 213, JAPN 251, JAPN 323, JAPN 361.

**JAPN 403 (3) Advanced Modern Japanese: Conversation and Composition II**

Improvement of speaking and writing skills through readings and discussions on a variety of social and cultural issues; emphasis on the development of formal presentation skills. It is strongly recommended that students plan to complete both JAPN 402 and JAPN 403 within one year. Credit will be granted for only one of JAPN 403 or JAPN 303.

**Prerequisite:** One of JAPN 302, JAPN 402.

**JAPN 422 (3) Classical Japanese I**

The grammar, orthography, and literary style of pre-modern Japanese (bungo). It is strongly recommended that students have 12 credits of JAPN, or equivalent, prior to registration. Credit will be granted for only one of JAPN 422 or JAPN 311.
JAPN 423 (3) Classical Japanese II
A continuation of JAPN 422. Focus on reading pre-modern primary sources and producing English translations. Credit will be granted for only one of JAPN 423 or JAPN 312.
Prerequisite: One of JAPN 311, JAPN 422.

JAPN 424 (3) Japanese for Professional Life I
Technical Japanese as it is used in business, commerce, industry, etc. Emphasis on specialized current vocabulary and on the development of communicative competence relevant for workplaces in these fields. Credit will be granted for only one of JAPN 424 or JAPN 314.
Prerequisite: One of JAPN 213, JAPN 251, JAPN 323, JAPN 361.

JAPN 425 (3) Japanese for Professional Life II
Continuation of JAPN 424. Credit will be granted for only one of JAPN 425 or JAPN 315.
Prerequisite: One of JAPN 314, JAPN 424.

JAPN 450 (3) Advanced Oral Communication I
Oral communication skills appropriate for studying and working in a Japanese-speaking environment either formal or informal. Credit will be granted for only one of JAPN 450 or JAPN 410. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 300, JAPN 400 and one of JAPN 302, JAPN 402, JAPN 314, JAPN 424.

JAPN 451 (3) Advanced Oral Communication II
A continuation of JAPN 450. Credit will be granted for only one of JAPN 451 or JAPN 411. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 410, JAPN 450.

JAPN 452 (3) Readings in Modern Japanese Essays
Advanced reading and analysis of scholarly texts in modern Japanese drawn from history, sociology, economics, etc. Advanced conversation, composition, and practice in the use of standard reference tools as preparation for independent research in Japanese. Students are recommended to complete JAPN 403 prior to taking JAPN 452. Credit will be granted for only one of JAPN 452 or JAPN 408. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 301, JAPN 401.

JAPN 453 (3) Readings in Modern Japanese Literature
An advanced course in the reading and analysis of literary texts in modern Japanese. Advanced conversation, translation into English and practice in the use of standard reference tools as preparation for advanced research in Japanese. Credit will be granted for only one of JAPN 453 or JAPN 408. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 301, JAPN 401.

JAPN 456 (3) Newspaper Japanese I
Developing fluency in reading contemporary Japanese newspapers; concentration on current and emerging vocabulary, evolving grammatical features, and style of presentation. Credit will be granted for only one of JAPN 456 or JAPN 416. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 301, JAPN 401 and one of JAPN 302, JAPN 402, JAPN 314, JAPN 424.

JAPN 457 (3) Newspaper Japanese II
A continuation of JAPN 456. Credit will be granted for only one of JAPN 457 or JAPN 417. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of JAPN 416, JAPN 456.

JAPN 459 (3) Topics in Japanese Language, Culture, and Society
Advanced Japanese language course combined with analysis of various media in literary, journalistic, and popular genres drawn from history, sociology, cultural studies, etc. Practice in the use of standard reference tools prepares students for independent research in Japanese. Students are recommended to complete JAPN 403 prior to JAPN 459. Credit will be granted for only one of JAPN 459 or JAPN 419.
Prerequisite: One of JAPN 301, JAPN 401 and permission from instructor.

JAPN 460 (3) Grammatical Analysis of Japanese I
Analysis of the grammatical structure of modern Japanese. Contrastive analysis of Japanese and English as well as error analysis. Credit will be granted for only one of JAPN 460 or JAPN 420.
Prerequisite: One of JAPN 301, JAPN 401 and one of JAPN 303, JAPN 403.

JAPN 461 (3) Grammatical Analysis of Japanese II
A continuation of JAPN 460. Credit will be granted for only one of JAPN 461 or JAPN 421.
Prerequisite: One of JAPN 420, JAPN 460.

JAPN 462 (3) Researching Modern Japanese Religions
Research tools and approaches to the interdisciplinary study of modern Japanese religions (nineteenth century to the present) including state-of-the-field works in English, and locating primary and secondary materials in Japanese. Credit will be granted for only one of JAPN 462 or JAPN 452.
Prerequisite: 6 credits of 200- or 300-level courses in Asian religions; 3 credit writing-intensive course in Asian Studies; ability to read modern Japanese or 18 credits of Japanese language courses and permission of instructor.

JAPN 470 (3-18) c Supervised Study in the Japanese Language
Primarily for graduate students. Credit will be granted for only one of JAPN 470 or JAPN 440.

JAPN 472 (12) Tutorial in Japanese for Honours Students
This course will require the presentation of at least one research paper. Credit will be granted for only one of JAPN 472 or JAPN 442.

School of Journalism, Faculty of Arts

JRNL: Journalism

JRNL 100 (3/6) d New Media and Society
Development of new media technologies, their applications, and their cultural, political, and social impacts.

JRNL 400 (3) Feminist Postcolonial Critique and Journalism in a Digital Age
Feminist postcolonial critique of journalism, and an examination of underlying democratic ideals in a rapidly evolving media landscape.

JRNL 503 (3-9) d Journalism Practice and Standards
This course is not eligible for Credit/D/Fail grading.

JRNL 505 (3-9) d Principles of Investigative Journalism
This course is not eligible for Credit/D/Fail grading.

JRNL 510 (3) News Writing and Reporting
This course is not eligible for Credit/D/Fail grading.

JRNL 515 (3-9) c Integrated Journalism
Grammar and syntax of media across platforms; skills and knowledge-based model of learning with an emphasis on digital literacy. This course is not eligible for Credit/D/Fail grading.

JRNL 520 (1.5-9) d Special Topics in Contemporary Journalism
This course is not eligible for Credit/D/Fail grading.

JRNL 523 (3) Audience Research and Reception Theories
This course is not eligible for Credit/D/Fail grading.

JRNL 525 (3) Critical Approaches for Journalists
This course is not eligible for Credit/D/Fail grading.

JRNL 527 (3) Internship
This course is not eligible for Credit/D/Fail grading.

JRNL 530 (3) Advanced Video Reporting
This course is not eligible for Credit/D/Fail grading.

JRNL 533 (3) Media Ethics & Leadership
This course is not eligible for Credit/D/Fail grading.

JRNL 534 (3) Media Law
This course is not eligible for Credit/D/Fail grading.

JRNL 535 (3) Media and Society
This course is not eligible for Credit/D/Fail grading.

JRNL 539 (3-9) d Directed Studies
This course is not eligible for Credit/D/Fail grading.

**JRNL 540 (3)** Special Topics in Science and Environment Journalism
This course is not eligible for Credit/D/Fail grading.

**JRNL 548 (6)** Final Research Project
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**JRNL 549 (6-12)** Thesis
This course is not eligible for Credit/D/Fail grading.

**JRNL 550 (3)** Feature Writing
This course is not eligible for Credit/D/Fail grading.

**JRNL 555 (3-6)** International Reporting
This course is not eligible for Credit/D/Fail grading.

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### School of Kinesiology, Faculty of Education

**KIN: Kinesiology**

**KIN 101 (6)** Co-operative Work Placement
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**KIN 103 (3)** Active Health
Role of physical activity in the maintenance of a healthy life. Application of basic physical fitness and exercise methods, exercise techniques and fitness appraisal. [2-2]

**KIN 115 (3/6)** Performance Analysis of Selected Individual Sports and Activities
Specific topics to be announced each year. KIN 115 and 215 can be taken in any order. [2-2]

**KIN 151 (3)** Biomechanics I
Application of elementary principles of physics and math to a quantitative analysis of movement. Analysis will also focus on the development of forces within muscles and their effect on initiating and controlling human movement. [3-0]

**KIN 161 (3)** Leisure and Sport in Society
Introduction to the political, economic and social basis of leisure and sport; concepts, theories and problems. [3-0]

**KIN 190 (3)** Anatomy & Physiology I
Structure and function of the neuromuscular and skeletal systems of the human body. Special emphasis on movement analysis and the physiological effects of exercise. Please consult the School of Kinesiology Credit Exclusion Lists: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,205,352,1477. [2-2]

**KIN 191 (3)** Anatomy & Physiology II
Structure and function of the digestive, endocrine, urinary, circulatory and respiratory systems. Special emphasis on effects of exercise. Please consult the School of Kinesiology Credit Exclusion Lists: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,205,253,1477. [2-2]

**KIN 201 (6)** Co-operative Work Placement
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**KIN 215 (3/6)** Performance Analysis of Selected Team Sports and Activities
Specific topics to be announced each year. KIN 115 and 215 can be taken in any order. [2-2]

**KIN 230 (3)** Human Motor Behaviour I
Processes underlying human movement and learning motor skills and factors influencing acquisition, performance, and movement control. [3-0-0]
Prerequisite: Second-year standing.

**KIN 231 (3)** Sport and Exercise Psychology
Psychological theories and research related to sport and exercise behaviour. Please consult the School of Kinesiology Credit Exclusion Lists: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,205,352,1477 [3-0-0]

**Prerequisite:** Second-year standing.

**KIN 261 (3) Health Policy and Society**
Health policy and the social context in relation to active health. [3-0]
**Prerequisite:** Second-year standing.

**KIN 275 (3) Exercise Physiology I**
Acute and chronic effects of exercise on body systems; basic concepts of cardiovascular, respiratory and muscular responses to physical activity. [2-0-2]
**Prerequisite:** Second-year standing.

**KIN 284 (3) Lifespan Motor Development**
A lifespan approach to motor development that examines underlying factors affecting physical growth, physical activity behaviour, and human motor performance, while highlighting contemporary issues and trends in society. [3-0]
**Prerequisite:** Second-year standing.

**KIN 301 (6) Co-operative Work Placement**
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program. Pass/FailThis course is not eligible for Credit/D/Fail grading.

**KIN 303 (3) High Performance Conditioning in Physical Activity and Sport**
Conditioning methods, exercise techniques and appraisal methods for fitness in high performance physical activity and sport. [2-2]
**Prerequisite:** Third-year standing.

**KIN 330 (3) Human Motor Behaviour II**
Acquisition, performance, and control of skilled movements. Processes and underlying mechanisms involved in learning and performing motor skills. Credit will be granted for only one of KIN 330 or KIN 468. [2-2]
**Prerequisite:** Third-year standing.

**KIN 343 (3) Biology of Human Athletic Performance**
Basics of exercise physiology and related issues pertaining to sports and athletic performance for non-Kinesiology students. Not for credit in the B.Kin. Program. [3-0]
**Prerequisite:** Second-year standing.

**KIN 351 (3) Biomechanics II Mechanical Properties of Tissues**
Mechanics of muscular contraction and how the mechanical properties of the muscle, ligaments, tendons, and bone work synergistically. [2-0-2]
**Prerequisite:** Third-year standing.

**KIN 353 (3) Human Body Composition**
Examination of techniques for measuring the amounts of adipose tissue, muscle and bone in the body, and factors affecting body composition, with particular emphasis on physical activity. [3-0]
**Prerequisite:** Third-year standing.

**KIN 360 (3) Sport, Peace, and Conflict**
Relationships that sport and leisure have with peace, conflict, and social inequality in Canada and internationally. [3-0]
**Prerequisite:** Third-year standing.

**KIN 361 (3) Introduction to Athletic Training**
Recognition, prevention, and first aid treatment of common sports injuries. Laboratory sessions emphasize principles and techniques of basic protective taping and strapping. [2-2]
**Prerequisite:** Third-year standing.

**KIN 362 (3) Inclusive Physical Activity for Individuals with Special Needs**
For persons with disabilities; a developmental, lifelong approach to programming. Includes field work. [2-0-2]
**Prerequisite:** Third-year standing.

**KIN 365 (3) Foundations of Coaching**
Methods of athletic conditioning, planning the program, psychology of training and coaching, athletic evaluation. [3-0]
**Prerequisite:** Third-year standing.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisite:</th>
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</thead>
<tbody>
<tr>
<td>KIN 366 (3)</td>
<td>Movement Experiences for Young Children</td>
<td>The design and implementation of movement experiences for children in early childhood years.</td>
<td>Third-year standing.</td>
</tr>
<tr>
<td>KIN 367 (3)</td>
<td>Leisure Services for Persons with a Disability</td>
<td>Policy issues relating to leisure opportunities for persons with disabilities.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 369 (3)</td>
<td>Instructional Analysis and Design in Sport and Physical Activity Programs</td>
<td>Instructional design and technologies applied to sport and physical activity programs.</td>
<td>Third-year standing.</td>
</tr>
<tr>
<td>KIN 373 (3)</td>
<td>Research Methods in Kinesiology</td>
<td>Critical evaluation of research studies and methods with emphasis on the physical activity context.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 375 (3)</td>
<td>Exercise Physiology II</td>
<td>Transport of oxygen during exercise in humans. Regulation and integration of the cardiovascular and respiratory systems during exercise.</td>
<td>Third-year standing.</td>
</tr>
<tr>
<td>KIN 381 (3)</td>
<td>Leisure, Sport and Popular Culture</td>
<td>Selected aspects of leisure and sport examined in relation to modern social structures and cultures. Credit will be granted for only one of KIN 281 or KIN 381.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 382 (3)</td>
<td>Meaning and Values in Sport</td>
<td>An analysis of the experience of sports activities.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 383 (3)</td>
<td>The Modern Olympics: Power, Politics, and Performance</td>
<td>Examination of the Modern Olympic Games as an event with important political, economic, environmental, and cultural ramifications.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 389 (3)</td>
<td>Neuromuscular Integration of Human Movement</td>
<td>The neurophysiological and functional neuroanatomical processes involved in the sensory and motor control of movement, posture and balance in the human. Peripheral and central sensorimotor structures, and neurological diseases that effect human movement and balance control will be discussed.</td>
<td>Third-year standing.</td>
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<tr>
<td>KIN 390 (3)</td>
<td>Human Functional Musculoskeletal Anatomy</td>
<td>The musculoskeletal structures and neural innervations involved in the control of human movement. Attention will be given to the practical application of human anatomy as it pertains to clinical, athletic, or everyday situations.</td>
<td>Human Functional Musculoskeletal Anatomy.</td>
</tr>
<tr>
<td>KIN 392 (3)</td>
<td>The Leisure and Sport Industry</td>
<td>Economic and financial issues in the leisure and sport industry. Topics include entrepreneurship, economic impact, commercialization, patterns of ownership and control, and selected financial practices.</td>
<td>Third-year standing. Restricted to students in the BHK and BKin programs.</td>
</tr>
<tr>
<td>KIN 400 (3)</td>
<td>Planning Physical Education, Sport and Exercise Programs</td>
<td>Processes, techniques and considerations in the planning, implementation and evaluation of physical education, sport and exercise programs in both public and private agencies.</td>
<td>Third-year standing.</td>
</tr>
<tr>
<td>KIN 401 (6)</td>
<td>Co-operative Work Placement</td>
<td>Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program.</td>
<td>Third-year standing.</td>
</tr>
</tbody>
</table>
Pass/Fail This course is not eligible for Credit/D/Fail grading.

**KIN 402 (6) Co-operative Work Placement**
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program. Pass/Fail This course is not eligible for Credit/D/Fail grading.

**KIN 403 (6) Co-operative Work Placement**
Supervised, technical work experience in an established company or organization for a minimum of three months. Technical report. Restricted to students meeting the requirements of the School of Kinesiology and the Co-operative Education Program.

**KIN 415 (3) Conceptual Approaches to Games Education**
Examination of developmentally appropriate conceptual and tactical approaches to team game instruction. [2-2]
Prerequisite: Third-year standing.

**KIN 425 (3) Aging, Health, and the Body**
The sociology of aging and the body. Focus on how older adults perceive and experience health and illness. Prerequisite: Third-year standing.

**KIN 454 (3/6) Field Experience**
Students have the opportunity to develop their leadership, instruction, and professional skills in a variety of supervised fieldwork settings. Students should select the section of the course (A, B) most relevant to their program of study and career goals. Prerequisite: Third-year standing.

**KIN 455 (15) Field Work and Field Research Practicum**
Field work and a field research project will be undertaken concurrently in a cooperating leisure, sport or other agency over one term in fourth year (30 hours per week). Students will also attend weekly seminars to discuss field work and the field research projects. Limited enrolment This course is not eligible for Credit/D/Fail grading. Prerequisite: One of KIN 371, HKIN 371. Fourth-year standing and approval from KIN Program Coordinator.

**KIN 456 (3) Field Experiences in Physical Education Settings**
Analytical observations and supervised professional practice in physical activity settings. Prerequisite: KIN 369. Third-year standing. Restricted to students in the BHK and Bkin programs.

**KIN 461 (3) Prevention of Sports Injuries I**
Training and safety strategies for the prevention of injuries to the musculoskeletal system and sense organs. [3-0] Prerequisite: One of KIN 361, HKIN 361 and third-year standing. Corequisite: One of KIN 375, HKIN 375.

**KIN 462 (3) Skeletal Muscle Physiology: From Generation to Regeneration**
Cellular and molecular mechanisms of muscle adaptability to physical activity: muscle development, signaling cascades of hypertrophy and atrophy, and satellite cell contribution to muscle regeneration/repair; etiology of intramuscular fatigue. [3-0-1] Prerequisite: One of KIN 375, HKIN 375 and third-year standing.

**KIN 464 (3) Health Promotion and Physical Activity**
Current perspectives on health promotion and health education; design and implementation of health promotion strategies in a variety of arenas, particularly health promotion/education strategies aimed at encouraging physical activity. [3-0] Prerequisite: Third-year standing.

**KIN 465 (3) Interculturalism, Health and Physical Activity**
Examination of multiculturalism and interculturalism in the delivery of community-based physical activities for diverse populations; connections between physical activity and health in different cultural contexts. Community service learning and participation in culturally unfamiliar physical activities are core elements. Prerequisite: Fourth-year standing.

**KIN 469 (3) Chronic Health Issues, Physical Activity, and Community Practice**
Issues related to physical activity and public health. Focus on community interventions. Creation of activity plans that promote physical, mental, and/or social well-being in persons dealing with chronic health issues. Community service-learning component. [3-0] Prerequisite: Third-year standing.

**KIN 471 (3) Prevention of Sports Injuries II**
Training and safety strategies for the prevention of injuries or disorders of internal organs and central nervous system. Environmental and nutritional factors in conditioning and pre-event preparation. [3-0]
**KIN 473 (3) Neuroanatomy of Human Movement**
Neuroanatomy of human motion in healthy and clinical populations. [3-0]
Prerequisite: Third-year standing.

**KIN 475 (3) Pulmonary Physiology of Exercise**
Operation of the lungs, chest wall, and ventilatory control mechanisms during dynamic whole-body exercise. [3-0]
Prerequisite: Third-year standing.

**KIN 481 (3) Sport Marketing and Communication**
A seminar on the application of social science theories and methods to sport marketing and communication. [3-0]
Prerequisite: Third-year standing.

**KIN 489 (3-9) d Seminar**
Current topics and research in specific areas. [3-0-0]
Prerequisite: Fourth-year standing. Consult with Advisor for specific prerequisites.

**KIN 499 (3) Projects in Kinesiology**
Provides opportunities to perform research pertaining to a chosen area of kinesiology.
Prerequisite: Fourth-year standing and permission of the Associate Director, Undergraduate Program.

**KIN 500 (3/12) d Special Topics in Kinesiology**
This course is not eligible for Credit/D/Fail grading.

**KIN 515 (3) Gap Analysis**
Using analytics to obtain, describe, and visualize data to create a sport profile. Determine optimal programming decisions for coached athletes based on their performance pathway and gold medal profile. Apply research methods and principles of scientific inquiry, performance analysis, descriptive, prescriptive, and predictive analytics to improve athlete development and performance. This course is not eligible for Credit/D/Fail grading.

**KIN 516 (3) Psychology of Leadership and Group Processes**
Contemporary theory, research and application with regard to leadership and group processes in the context of sport and exercise. This course is not eligible for Credit/D/Fail grading.

**KIN 517 (3) Business of High Performance Sport in Canada**
Canada’s sport system, its governance and stakeholders; financial management for high performance sport; communications, marketing, and sponsorship of high performance sport. This course is not eligible for Credit/D/Fail grading.

**KIN 530 (3/6) d Directed Studies**
Topics selected by the student, with the approval of the Graduate Advisor, can be studied under the supervision of a member of the faculty. This course is not eligible for Credit/D/Fail grading.

**KIN 562 (3) Bioenergetics of Physical Activity**
Basic energy systems of the human body; primarily concentrating on the bioenergetics of the skeletal muscle cell, recovery from muscular work, substrate utilization, muscle fiber types, strength, endurance and the physiological assessment of maximal performance. This course is not eligible for Credit/D/Fail grading.

**KIN 563 (3) Measurement of Human Motion**
A critical evaluation of research tools used to measure and assess human motor performance including electromyography, anthropometry, ergometers, indirect calorimetry, cinematography, and indirect dynamics. This course is not eligible for Credit/D/Fail grading.

**KIN 564 (3) Psycho-Social Aspects of Physical Activity**
Selected psycho-social considerations in sport: initial and continuing involvement in the competitive sport environment. This course is not eligible for Credit/D/Fail grading.

**KIN 565 (3) Physiological Aspects of Physical Activity**
Survey of research regarding the physiological aspects of activity; the effects of altitude and environmental temperature on man’s performance in exercise and sports. This course is not eligible for Credit/D/Fail grading.

**KIN 567 (3) Human Motor Performance**
Processes underlying the ability to learn and perform motor skills. This course is not eligible for Credit/D/Fail grading.

**KIN 568 (3) Seminar in Human Sensorimotor Control**
Reports and discussions of research literature concerning theories and findings in human sensorimotor control. Emphasis is
given to understanding the basic mechanisms underlying sensorimotor control, utilizing frameworks drawn from motor behaviour, cognitive neuroscience, and neurophysiology. This course is not eligible for Credit/D/Fail grading.

**KIN 570 (3) Research Methods in Kinesiology**
Research methods applied to the study of sport and physical activity, the nature of scientific inquiry, the design of experiments, the survey as a research medium, the historical and philosophical methods of inquiry, the writing of the research report. This course is not eligible for Credit/D/Fail grading.

**KIN 571 (3) Qualitative Methods in Sport, Leisure, and Health Studies**
Theoretical, methodological, and ethical debates about and approaches to qualitative methods; issues in and approaches to qualitative inquiry. This course is not eligible for Credit/D/Fail grading. [3-0]

**KIN 572 (3) Research Methods in Sports Coaching**
Interpretation and evaluation of research methods and scientific findings related to coaching sciences. This course is not eligible for Credit/D/Fail grading.

**KIN 573 (3) Seminar in Mechanical Analysis of Human Movement**
An investigation of human movement using cinematographical and other research methods. The case study approach will be used to examine kinesiological concepts and principles. This course is not eligible for Credit/D/Fail grading.

**KIN 574 (3) Seminar in Health Promotion Through Physical Activity**
The relationship of new concepts in health to the promotion of health through physical activity; the application of research findings from a number of disciplines to the identification, selection, and targeting of health promotion/education strategies related to physical activity. This course is not eligible for Credit/D/Fail grading.

**KIN 580 (3) Seminar in Body, Exercise, and Society**
Personal, social, and cultural significance of the body in sport, exercise, and physical culture. This course is not eligible for Credit/D/Fail grading.

**KIN 581 (3) Sport, Leisure and Consumer Culture**
Sport and leisure are viewed in the context of theoretical debates about mass society and consumer culture. This course is not eligible for Credit/D/Fail grading.

**KIN 583 (3) Physical Education, Sport and Exercise Programs**
The development of curricula, implementation and evaluation techniques in physical education, sport and exercise programs; relationships of programs in schools, community centres and other institutions. This course is not eligible for Credit/D/Fail grading.

**KIN 585 (3) Performance Planning**
Application of findings from sport profile and gap analysis to the planning and design of high performance training and coaching programs. Focuses on quadrennial, annual, meso and microcycle planning to integrate key factors that impact athlete performance and progression along the athlete development pathway. This course is not eligible for Credit/D/Fail grading.

**KIN 586 (3) Coaching Effectiveness**
Analysis of athlete performance and appropriate design and application of coaching intervention and skill acquisition for athlete and coach development. This course is not eligible for Credit/D/Fail grading.

**KIN 591 (3) Seminar in the Organizational Analysis of Leisure**
Selected topics in organizational theory as applied to the analysis of leisure and sport organizations. This course is not eligible for Credit/D/Fail grading.

**KIN 595 (3) Master's Graduating Paper**
This course is not eligible for Credit/D/Fail grading.

**KIN 596 (6) High Performance Sport Inquiry**
Blended learning approach in a problem-based setting. Students support their own research interests within the high performance sport arena. This course is not eligible for Credit/D/Fail grading. Prerequisite: KIN 572.

**KIN 598 (3) Directed Field Studies in Sport and Physical Activity Agencies**
This course is not eligible for Credit/D/Fail grading.

**KIN 599 (12) Master's Thesis**
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**KIN 601 (3-12) c Doctoral Seminar**
This course is not eligible for Credit/D/Fail grading.
KIN 699 (0) Doctoral Dissertation
Pass/Fail.

Asian Studies, Faculty of Arts

KORN: Korean

For each academic session (W and S), prior to registration in any KORN course, students are required to complete the Korean Placement Interview. For more information, please visit http://asia.ubc.ca/undergraduate/placement-tests/. Note: Students must obtain a minimum grade of 60% to advance to the next level of language. This applies to all students in KORN language courses, not just language majors.

KORN 100 (3) Basic Korean I
An introduction to the grammar and syntax of modern spoken and written Korean. Credit will be granted for only one of KORN 100 or KORN 102.

KORN 101 (3) Basic Korean II
Continuation of KORN 100. Credit will be granted for only one of KORN 101 or KORN 102.
Prerequisite: KORN 100.

KORN 102 (6) Basic Korean
An introduction to the grammar and syntax of modern spoken and written Korean. As of 2011W, credit will be granted for only one of KORN 100/101 or KORN 102.

KORN 104 (6) Basic Korean Grammar
Emphasis on grammar, writing, and reading. For heritage learners and students with prior background in spoken Korean.

KORN 161 (9) Enriched Summer Intensive Beginning
An integrated language course developing communicative competence in speaking, listening to, reading, and writing modern Korean. This course is not eligible for Credit/D/Fail grading.

KORN 200 (6) Intermediate Korean
Reading and writing of modern colloquial Korean at an intermediate level. As of 2011W, credit will be granted for only one of KORN 201/202 or KORN 200.
Prerequisite: One of KORN 101, KORN 102.

KORN 201 (3) Intermediate Korean I
Reading and writing of modern colloquial Korean at an intermediate level. Credit will be granted for only one of KORN 201 or KORN 200.
Prerequisite: KORN 101.

KORN 202 (3) Intermediate Korean II
Continuation of KORN 201. Credit will be granted for only one of KORN 202 or KORN 200.
Prerequisite: KORN 201.

KORN 300 (6) Readings in Korean Topics
Readings in intermediate-level Korean on aspects of Korean culture, customs, and contemporary life, along with structured conversations based on those readings. As of 2011W, credit will be granted for only one of KORN 301/302 or KORN 300.
Prerequisite: One of KORN 200, KORN 202.

KORN 301 (3) Readings in Korean Topics I
Readings in intermediate-level Korean on aspects of Korean culture, customs, and contemporary life, along with structured conversations based on those readings. As of 2011W, credit will be granted for only one of KORN 301/302 or KORN 300.
Prerequisite: KORN 202. Or permission of instructor.

KORN 302 (3) Readings in Korean Topics II
Continuation of KORN 301. As of 2011W, credit will be granted for only one of KORN 301/302 or KORN 300.
Prerequisite: KORN 301 or permission of instructor.

KORN 351 (3/6) d Introduction to Sino-Korean Readings
Chinese characters in their Korean pronunciations and shapes. Students learn approximately 600 characters, related vocabulary, and do structured readings in mixed scripts on aspects of Korean culture and contemporary life.

Prerequisite: Permission of instructor.

KORN 410 (3/6) d Modern Korean Short Fiction
Reading and translating twentieth-century Korean short fiction. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) KORN 300 or (b) all of KORN 301, KORN 302.

KORN 411 (3/6) d Advanced Readings in Korean Non-Fiction
Guided readings on contemporary affairs from the Korean press and/or selected readings in Korean academic prose.
Prerequisite: KORN 300.

KORN 412 (3/6) d Korean-to-English Translation
Translation into English of Korean writing in various literary genres, including short story, poetry, personal essay, and academic essay. Supplementary readings in translation studies and translation theory.

KORN 415 (3/6) d Korean Conversation and Composition
Structured conversation practice and weekly composition assignments based on viewing one designated Korean television program per week.
Prerequisite: KORN 300.

KORN 420 (3) Readings in Middle and Early Modern Korean
History and structure of the Korean language through targeted close readings in different editions of an illustrated text from the 15th and 18th centuries.
Prerequisite: Non-heritage speakers should have completed KORN 410 or be taking it concurrently. Heritage and native speakers of Korean welcome.

KORN 440 (3/12) d Supervised Study in the Korean Language
Seminar in Korean-to-English literary translation. Primarily for, but not limited to, students in Asian Studies and Linguistics.
Prerequisite: KORN 410 or placement exam.

School of Library, Archival & Information Studies, Faculty of Arts

LAIS: Library, Archival and Information Studies

LAIS 605 (3) Seminar in Advanced Research Methods
This course is not eligible for Credit/D/Fail grading.

LAIS 607 (3) Doctoral Proseminar
This course is not eligible for Credit/D/Fail grading.

LAIS 608 (3) Academic and Research Practices in Library, Archival and Information Studies
This course is not eligible for Credit/D/Fail grading.

LAIS 609 (3-6) d Advanced Seminar in Library, Archival and Information Studies Topics
This course is not eligible for Credit/D/Fail grading.

LAIS 620 (6) Advanced Study in Major Area
This course is not eligible for Credit/D/Fail grading.

LAIS 621 (6) Advanced Study in Minor Area
This course is not eligible for Credit/D/Fail grading.

LAIS 699 (0) Doctoral Dissertation

School of Architecture and Landscape Architecture, Faculty of Applied Science

LARC: Landscape Architecture

LARC 316 (3) Trees and Shrubs in Landscape
Culture and identification of landscape materials with emphasis on woody plants. Elementary principles of landscape
composition. Suitable for students of other faculties and departments interested in landscape materials and their uses, but priority given to Agroecology and Landscape Architecture students. [2-2]

**LARC 415 (3) A Behavioural Approach to Planting Design**  
Functional, ecological, and behavioural theory and practice applied to planting design at different scales. [2-2]  
*Prerequisite:* LARC 316.

**LARC 421 (3) Creativity and Design Applied**  
An exploration of creativity and design and their application to a number of design disciplines. Web based. [3-0-0]

**LARC 431 (3) Landscape Technologies I: Site Engineering**  
Terrain design, drainage, and stormwater management. Open only to B. End. students. Credit will be granted for only one of LARC 431 or LARC 531.

**LARC 440 (3) SITE ANALYSIS AND PLANNING II**  
Site analysis and planning of relatively complex sites, emphasizing storm water management design. Open only to B.En.D. students. Credit will be granted for only one of LARC 440, LARC 540 or DES 231.

**LARC 444 (3) Green Network Planning**  
Theory and methods of long-range green space planning for urban areas. *This course is not eligible for Credit/D/Fail grading.*  
*Equivalency:* LARC 553.

**LARC 501 (9) Landscape Architecture Design Studio I**  
Landscape design methods and processes. Restricted to M.L.A. students. *This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* LARC 511.

**LARC 502 (9) Landscape Architecture Design Studio II**  
*This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* All of LARC 316, LARC 501.

**LARC 503 (9) Landscape Architecture Design Studio III**  
*This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* One of LARC 502, ARCH 500.

**LARC 504 (9) Landscape Architecture Design Studio IV**  
*This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* Either (a) LARC 502 or (b) ARCH 500 or equivalent.

**LARC 505 (9) Landscape Architecture Design Studio V**  
*This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* One of LARC 502, ARCH 501.

**LARC 510 (2-12) d Advanced Field Studies in Landscape Architecture**  
*This course is not eligible for Credit/D/Fail grading.*

**LARC 511 (2) Introductory Workshop**  
Commences in August the two weeks prior to Labour Day. Enrolment mandatory for all incoming students. A non-refundable fee will be charged to cover expenses. Credit will be granted for only one of LARC 511 or ARCH 502.*This course is not eligible for Credit/D/Fail grading.*

**LARC 515 (3) Planting Design**  
Functional, ecological, and behavioural theory and practice applied to planting design at different scales. *This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* LARC 316.

**LARC 522 (3) Landscape Architectural History**  
History, principles, and theory of landscape architecture in Europe, America and Asia. Influence of cultural attitudes and societal change upon natural environments, parks, gardens, and town planning.*This course is not eligible for Credit/D/Fail grading.* [3-0]

**LARC 523 (3) Landscape Architecture Theory**  
Theoretical positions in landscape architecture and their relation to designed landscapes. Seats are reserved for students who meet one of the following sets of restrictions: 1) M.Arch. students; 2) M.A.S.A. or M.A.S.L.A. students; and 3) M.L.A. students, by instructor's permissions only.*This course is not eligible for Credit/D/Fail grading.* [2-2]

**LARC 525 (3) Research Methods**  
An examination of various quantitative, qualitative and design research methods in landscape architecture using case studies, lectures and seminars.*This course is not eligible for Credit/D/Fail grading.*

**LARC 531 (3) Landscape Technologies I**  
Terrain design, drainage and stormwater management. Credit will be granted for only one of LARC 531 or LARC 431. *This
LARC 532 (3) Landscape Technologies II
Hard landscape materials. This course is not eligible for Credit/D/Fail grading.

LARC 540 (3) Site Analysis and Planning
Site analysis and planning of relatively complex sites, emphasizing stormwater management design. Credit will be granted for only one of LARC 540, LARC 440 or DES 231. This course is not eligible for Credit/D/Fail grading.

LARC 541 (3) Landscape Planning and Management
This course is not eligible for Credit/D/Fail grading.

LARC 542 (3) Aesthetics and Sustainability
Analysis and planning of landscapes to communicate sustainability and to inform public awareness and design by exploring the relationship between aesthetics and sustainability. This course is not eligible for Credit/D/Fail grading.

LARC 543 (3) Environment and Urban Form
Ecological structures and the structure and quality of urban life. This course is not eligible for Credit/D/Fail grading.

LARC 551 (3) Professional Practice
Ethical, legal and business context of professional practice, including contracts, project management. This course is not eligible for Credit/D/Fail grading.

LARC 553 (3) Green Network Planning
Theory and methods of long-range green space planning for urban areas. Credit will be granted for only one of LARC 444 or LARC 553. This course is not eligible for Credit/D/Fail grading.

LARC 570 (3/6) d Co-op Work Placement
A mechanism for students to earn academic credit for relevant work experience outside the university. Open only to M.L.A. students. This course is not eligible for Credit/D/Fail grading.

LARC 580 (2-6) d Directed Studies in Design Analysis, Programming and Theory
This course is not eligible for Credit/D/Fail grading.

LARC 581 (2-6) d Directed Studies in Landscape Planning and Sustainability
This course is not eligible for Credit/D/Fail grading.

LARC 582 (1-9) d Seminar: Special Topics
This course is not eligible for Credit/D/Fail grading.

LARC 593 (1) Landscape Architecture Seminar
A forum for the exchange of ideas and the presentation of papers by faculty, students, and visitors. Credit will be granted for only one of LARC 500 or LARC 593. This course is not eligible for Credit/D/Fail grading.

LARC 595 (3) Graduate Project Part I
Preparation of a graduation design project proposal including literature review. This course is not eligible for Credit/D/Fail grading. Prerequisite: LARC 525.

LARC 598 (9) Graduate Project Part II
Design component, completion, and defense of the graduation design project. Open only to M.L.A. candidates. This course is not eligible for Credit/D/Fail grading. Prerequisite: LARC 595.

LARC 599 (12) Research Thesis
Open only to M.A.S.L.A. candidates. This course is not eligible for Credit/D/Fail grading.

Faculty of Arts

LASO: Law and Society

LASO 204 (3) Introduction to Law and Society
Ideas, concepts, and frameworks for thinking about the nature of law and legal processes in both Canadian and global contexts.
**Faculty of Arts**

**LAST: Latin American Studies**

**LAST 100 (3) Introduction to Latin American Studies**
An overview of the culture and society of Latin America from ancient to contemporary times and from Argentina to Mexico.

**LAST 201 (3) Popular Culture in Latin America**
The culture of everyday life, both rural and urban: issues of identity, popular memory, resistance, negotiation, as expressed through ritual, crafts, the body, social movements, films, music, and literature.

**LAST 205 (3) Issues of Development in Modern Latin America**
Theory of development in the Latin American context: current problems and development alternatives.

**LAST 301 (3) Human and Civil Rights in Latin America**
Focuses on human rights movements; state violence and impunity; reform of criminal justice systems; rights of indigenous peoples, women, and minorities; international protection of human rights; the UN and inter-American systems.

**LAST 303 (3) Indigenous Peoples of Latin America**
Ethnohistory and contemporary cultures of the indigenous peoples of Mexico, Middle America, and South America. Different cultural areas or regions may be selected to illustrate the course's principal themes.

**Classical, Near Eastern and Religious Studies, Faculty of Arts**

**LATN: Latin**

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

**LATN 101 (3) First-Year Latin I**
Classical Latin for students with no previous knowledge of Latin, Part I.

**LATN 102 (3) First-Year Latin II**
Classical Latin for students with no previous knowledge of Latin, Part II.

**LATN 201 (3) Second-Year Latin I**
Completion of the grammatical foundations of classical Latin, Part I.

**LATN 202 (3) Second-Year Latin II**
Completion of the grammatical foundations of classical Latin, Part II, and an introduction to the reading of unadapted passages of Latin literature.

**LATN 350 (3) Latin Literature of the Classical Period (Prose)**
Readings in Latin Prose.

**LATN 351 (3) Latin Literature of the Classical Period (Verse)**
Readings in Latin Verse.

**LATN 401 (3-12) c Latin Prose**
Studies in history, oratory and/or philosophy. May be repeated for up to 12 credits. It is recommended that the corequisite course be completed prior to LATN 401. This course is not eligible for Credit/D/Fail grading.

**LATN 402 (3-12) c Latin Verse**
Studies in narrative verse, comedy, satire, elegiac and lyric poetry. May be repeated for up to 12 credits. It is recommended that the corequisite course be completed prior to LATN 402. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of LATN 301, LATN 350, LATN 351.

LATN 501 (3/6) c Latin Prose
History, oratory and/or philosophy. Credit will not be given for both LATN 401 and LATN 501. This course is not eligible for Credit/D/Fail grading.

LATN 502 (3/6) c Latin Verse
Narrative verse, comedy, satire, elegiac and lyric poetry. Credit will not be given for both LATN 402 and LATN 502. This course is not eligible for Credit/D/Fail grading.

LATN 521 (3/6) c Studies in Latin Literature
This course is not eligible for Credit/D/Fail grading.

LATN 525 (3/6) d Seminar in Latin Literature
This course is not eligible for Credit/D/Fail grading.

LATN 530 (3/6) d Seminar in Roman Archaeology
This course is not eligible for Credit/D/Fail grading.

LATN 535 (3/6) d Seminar in Roman History
This course is not eligible for Credit/D/Fail grading.

LATN 540 (3/6) d Seminar in Latin Palaeography
This course is not eligible for Credit/D/Fail grading.

LATN 545 (3/6) d Seminar in Latin Epigraphy
This course is not eligible for Credit/D/Fail grading.

LATN 550 (3/6) c Directed Studies
This course is not eligible for Credit/D/Fail grading.

LATN 649 (0) Doctoral Dissertation

Peter A. Allard School of Law

LAW: Law

LAW 201 (6) Canadian Constitutional Law
Principles of Canadian constitutional law, including Canadian federalism, the Charter of Rights and Freedoms, and the unique constitutional status and rights of Aboriginal Peoples in Canada.

LAW 211 (5) Contracts
Historical development; formation and enforceability of contracts; parties; contractual terms; changes of circumstances; remedies for breach.

LAW 221 (5) Criminal Law and Procedure
Bases of criminal responsibility; principles and objectives of the criminal law and procedure; pre-trial procedure.

LAW 231 (5) Property Law
The legal concept of ownership and its changing nature and application, including equitable principles, the acquisition and transfer of interests, the regulation of use, Aboriginal title, and statute-based systems for registering interests in land.

LAW 241 (5) Torts
A study of the bases of civil liability for intentionally and accidentally caused harms.

LAW 251 (2) Public Law
An overview of the constitutional and statutory law governing the legislative, executive, and judicial branches of government in Canada, including an introduction to statutory construction and analysis and the administration of law in Canada.

LAW 261 (2) Transnational Law
Introduction to principles of public and private international law and research methods for international legal materials. This course is not eligible for Credit/D/Fail grading.

LAW 281 (2) Legal Research and Writing
Introduction to legal research and writing skills and the use of legal databases.
LAW 300 (3) Jurisprudence and Critical Perspectives
Introduction to the basic principles of legal theory and critical perspectives on law. Credit will be granted for only one of LAW 290 or LAW 300.

LAW 301 (3) Philosophy of Law
An examination of the principal schools of legal theory, such as legal positivism, legal realism, sociological jurisprudence, and contemporary rights theory. Not offered each year, consult Faculty.

LAW 302 (3) Fundamental Concepts of Law
A study of some of the fundamental principles and ideas that cut across many areas of the substantive law, including such concepts as fault, intent, legal personality, possession, ownership, justice, and causation. Not offered each year, consult Faculty.

LAW 303 (3) Legal Traditions and Ideas of Law
Historical and comparative study of the evolution of legal systems from custom and proto law emphasizing influences and sharing ideas among traditions of the Ancient Near East, Athens, Roman Empire, Western Europe and China. Not offered each year, consult Faculty.

LAW 305 (3) Law, Society and State
Theories of the relationship between the legal system, social relations and the state. Not offered each year, consult Faculty.

LAW 306 (3) Corporate Social Responsibility and the Law
This course is not eligible for Credit/D/Fail grading.

LAW 307 (3) Women, Law and Social Change
A survey of feminist approaches to law, with reference to selected substantive areas of the law.

LAW 308 (3) Feminist Legal Theory
Recent developments in feminist legal theory. Not offered each year, consult Faculty.

LAW 309 (1-3) d Topics in Feminist Legal Studies
Not offered each year, consult Faculty.

LAW 310 (3) Economic Analysis of Law
Economic analysis used to explore, describe, evaluate and offer prescriptive suggestions for legal decision-making. Not offered each year, consult Faculty.

LAW 311 (3) Property Law and Theory
The idea of property, its origins, its justifications, its uses, its effects, and the rules that surround and create it.

LAW 312 (1-3) d Topics in Philosophy of Law and Theoretical Perspectives
Not offered each year, consult Faculty. This course is not eligible for Credit/D/Fail grading.

LAW 313 (3) Legal History
The relationship between law, society and historical change, normally emphasizing 19th and 20th century issues. Not offered each year, consult Faculty.

LAW 315 (1-3) d Topics in Legal History
Not offered each year, consult Faculty.

LAW 316 (3) International Law
The history, sources and evidence of international law and its relation to municipal law; international personality; state jurisdiction; and treaties. Students who have taken POLI 465 cannot take this course.

LAW 318 (3) Marine Resources Law
Legal regimes governing the protection and exploitation of ocean resources. Not offered each year, consult Faculty.

LAW 319 (3) International Human Rights
The recognition and protection of human rights in international law. Not offered each year, consult Faculty.

LAW 320 (3) Indigenous Peoples in Comparative and International Law
The legal situation of indigenous peoples in various states and in modern international law. Not offered each year, consult Faculty.

LAW 321 (3) Law of Armed Conflict
The legal basis for armed conflict or military operations; the rights and obligations of combatants and civilians in a region of armed conflict; war crimes.
LAW 322 (3) International Law Problems
Selected issues in international law. Not offered each year, consult Faculty.
Prerequisite: LAW 316.

LAW 323 (3) International Environmental Law
Customary international law and treaties relating to the environment; institutional structures. Not offered each year, consult Faculty.

LAW 324 (1-3) Topics in International Law and Transactions
Not offered each year, consult Faculty.

LAW 325 (3) Conflict of Laws
A study of the private legal problems arising in cases in which the relevant facts cut across provincial or national boundaries. Recommended to be taken in third year.

LAW 326 (3) Globalization and Law

LAW 327 (3) International Trade Law
Rules and regulatory systems that govern the international movement of capital, goods and services.

LAW 328 (3) International Business Transactions
Legal problems in international financial and commercial transactions. Not offered each year, consult Faculty.

LAW 329 (3) International Commercial Disputes
International commercial arbitration and other means for resolving legal disputes relating to international commercial transactions. Not offered each year, consult Faculty.

LAW 330 (3) Cultural Property and Art Law
National and international aspects of the law relating to the art trade and the protection and regulation of cultural property and cultural heritage.

LAW 331 (1-3) Topics in Cultural Heritage and Art Law
Not offered each year, consult Faculty.

LAW 332 (3) Maritime Law
Canadian maritime law and admiralty practice.

LAW 333 (3) Cultural Law
Relationship of law to cultural activities and phenomena. International, national, and indigenous laws as they apply to various forms of tangible and intangible cultural expression. This course is not eligible for Credit/D/Fail grading.

LAW 334 (3) Introduction to Asian Legal Systems
Introduction to the comparative study of legal systems of East and South-East Asia, including those of China and Japan.

LAW 336 (3) Chinese Law: Implications for Canada-China Relations
Overview of the laws and legal system in the People’s Republic of China with some introduction to Taiwan law. Legal interpretation of implications for Canada-China relations.

LAW 337 (3) Trade and Investment in The People’s Republic of China
The legal regime in The People’s Republic of China governing trade and foreign investment. Not offered each year, consult Faculty.

LAW 338 (3) Japanese Law
Constitutional foundation and protection of human rights under Japanese law.

LAW 339 (3) Human Rights in Asia
Legal issues relating to civil, political, social and cultural rights in particular areas in Asia. Not offered each year, consult Faculty.

LAW 340 (3) Comparative Law
Basic theory of comparative law and the differences between the civil law tradition and the common law tradition. This course is not eligible for Credit/D/Fail grading.

LAW 341 (3) European Union Law
The legal system of the European Union as created by the treaties establishing the Union and by the Union’s institutions. Not offered each year, consult Faculty.

LAW 342 (1-3) Topics in Comparative Law
Not offered each year, consult Faculty.

**LAW 343 (1-3) d Topics in Public Law**
Not offered each year, consult Faculty. *This course is not eligible for Credit/D/Fail grading.*

**LAW 344 (3) Innovations in Governance and Regulatory Design**
Emerging interdisciplinary scholarship on regulation, governance, and institutional design. Examination of research and experience around both formal and legal regulatory strategies, and other informal, centred, or non-state-based methods of ordering individual and organizational behaviour.

**LAW 348 (3) Comparative Constitutional Law**
Comparison of the constitutional history, government structure and powers, and protection of individual rights between the United States and Canada. *This course is not eligible for Credit/D/Fail grading.*

**LAW 349 (1-3) d Topics in Constitutional Law**
Not offered each year, consult Faculty.

**LAW 350 (3) Innovations in Governance and Regulatory Design**
Emerging interdisciplinary scholarship on regulation, governance, and institutional design. Examination of research and experience around both formal and legal regulatory strategies, and other informal, centred, or non-state-based methods of ordering individual and organizational behaviour.

**LAW 351 (1-3) d Topics in Human Rights**
Not offered each year, consult Faculty.

**LAW 352 (3) Aboriginal Peoples and Canadian Law**
Survey of the history and present status of the legal relationships between Canada’s Aboriginal peoples and the state. Credit will be granted for only one of LAW 200 or LAW 352.

**LAW 353 (3) Aboriginal and Treaty Rights**
Rights of Aboriginal people stemming from their Aboriginal status and from treaties. Not offered each year, consult Faculty. *Prerequisite:* One of LAW 200, LAW 352.

**LAW 354 (3) First Nations Self-Government**
Issues relating to First Nations’ assumption of self-government powers. Not offered each year, consult Faculty.

**LAW 355 (3) First Nations and the Administration of Justice**
The justice system and its operation in relation to First Nations people. Not offered each year, consult Faculty.

**LAW 356 (3) First Nations and Economic Development**
Legal issues affecting land use and economic activity involving First Nations’ resources. Not offered each year, consult Faculty.

**LAW 358 (1-3) d Topics in First Nations Law**
Not offered each year, consult Faculty.

**LAW 359 (3/4) d Family Law**
The law relating to family relationships, including the law of marriage, divorce, maintenance, custody, matrimonial property, and related matters. Credit will be granted for only one of LAW 240 or LAW 359. [3-0]

**LAW 360 (3) Children and the Law**
The civil and criminal law affecting juveniles; custody, guardianship and adoption. *Prerequisite:* LAW 240 or LAW 359 is recommended

**LAW 362 (1-3) d Topics in Family Law**
Not offered each year, consult Faculty.

**LAW 363 (3) Racism and Law**
Legal issues relating to race and racism, including related issues of gender, culture or identity. Not offered each year, consult Faculty.

**LAW 364 (1-3) d Topics in Race and Law**
Not offered each year, consult Faculty.

**LAW 365 (3) Women, Law and Family**
Feminist and other critical perspectives on the relationship between unequal gender relations and laws embodying a concept of "family". Not offered each year, consult Faculty.

**LAW 367 (3) Reproduction and Law**
Legal issues relating to human reproduction. Not offered each year, consult Faculty.

LAW 368 (3) Sexuality and Law
Legal issues relating to sexual activity, orientation and identification. Not offered each year, consult Faculty.

LAW 370 (1-3) d Topics in Social Justice
Not offered every year; consult the Faculty.

LAW 371 (1-3) d Topics in Law and Social Relations
Not offered each year, consult Faculty.

LAW 372 (3/4) d Administrative Law
The system of legal control exercised through non-judicial agencies and the relationship of the courts to the administrative process. Credit will be granted for only one of LAW 210, LAW 372, or LAW 509.

LAW 373 (1-3) d Topics in Administrative Law
Not offered each year, consult Faculty.

LAW 374 (3) Municipal Law
The municipality as a legal entity; its creation, operation and powers; by-laws and their validity; contractual liability; judicial review; business regulation; expropriation and land use control.

LAW 375 (3) Land Use Planning
The legal and administrative aspects of the regulation of land use and development, especially at the local level. Not offered each year, consult Faculty.

LAW 376 (1-3) d Topics in Municipal and Planning Law
Not offered each year, consult Faculty.

LAW 377 (3) Immigration Law
Admission of immigrants into Canada; refugee protection; practice and procedure before immigration tribunals and the courts.

LAW 378 (3) Refugee Law
International and Canadian refugee law; the Refugee Convention and its implementation in Canada; the practice of refugee law in Canadian courts and tribunals. Course content does not duplicate Law 377. This course is not eligible for Credit/D/Fail grading.

LAW 379 (4-11) d Externship
Students work for an approved organization, supervised by a Faculty-approved mentor and a faculty member. Consult the Faculty for full eligibility criteria. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) one of LAW 280, LAW 476 and either (a) LAW 240 or (b) all of LAW 359, LAW 260 or (c) all of LAW 400, LAW 270 or (d) LAW 469; or (b) one of LAW 387, LAW 392 or (c) one of LAW 230, LAW 459. Or other studies that provide adequate preparation for the program.

Corequisite: LAW 380.

LAW 380 (2-6) d Externship Reflection
Structured reflective exercises on the LAW 379 Externship experience.

Corequisite: LAW 379.

LAW 381 (3) Disabilities and Law
Legal issues relating to people with disabilities. Not offered each year, consult Faculty.

LAW 382 (3) Health Law
Legal and policy issues relating to the health care system, including legal aspects of individual and public health decision-making.

LAW 383 (3) Mental Health Law
The law relating to commitment and treatment issues for persons with mental disabilities.

LAW 385 (3) Social Welfare Law
Aspects of the law structuring the provision of welfare and other social services in Canada. Not offered each year, consult Faculty.

LAW 386 (3) Sustainable Development Law
The linkages, intersections, and tensions between the legal regulation of the environment and competing social and economic priorities.

LAW 387 (3/4) d Environmental Law
A foundation course dealing with the regulatory and policy framework for the protection of the environment in Canada, such as pollution control and biodiversity conservation.

LAW 388 (3) Environmental Law in Practice
Jurisdiction, remedies and administrative schemes as they apply in practice to selected environmental law problems. Not offered each year, consult Faculty.

LAW 389 (1-3) d Selected Issues in Environmental Law and Policy
Case studies of leading problems in environmental law and regulation. Not offered each year, consult Faculty.

LAW 390 (3) Environmental Law Workshop
Legal research and writing for environmental agency or NGO under supervision of faculty member and lawyer. Not offered every year, consult Faculty.

LAW 391 (1-3) d Topics in Environmental Law
Not offered each year, consult Faculty.

LAW 392 (3) Natural Resources Law
A foundation course dealing with legal problems common to the management of natural resources such as fisheries, mines and minerals, petroleum, forests, and water resources.

LAW 394 (3) Mining Law
Acquisition of mineral interests; development, financing and organization of mining companies; regulation of exploitation industry interests; management taxation. Not offered each year, consult Faculty.
Prerequisite: LAW 392 is recommended.

LAW 395 (3) Forest Law
Acquisition of timber interests; development, financing and organization of timber companies; regulation of exploitation industry interests; management taxation. Not offered each year, consult Faculty.
Prerequisite: LAW 392 is recommended.

LAW 396 (3) Fisheries Law
Legal regimes for the exploitation and regulation of fisheries. Not offered each year, consult Faculty.
Prerequisite: LAW 392 is recommended.

LAW 397 (3) Oil and Gas Law
Legal regimes for the disposition of interests in petroleum; government regulation. Not offered each year, consult Faculty.
Prerequisite: LAW 392 is recommended.

LAW 398 (1-3) d Topics in Natural Resources
Not offered each year, consult Faculty.

LAW 399 (3) Advanced Criminal Law
Selected topics in advanced substantive criminal law and related issues.

LAW 400 (3) Advanced Criminal Procedure
Selected topics relating to procedural law and practice in criminal matters. Credit will be granted for only one of LAW 260 or LAW 400.

LAW 401 (3) Penal Policy
Selected legal policy issues relating to punishment for crime. Not offered each year, consult Faculty.

LAW 402 (3) The Law of Sexual Offences
Criminal law relating to sexual offences, including non-consent, evidentiary and procedural rules, and sentencing. History of sexual offence laws and law reform movements. This course is not eligible for Credit/D/Fail grading.

LAW 404 (3) The Law of Homicide
Available in online distance education format only. Elements of sentencing for murder, manslaughter and infanticide; defences to homicide; parties to homicide; and corporate homicide. This course is not eligible for Credit/D/Fail grading.

LAW 405 (1-3) d Topics in Criminal Law
Not offered each year, consult Faculty.

LAW 406 (1-3) d Topics in Criminal Justice
Not offered each year, consult Faculty. This course is not eligible for Credit/D/Fail grading.

LAW 407 (3-4) d Taxation
A survey of the law and practice of income and capital gains taxes. Credit will be granted for only one of LAW 220, LAW 407, or LAW 506. [3-0]

LAW 408 (3) Taxation of Corporations and Shareholders
The taxation of corporations, the taxation of shareholders, and the tax implications of the reorganization of corporations. Credit will be granted for only one of LAW 408 or LAW 562.
Prerequisite: One of LAW 220, LAW 407.

LAW 409 (3) Taxation of Partnerships and Trusts
Survey of statutory and judicial rules governing the taxation of income earned through partnerships and trusts. Credit will be granted for only one of LAW 409 or LAW 563. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of LAW 220, LAW 407.

LAW 410 (3) International Taxation
The tax aspects of international transactions. Not offered each year; consult Faculty. Credit will be granted for only one of LAW 410 or LAW 565.
Prerequisite: One of LAW 220, LAW 407.

LAW 411 (3) Tax Policy
The policies underlying the creation and implementation of tax laws. Not offered each year, consult Faculty. Credit will be granted for only one of LAW 411 or LAW 566. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of LAW 220, LAW 407.

LAW 412 (3) Taxation of Trusts and Estates
Not offered each year, consult Faculty. Credit will be granted for only one of LAW 412 or LAW 564. This course is not eligible for Credit/D/Fail grading.
Prerequisite: LAW 407.

LAW 413 (3) Tax Administration and Dispute Resolution
Not offered each year, consult Faculty. Credit will be granted for only one of LAW 413 or LAW 567. This course is not eligible for Credit/D/Fail grading.
Prerequisite: LAW 407.

LAW 416 (3) Labour Law
Union-management relations; the collective bargaining process; the collective agreement, arbitration and conciliation procedure. The relationship between the union and its membership. Credit will be granted for only one of LAW 415 or LAW 416. [2-0] or [3-0]

LAW 417 (3) Labour Law and Policy
The role of the law in the operation of the labour market. Not offered each year, consult Faculty.

LAW 418 (3) Resolution of Labour Disputes
Labour arbitration and collective agreement negotiation and interpretation. Not offered each year, consult Faculty.
Prerequisite: One of LAW 415, LAW 416.

LAW 419 (3) Individual Employment Law
Legal aspects of employment relationships other that those arising by collective bargaining. Not offered each year, consult Faculty.

LAW 421 (1-3) d Topics in Labour Law
Not offered each year, consult Faculty. This course is not eligible for Credit/D/Fail grading.

LAW 422 (3) Intellectual Property
Copyright, patents, trade marks, industrial design, the protection of computer software, and torts such as passing-off and breach of confidence.

LAW 423 (1-3) d Topics in Intellectual Property
Not offered each year, consult Faculty.

LAW 424 (3) Communications Law
Selected legal issues relating to the communications industries and their regulation. Not offered each year, consult Faculty.

LAW 425 (3) Cyberspace Law
Legal issues arising from the development of the Internet and cyberspace. This course is not eligible for Credit/D/Fail grading.

LAW 426 (1-3) d Topics in Law and Technology
Not offered each year, consult Faculty.
LAW 430 (3) Advanced Legal Research
Research using electronic databases, information systems, and non-legal databases relevant to the resolution of legal issues.

LAW 432 (1-3) d Topics in Private Law
Not offered each year, consult Faculty.

LAW 434 (3) Medical Negligence Law
Legal issues relating to tort claims in negligence and related causes of action against health care providers, with a primary focus on physicians and hospital authorities.

LAW 435 (1-3) d Topics in Tort Law
Not offered each year, consult Faculty.

LAW 436 (3) Restitution
Unjust enrichment as the basis of civil liability. Not offered each year, consult Faculty.

LAW 437 (3) Commercial Transactions
The law of sale of goods, bills of exchange, promissory notes, and cheques. [3-0]

LAW 438 (3) Secured Transactions
The law governing the creation, perfection and enforcement of security interests in personal property.

LAW 439 (3) Construction Law
Legal issues relating to the construction process. Not offered each year, consult Faculty.

LAW 440 (3) Insurance Law
The general legal principles of life, automobile, fire and other types of insurance; the regulation of the insurance industry.

LAW 442 (3) Condominium Law
Legal issues over the lifecycle of condominium/strata property from creation and development, through operating life, to termination. This course is not eligible for Credit/D/Fail grading.

LAW 443 (3) Creditors' Remedies
Remedies of an unsecured creditor; fraudulent conveyances and preferences; builders’ liens; bankruptcy.
Prerequisite: LAW 437 and LAW 438 are recommended.

LAW 444 (3) Insolvency Law
The law relating to insolvency, receivership and bankruptcy. Not offered each year, consult Faculty.

LAW 447 (1-3) d Topics in Commercial Law
Not offered each year, consult Faculty.

LAW 448 (3) Sports Law
Legal issues relating to the sports industry and those who participate in it. Not offered each year, consult Faculty.

LAW 449 (3) Media and Entertainment Law
Selected legal issues relating to the media and entertainment industries and their regulation. Not offered each year, consult Faculty.

LAW 450 (1-3) d Topics in Sports, Media, Entertainment or Communications Law
Not offered each year, consult Faculty.

LAW 451 (3) Trusts
History and nature of trusts; express, resulting, implied and constructive trusts; charitable and purpose trusts; administration of trusts; breach of trust. Credit will be granted for only one of LAW 250 or LAW 451.

LAW 452 (3) Succession
The law of wills and intestate succession, variation of wills, principles of probate and administration of estates.
Prerequisite: LAW 250 or LAW 451 is recommended.

LAW 453 (3) Equitable Remedies
The history and development of equitable remedies such as specific performance, injunctions, declarations, relief against forfeiture, and tracing.

LAW 454 (1-3) d Topics in Trusts and Estates
Not offered each year, consult Faculty.
LAW 455 (3) Real Estate Transactions
The law relating to the sale and purchase of land, real estate agency, and mortgages.

LAW 457 (3) Real Estate Development
A study of the legal aspects of the development of real estate projects such as shopping centres, sports centres and condominiums. Not offered each year, consult Faculty.
Prerequisite: LAW 456.

LAW 458 (1-3) d Topics in Real Property
Not offered each year, consult Faculty.

LAW 459 (3/4) d Business Organizations
A conceptual overview of business organizations in Canada, including partnerships and corporations, and the rights and duties of shareholders and directors. Credit will be granted for only one of LAW 230, LAW 459, or LAW 508.

LAW 460 (3) Advanced Corporate Law
Selected topics such as the nature of shares, equity financing, corporate structure and reorganization, and shareholder squeezes. 
Prerequisite: One of LAW 230, LAW 459.

LAW 461 (3) Corporate Transactions
Legal aspects of selected transactions relating to public corporations and corporate governance. Not offered each year, consult Faculty.

LAW 462 (3) Close Corporations
The corporation, taxation, accounting, insurance and estate planning aspects of the close corporation. Not offered each year, consult Faculty.
Prerequisite: One of LAW 230, LAW 459.

LAW 463 (3) Securities Regulation
The law relating to the distribution of securities. Continuous and timely disclosure requirements and civil liability.

LAW 464 (3) Competition Policy
The law and policy relating to the regulation of competition in Canada and other jurisdictions. Not offered each year, consult Faculty. Credit will be granted for only one of LAW 414 or LAW 464.

LAW 465 (3) Introduction to Corporate Finance
Interdisciplinary elements of corporate finance and law, in both theory and practice. 
Prerequisite: One of LAW 230, LAW 459.

LAW 466 (3) Business Law Capstone
Integration of theoretical and practical elements of business law. For students opting for the Business Law Concentration.
Prerequisite: All of LAW 407, LAW 459, LAW 463. And 6 credits of other courses from the Concentration.

LAW 467 (1-3) d Topics in Corporate Law
Not offered each year, consult Faculty. This course is not eligible for Credit/D/Fail grading.

LAW 468 (3) Ethics and Professionalism
The ethical dimensions of legal practice in Canada, including legislation, regulations, rules of professional conduct and cases, and the roles of lawyers, the legal profession and the legal system including their role in securing access to justice.

LAW 469 (3) Civil Procedure
Problems in the conduct of civil litigation including: ethical considerations; substantive problems such as notice, pleading, and discovery; and selected procedural problems. Credit will be granted for only one of LAW 270 or LAW 469. [2-0] or [3-0]

LAW 470 (6) Innocence Project
Clinical program giving hands-on experience in reviewing claims of innocence post-conviction. Not offered every year; consult Faculty.
Corequisite: One of LAW 280, LAW 476 and LAW 471.

LAW 471 (3) Preventing Wrongful Convictions
Substantive legal principles and rules of evidence that can cause or help to prevent wrongful convictions or other miscarriages of justice. Roles of the participants in the criminal justice system. Not offered each year; consult Faculty.

LAW 472 (3) Advanced Trial Advocacy
Skills-training in all aspects of civil and criminal trial advocacy. This course is not eligible for Credit/D/Fail grading. [4-0-0]

Prerequisite: One of LAW 270, LAW 469. LAW 280 or LAW 476 is also recommended.

LAW 473 (3) Appellate Advocacy
Issues relating to advocacy before appellate courts; techniques of appellate advocacy. Not offered each year, consult Faculty.

LAW 474 (3) Trial Advocacy
Techniques of advocacy in civil and criminal cases including interviewing, pre-trial preparation, tactical analysis, development of facts, direct and cross examination and various ethical considerations. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of LAW 280, LAW 476.

LAW 475 (2-4) d Competitive Trial Advocacy Credit
Trial advocacy. Restricted to students participating in one or more faculty approved trial advocacy competitions. Students enrolled in this course must also be enrolled in LAW 474. This course is not eligible for Credit/D/Fail grading.

LAW 476 (3-4) d Evidence
The admissibility and use of evidence in litigation. Credit will be granted for only one of LAW 280, LAW 476, or LAW 507.

LAW 477 (3) Negotiation and Dispute Resolution
Negotiation and bargaining; formulation of general principles governing the negotiation process; negotiation in legal practice; alternative means of dispute resolution.

LAW 478 (3) Foundations of Dispute Resolution
Theoretical premises underlying the dispute-resolving process; arbitration, other non-judicial means of resolving legal disputes, and their relationship to litigation. Not offered each year, consult Faculty.

LAW 479 (3) Mediation
Mediation of legal disputes; negotiation theory and practice as they relate to mediation. Not offered each year, consult Faculty.

LAW 481 (1-3) d Topics in Litigation, Dispute Resolution and the Administration of Justice
Not offered each year, consult Faculty.

LAW 482 (1-3) d Topics in Procedure and Evidence
Not offered each year, consult Faculty.

LAW 483 (3-6) d Competitive Moots and Advocacy Credit A
Appellate and related forms of advocacy. Restricted to students representing the Faculty for the first time in an approved advocacy competition. This course is not eligible for Credit/D/Fail grading.

LAW 485 (3-6) d Client Counselling Competition Credit
Interviewing, counselling and negotiating. Restricted to students representing the Faculty in an approved client counselling competition. This course is not eligible for Credit/D/Fail grading.

LAW 486 (2) Law Review Credit
Editing and business operations by senior editors or the business manager for UBC Law Review, Canadian Journal of Family Law or any other equivalent legal journal based in the Allard School of Law. One time credit only; cannot be repeated. This course is not eligible for Credit/D/Fail grading.

LAW 488 (11) Clinical Term
Designed to explore the legal system in relation to disadvantaged members of society. Under supervision, students will act for clients in a range of legal matters and can expect to appear before courts and tribunals. Students will also work with community-based organisations. Credit will be granted for only one of LAW 490 or LAW 491. Pass/Fail This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of LAW 280, LAW 476.

LAW 489 (4) Clinical Term: Paper
The graded component of LAW 488.

LAW 490 (6) Clinical Criminal Law
Dealing with criminal files under the supervision of experienced lawyers. Credit will be granted for only one of LAW 488, LAW 490, or LAW 491. Pass/Fail This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of LAW 260, LAW 400 and one of LAW 280, LAW 476.

LAW 491 (6) Law Students Legal Advice Program Credit
Restricted to a limited number of upper year students who (a) in their first or second year have participated in the provision of legal services to the public through the Law Students Legal Advice Program, and (b) continue that participation in their second
or third year. Credit will be granted for only one of LAW 488, LAW 490, or LAW 491.

LAW 493 (2-4) d Directed Research
Enrolment restricted.

LAW 494 (2-4) d Directed Research
Enrolment restricted.

LAW 495 (2-4) d Directed Research
Enrolment restricted.

LAW 496 (2-4) d Directed Research
Enrolment restricted.

LAW 500 (4) Current Legal Problems
This course is not eligible for Credit/D/Fail grading.

LAW 501 (2-8) d Directed Research
Students will be able to undertake advanced research into a topic approved by a faculty member, under the supervision of and in consultation with, that faculty member. This course is not eligible for Credit/D/Fail grading.

LAW 504 (5-6) d Property Law
This course is not eligible for Credit/D/Fail grading.

LAW 505 (5) Canadian Public Law
This course is not eligible for Credit/D/Fail grading.

LAW 506 (4) Taxation
Law and practice of income and capital gains taxes. Credit will be granted for only one of LAW 506, LAW 220 or LAW 407. This course is not eligible for Credit/D/Fail grading.

LAW 507 (4) Evidence
The admissibility and use of evidence in litigation. Credit will be granted for only one of LAW 507, LAW 280 or LAW 476. This course is not eligible for Credit/D/Fail grading.

LAW 508 (3-4) d Business Organizations
A conceptual overview of business organizations in Canada, including partnerships and corporations, and the rights and duties of shareholders and directors. Credit will be granted for only one of LAW 508, LAW 230 or LAW 459. This course is not eligible for Credit/D/Fail grading.

LAW 509 (4) Administrative Law
The system of legal control exercised through non-judicial agencies and the relationship of the courts to the administrative process. Credit will be granted for only one of LAW 509, LAW 210 or LAW 372. This course is not eligible for Credit/D/Fail grading.

LAW 510 (2-4) d Sentencing
Comparative sentencing structures; competing sentencing philosophies and principles; the exercise of discretion; sentencing law and practice; sentencing advocacy; aids to sentencing, such as computerized information systems; prescriptive guidelines; problematic issues in sentencing, such as wife and child abuse. This course is not eligible for Credit/D/Fail grading.

LAW 511 (2-4) d International Criminal Law
Analysis of topics such as jurisdiction, immunity from prosecution, mutual assistance in penal matters, recognition and enforcement of foreign penal laws, and international police co-operation; examination of selected offences such as war crimes, crimes against humanity, genocide, terrorism, illicit drug trafficking, and torture. This course is not eligible for Credit/D/Fail grading.

LAW 515 (5) Canadian Private Law: Contractual Obligations and Remedies
This course is not eligible for Credit/D/Fail grading.

LAW 518 (2-4) d Feminist Legal Studies: Key Themes and Current Debates
Diverse theoretical perspectives, key resources for feminist research on law, and the viability of different strategies or methods of engaging with law. This course is not eligible for Credit/D/Fail grading.

LAW 521 (2-4) d Law and Development
Law and legal institutions in development policy and practice; multilateral, state and NGO perspectives. This course is not eligible for Credit/D/Fail grading.
LAW 522 (2-4) d Modern Legal Culture: Historical Explorations
Aspects of the history of ideas relating to law in North America and elsewhere. *This course is not eligible for Credit/D/Fail grading.*

LAW 524 (2-4) d Methodologies in Law and Policy
*This course is not eligible for Credit/D/Fail grading.*

LAW 525 (5) Canadian Criminal Law and Procedure
*This course is not eligible for Credit/D/Fail grading.*

LAW 530 (4) Advanced Legal Research and Writing
*This course is not eligible for Credit/D/Fail grading.*

LAW 549 (20) Master's Thesis
*This course is not eligible for Credit/D/Fail grading.*

LAW 552 (1-4) d Topics in Common Law Theory and Practice: Public Law I
*This course is not eligible for Credit/D/Fail grading.*

LAW 553 (1-4) d Topics in Common Law Theory and Practice: Public Law II
*This course is not eligible for Credit/D/Fail grading.*

LAW 554 (1-4) d Topics in Common Law Theory and Practice: Comparative and International Law
*This course is not eligible for Credit/D/Fail grading.*

LAW 555 (1-4) d Topics in Common Law Theory and Practice: Legal Theory and Practice
*This course is not eligible for Credit/D/Fail grading.*

LAW 556 (1-4) d Topics in Common Law Theory and Practice: Private and Commercial Law
*This course is not eligible for Credit/D/Fail grading.*

LAW 557 (1-4) d Topics in Common Law Theory and Practice: Human and Group Rights Law
*This course is not eligible for Credit/D/Fail grading.*

LAW 560 (3) Seminar in Topics in Common Law Theory and Practice
Completion of an upper-level 300- or 400-level J.D. seminar or workshop course 4 credit minimum, completion of a substantial research paper consisting of an advanced analysis relating to the subject matter of the particular seminar or workshop *This course is not eligible for Credit/D/Fail grading.*

LAW 561 (2) Fundamental Concepts in Tax Law
*This course is not eligible for Credit/D/Fail grading.*

LAW 562 (4) Taxation of Corporations and Shareholders
Taxation of corporations, taxation of shareholders, and the tax implications of the reorganization of corporations. Credit will be granted for only one of LAW 408 or LAW 562. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: One of LAW 220, LAW 407, LAW 506, LAW 561.

LAW 563 (3) Taxation of Partnerships and Trusts
Survey of statutory and judicial rules governing the taxation of income earned through partnerships and trusts. Credit will be granted for only one of LAW 409 or LAW 563. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: One of LAW 220, LAW 407, LAW 506, LAW 561.

LAW 564 (3) Taxation of Trusts and Estates
Not offered each year, consult Faculty. Credit will be granted for only one of LAW 412 or LAW 564. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: One of LAW 220, LAW 407, LAW 506, LAW 561.

LAW 565 (4) International Taxation
The tax aspects of international transactions. Credit will be granted for only one of LAW 410 or LAW 565. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: One of LAW 220, LAW 407, LAW 506, LAW 561.

LAW 566 (3) Tax Policy
The policies underlying the creation and implementation of tax laws. Credit will be granted for only one of LAW 411 or LAW 566. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: One of LAW 220, LAW 506, LAW 561.
LAW 567 (3) Tax Administration and Dispute Resolution
Not offered each year, consult Faculty. Credit will be granted for only one of LAW 413 or LAW 567. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of LAW 220, LAW 407, LAW 506, LAW 561.

LAW 568 (1-4) d Topics in Taxation
Credit will be granted for only one of LAW 413 or LAW 568. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of LAW 220, LAW 506, LAW 561.

LAW 569 (1-4) d Topics in International Taxation
Credit will be granted for only one of LAW 414 or LAW 569. This course is not eligible for Credit/D/Fail grading.
Corequisite: One of LAW 410, LAW 565.

LAW 610 (2-4) d Doctoral Seminar I: Issues in Legal Theory
Including law and feminism, Marxism, post-modernism, social theory, law and the state; legal liberalism and its critics, and other jurisprudential discourses. This course is not eligible for Credit/D/Fail grading.

LAW 611 (2-4) d Doctoral Seminar II: Comparative and Interdisciplinary Perspectives on Legal Theory
Applicability of legal concepts in different cultures and societies, and the consequences for the form and structure of law. This course is not eligible for Credit/D/Fail grading.

LAW 649 (0) Doctoral Dissertation

Faculty of Land and Food Systems

LFS: Land & Food Systems

As of July 1, 2015, the IHHS courses have been distributed among the following units: School of Social Work, School of Population and Public Health, and Faculty of Land and Food Systems.

LFS 100 (1) Introduction to Land, Food and Community
Orientation to the programs, learning environment and core values of the Faculty of Land and Food Systems; career programs; survey of professional opportunities and requirements. [1-0-0]

LFS 101 (3) Principles of Microeconomics with Applications to Land and Food Systems
Microeconomic principles focused on private and social decision making related to the use of land especially in agriculture, forestry, and conservation. Restricted to Faculty of Land and Food Systems students in Land One Option. Credit will be granted for only one of FRST 101, LFS 101, ECON 101, or ECON 310. This course is not eligible for Credit/D/Fail grading.

LFS 110 (3) Land One: First-year Integrative Seminar
Current issues and cases in Forestry and Land and Food Systems are examined with a focus on integration of first-year subjects and exposure to both Indigenous and Western perspectives. Restricted to Faculty of Land and Food Systems students in the Land One option. This course is not eligible for Credit/D/Fail grading.
Equivalency: FRST 110.

LFS 150 (3) Scholarly Writing and Argumentation in Land and Food Systems
Communicating concepts of food systems and links to human and environmental health through writing, elements of argumentation, evaluating evidence, and searching for and citing references to back up claims; small-class experience. Enrollment limited to LFS students with first year status and a Language Proficiency Index (LPI) of 4 or equivalent. This course is not eligible for Credit/D/Fail grading.
Equivalency: FRST 150.

LFS 250 (6) Land, Food and Community I: Introduction to Food Systems and Sustainability
Managed systems and concepts of sustainability; economic, ecological and social components; managed landscapes, agri-food systems, and communities; urban and rural systems; the land, food, nutrition and human health continuum.

LFS 252 (3) Land, Food, and Community: Quantitative Data Analysis
Introduction to tools needed for data analysis of the economic, ecological, health, and scientific components of land and food systems. [3-0-1]
Prerequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

LFS 301 (3) Aquaculture Field Studies
An orientation to the aquaculture system in BC. Participating students are assessed a fee.

LFS 302 (3/6) d International Field Studies
Field studies carried out abroad under staff direction. Participating students are assessed a fee.

LFS 340 (3) First Nations Health and the Traditional Role of Plants
This Interprofessional Health and Human Service (IHHS) course covers the First Nations medical systems and medicinal plants. Bridging the traditional with modern sciences. Credit will be granted for only one of LFS 340 or IHHS 301.

LFS 350 (3) Land, Food, and Community II: Principles and Practice of Community Food Security
Project-based application of the principles and processes of community food security. Emphasis on developing skills required to address economic, ecological, social, and technological components of managed landscapes, agri-food systems, and communities comprising the land, food, nutrition and health continuum.
Prerequisite: LFS 250.

LFS 398 (3) Co-operative Work Placement I
Work experience in relevant private and/or public sector settings. Work terms are normally four months long. Restricted to students admitted to the Co-op Program in Land and Food Systems. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Must attend all Co-op pre-employment workshops.

LFS 399 (3) Co-operative Work Placement II
Work experience in relevant private and/or public sector settings. Work terms are normally four months long. Restricted to students admitted to the Co-op Program in Land and Food Systems. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: LFS 398.

LFS 400 (3) Audio Storytelling
Adopts a journalistic framework to communicate powerful stories and present academic content in new ways through the use of audio technology. [1-2-0]

LFS 402 (3) Living Language: Science and Society
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance.
Prerequisite: Fourth-year standing or permission of the instructor.
Equivalency: APSC 402, ASTU 402, FRST 402, LLED 402, PHAR 402..

LFS 450 (3) Land, Food, and Community III: Leadership in Campus Food System Sustainability
Design, analysis, recommendation or implementation of solutions in response to a food sustainability issue faced by community partners. Emphasis is on professional communication, leadership development, project management and decision-making skills.

LFS 490 (3) Topics in Land and Food Systems
Analysis and interpretation of current issues related to land and food systems.

LFS 496 (3/6) d Career Development Internship
Technical work experience appropriate to students’ career goals. Enrolment subject to competition and availability of work placements.

LFS 498 (3) Co-operative Work Placement III
Work experience in relevant private and/or public sector settings. Work terms are normally four months long. Restricted to students admitted to the Co-op Program in Land and Food Systems. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: LFS 399.

LFS 499 (3) Co-operative Work Placement IV
Work experience in relevant private and/or public sector settings. Work terms are normally four months long. Restricted to students admitted to the Co-op Program in Land and Food Systems. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: LFS 498.

LFS 500 (3) Graduate Seminar
This course is not eligible for Credit/D/Fail grading.

LFS 501 (3) Approaches to the Integration of Knowledge
This course is not eligible for Credit/D/Fail grading.

LFS 549 (12) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

LFS 649 (0) Doctoral Dissertation

Language and Literacy Education, Faculty of Education

LIBE: Teacher Librarianship

LIBE 461 (3) Administration of the School Library Resource Centre
The role, philosophy, and management of school library resource centres in elementary and secondary schools. [3-0-0]
Equivalency: LIBE 381.

LIBE 463 (3) Selection of Learning Resources I
[3-0-0]
Equivalency: LIBE 383.

LIBE 465 (3) Organization of Learning Resources
[3-0-0]
Equivalency: LIBE 385.

LIBE 467 (3) Information Services I
[3-0-0]
Equivalency: LIBE 387.

LIBE 477 (3/6) d Special Topics in Teacher Librarianship
In-depth study of selected topics in library education. [3-0-0]

LIBE 494 (3/6) c Supervised Study in Teacher Librarianship
Equivalency: LIBE 449.

LIBE 508 (3/6) d Theory and Research in Teacher Librarianship
This course is not eligible for Credit/D/Fail grading.

LIBE 527 (3/6) d Seminar in Teacher Librarianship
Research and its application for school library resource centres. This course is not eligible for Credit/D/Fail grading.

LIBE 561 (3-12) c Laboratory Practicum
This course is not eligible for Credit/D/Fail grading.

LIBE 565 (3/6) d Special Course in Subject Matter Field
Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field. This course is not eligible for Credit/D/Fail grading.

LIBE 580 (3-12) c Problems in Education
Investigation and report of a problem. This course is not eligible for Credit/D/Fail grading.

LIBE 590 (3) Graduating Paper
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LIBE 598 (3-12) c Field Experiences
For students in master's, doctoral, and diploma programs. This course is not eligible for Credit/D/Fail grading.

LIBE 599 (6-12) d Master's Thesis
This course is not eligible for Credit/D/Fail grading.

School of Library, Archival & Information Studies, Faculty of Arts
LIBR: Library and Information Studies

LIBR 504 (3) Management of Information Organizations
This course is not eligible for Credit/D/Fail grading. Equivalency: ARST 570.

LIBR 506 (3) Human-Information Interaction
This course is not eligible for Credit/D/Fail grading.

LIBR 507 (3) Methods of Research and Evaluation in Information Organizations
This course is not eligible for Credit/D/Fail grading.

LIBR 508 (3) Information Practices in Contemporary Society
This course is not eligible for Credit/D/Fail grading.

LIBR 509 (3) Foundations of Resource Description and Knowledge Organization
This course is not eligible for Credit/D/Fail grading.

LIBR 511 (3) Cataloguing and Classification
This course is not eligible for Credit/D/Fail grading.

LIBR 512 (3) Indexing
This course is not eligible for Credit/D/Fail grading.

LIBR 514 (1-13) d Topics in the Bibliographic Control of Information
This course is not eligible for Credit/D/Fail grading.

LIBR 516 (3) Information Asset Management
This course is not eligible for Credit/D/Fail grading.

LIBR 520 (3) Survey of Literature and Other Materials for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 521 (3) Contemporary Literature and Other Materials for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 522 (1-13) d Literature and Other Materials for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 523 (3) Canadian Literature and other Materials for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 524 (3) Writing, Publishing and the Book Trade for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 525 (3) Illustrated Literature and Other Materials for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 526 (3) Literature and Other Materials for Young Adults
This course is not eligible for Credit/D/Fail grading.

LIBR 527 (3) Services for Children
This course is not eligible for Credit/D/Fail grading.

LIBR 528 (3) Services for Young Adults
This course is not eligible for Credit/D/Fail grading.

LIBR 529 (3) Services for Families and Early Literacy in the Preschool Years
This course is not eligible for Credit/D/Fail grading.

LIBR 530 (3) Subject-Based Information Services
This course is not eligible for Credit/D/Fail grading.

LIBR 531 (3) Client-Centred Services for Adults
This course is not eligible for Credit/D/Fail grading.

LIBR 532 (3) Science and Technology Information Sources and Services
This course is not eligible for Credit/D/Fail grading.

LIBR 533 (3) Legal Information Sources and Services
This course is not eligible for Credit/D/Fail grading.

LIBR 534 (3) Health Information Sources and Services
This course is not eligible for Credit/D/Fail grading.

LIBR 535 (3) Instructional Role of the Librarian
This course is not eligible for Credit/D/Fail grading.

LIBR 538 (1-13) d Specialized Literatures
This course is not eligible for Credit/D/Fail grading.

LIBR 539 (1-13) d Specialized Materials
This course is not eligible for Credit/D/Fail grading.

LIBR 541 (3) New Media for Children and Young Adults
This course is not eligible for Credit/D/Fail grading.

LIBR 542 (1-13) d Services for Youth
This course is not eligible for Credit/D/Fail grading.

LIBR 544 (1-13) d Services for Adults
This course is not eligible for Credit/D/Fail grading.

LIBR 545 (3) Adult Popular Reading & Media Interests
This course is not eligible for Credit/D/Fail grading.

LIBR 546 (1-13) d Issues in Information Services
This course is not eligible for Credit/D/Fail grading.

LIBR 550 (3) Systems Analysis and Design of Information Systems
This course is not eligible for Credit/D/Fail grading.

LIBR 551 (3) Library Automation and Systems
This course is not eligible for Credit/D/Fail grading.

LIBR 553 (3) Understanding Information Users in Diverse Environments
This course is not eligible for Credit/D/Fail grading.

LIBR 554 (3) Database Design
This course is not eligible for Credit/D/Fail grading.

LIBR 555 (3) Information Design I - Systems
This course is not eligible for Credit/D/Fail grading.

LIBR 556 (3) Information Design II - Documents
This course is not eligible for Credit/D/Fail grading.

LIBR 557 (3) Information Retrieval Systems: Concepts and Practice
This course is not eligible for Credit/D/Fail grading.

LIBR 558 (3) Information Retrieval Systems: Structures and Algorithms
This course is not eligible for Credit/D/Fail grading.

LIBR 559 (1-13) d Topics in Computer-Based Information Systems
This course is not eligible for Credit/D/Fail grading.

LIBR 561 (3) Information Policy
This course is not eligible for Credit/D/Fail grading.

LIBR 562 (3) International Issues and Innovations
This course is not eligible for Credit/D/Fail grading.

LIBR 563 (3) Information Ethics
This course is not eligible for Credit/D/Fail grading.

LIBR 569 (1-13) d Current Issues and Trends in Library Services and Information Science
This course is not eligible for Credit/D/Fail grading.

LIBR 570 (3) Marketing in Information Organizations
This course is not eligible for Credit/D/Fail grading.

LIBR 571 (3) Human Resources Management
This course is not eligible for Credit/D/Fail grading.

LIBR 572 (3) Information Services Consulting
This course is not eligible for Credit/D/Fail grading.

LIBR 573 (3) Financial Management of Information Organizations
This course is not eligible for Credit/D/Fail grading.

LIBR 574 (3) Project Management in Information Organizations
This course is not eligible for Credit/D/Fail grading.

LIBR 575 (3) Academic Libraries
This course is not eligible for Credit/D/Fail grading.

LIBR 576 (3) Public Libraries
This course is not eligible for Credit/D/Fail grading.

LIBR 577 (3) Special Libraries
This course is not eligible for Credit/D/Fail grading.

LIBR 578 (3) Planning and Design of Libraries
This course is not eligible for Credit/D/Fail grading.

LIBR 579 (1-13) d Topics in the Management of Libraries and Archives
This course is not eligible for Credit/D/Fail grading.

LIBR 580 (3) Collection Management
This course is not eligible for Credit/D/Fail grading.

LIBR 581 (3) Digital Libraries
This course is not eligible for Credit/D/Fail grading.

LIBR 582 (3) Digital Image and Text Collections
This course is not eligible for Credit/D/Fail grading.

LIBR 587 (3) Preservation
This course is not eligible for Credit/D/Fail grading. Equivalency: ARST 587.

LIBR 591 (3) Topics in Research Methods
This course is not eligible for Credit/D/Fail grading.

LIBR 592 (3) Directed Research Project
This course is not eligible for Credit/D/Fail grading.

LIBR 593 (3/12) d Seminar
This course is not eligible for Credit/D/Fail grading.

LIBR 594 (3) Directed Study
This course is not eligible for Credit/D/Fail grading.

LIBR 595 (0) Practicum

LIBR 596 (3) Professional Experience
This course is not eligible for Credit/D/Fail grading.

LIBR 597 (3) Research Collaboration
This course is not eligible for Credit/D/Fail grading.

LIBR 599 (6/12) d Thesis
This course is not eligible for Credit/D/Fail grading.

Linguistics, Faculty of Arts

LING: Linguistics
LING 100 (3) Introduction to Language and Linguistics
Study of language as a universal and uniquely human cognitive system: What universals do all languages share and how do languages differ? An investigation of sound systems, word-building, grammatical principles, language change, dialect variation, language acquisition, neurolinguistics. Recommended but not required for an honours, major, or minor in linguistics or speech sciences.

LING 101 (3) Languages of the World
A survey of the linguistic map of the world, examining how languages are genetically classified and how different languages evolve. Principles underlying different writing systems and the decipherment of historical documents. Issues of languages in contact, minority language endangerment, language death and the role of English as a world language. Recommended but not required for an honours, major, or minor in linguistics or speech sciences.

LING 140 (3) Challenging Language Myths
Critical consideration of a broad range of commonly held beliefs about language and its relation to the brain and cognition, learning, society, change and evolution. Note. This is an elective course that does not fulfill writing requirements in any faculty or the literature requirement in the Faculty of Arts. This course is not eligible for Credit/D/Fail grading. Equivalency: ENGL 140.

LING 170 (3) Introduction to How to Learn a Language
Skills and strategies for second language acquisition, through the foundations of pronunciation, vocabulary, grammar, and pragmatics, connected to the practical, social, and personal challenges of language learning.

LING 200 (3) Linguistic Theory and Analysis I
Introduction to phonetics and phonology; training in the identification and production of speech sounds; principles and methods for describing and writing the sound system of a language; phonological theory with reference to selected languages; the interface between phonology and morphology. Analytical practice and seminar discussion.

LING 201 (3) Linguistic Theory and Analysis II
Introduction to grammatical analysis; morphology, syntax, semantics; synchronic analysis and description with illustrations from various languages. Analytical practice and seminar discussion.

LING 209 (3) Clinical Topics in Speech, Language, and Hearing Sciences
Introduction to speech and hearing sciences, with emphasis on the clinical perspectives of audiology and speech pathology.

LING 222 (3) Language Acquisition
Audition and speech perception, phonological organization, word learning, syntax, and pragmatics.

LING 270 (3) Introduction to Studies in Second Language Acquisition
Linguistic systems that learners of an additional language develop as they approximate towards the target language, and key questions about what this ‘interlanguage’ system reveals about how we learn languages. Prerequisite: One of LING 100, LING 101, LING 140, LING 170.

LING 300 (3) Studies in Grammar
Introduction to syntactic analysis and theory, with emphasis on description and analysis of data from a wide variety of languages. Prerequisite: LING 201.

LING 311 (3) Studies in Phonology
Introduction to phonological analysis and theory, with a strong emphasis on description and analysis of data from a wide variety of languages. Prerequisite: LING 200.

LING 313 (3) Introduction to Linguistic Phonetics and Speech Science
The articulatory and acoustic properties of speech production and perception, including practice in phonetic transcription, instrumental recording, and the analysis of normal speech. Prerequisite: LING 200. Recommended: All of LING 100, PSYC 100 (or PSYC 101 and 102), PSYC 217 and 218, PHYS 341.

LING 314 (3) Instrumental Phonetics
Physiological and/or acoustic phonetics. Focus on experimental methods and analysis techniques. Topics may include: source-filter theory; spectral and temporal acoustic analysis, inter-articulator timing and motor coordination. Prerequisite: LING 313. Recommended: All of LING 100, PSYC 100 (or PSYC 101 and 102), PSYC 217 and 218, PHYS 341.

LING 319 (3) Historical Linguistics
How and why languages change over time, and how languages can be grouped into families based on historical relationships.
Methods of comparative and internal reconstruction of phonological, morphological, syntactic, semantic change. Social factors in language change. Not offered every year.

**Prequisite:** LING 200 and LING 201.

**LING 327 (3) Introduction to Semantics**

The analysis and theory of linguistic meaning with emphasis on formal techniques for semantic analysis and their application to empirical phenomena in language, including pragmatics.

**Prequisite:** LING 201.

**LING 333 (3) Research Methods for Linguistics**

Research methods used in linguistics and speech science. Emphasis on scientific reasoning, critical thinking, experimental design, and the ethics and methods of linguistic data-collection.

**Prequisite:** All of LING 200, LING 201.

**LING 345 (3) Pragmatics**

Selected topics in pragmatics and information structure, including variations in their cross-linguistic expression and the corresponding influence of sentence form on context.

**Prequisite:** One of LING 201, ENGL 331, PHIL 220.

**LING 405 (3) Morphology**

Analytic and theoretical consideration of the interrelation of word formation, sound patterning, and meaningful sentence structure.

Not offered every year. *This course is not eligible for Credit/D/Fail grading.*

**Prequisite:** All of LING 300, LING 311. Recommended: LING 327

**LING 410 (3) Advanced Phonology**

Current issues in phonological theory. *This course is not eligible for Credit/D/Fail grading.*

**Prequisite:** LING 311.

**LING 420 (3) Introduction to Linguistics**

General background to linguistic studies; the different approaches to the analysis of languages; synchronic and diachronic linguistics; phonetics, phonology, morphology, syntax, and semantics. Not available for credit toward a Major or Honours program in Linguistics.

**LING 421 (3) Advanced Syntax**

Current issues in syntactic theory.

**Prequisite:** LING 300.

**LING 425 (3) Advanced Semantics**

Current issues in semantic theory. *This course is not eligible for Credit/D/Fail grading.*

**Prequisite:** LING 327 or PHIL 220. A basic introduction to syntax is recommended (e.g., LING 100, LING 201, or ENGL 331).

**LING 430 (3/6) d Honours Seminar in Linguistics**

Research papers on general linguistic topics to be read and discussed.

**LING 431 (3) Field Methods I**

Elicitation, transcription, organization, and analysis of linguistic data from a native speaker of a language not commonly studied. Practical experience in the use of fieldwork equipment.

**Prequisite:** All of LING 300, LING 311.

**LING 432 (3) Field Methods II**

Elicitation, transcription, organization, and analysis of linguistic data from a native speaker of a language not commonly studied. Practical experience in the use of fieldwork equipment.

**Prequisite:** LING 431.

**LING 433 (3) Native Languages of the Americas**

Survey of the indigenous languages of the Americas. Study of the basis of genetic classification and areal similarities. The structure of representative languages will be presented and contrasted. The present status of American Indian languages will be considered. Note: this course is not necessarily offered every year.

**LING 436 (3) Community-based Language Research**

Research methods and partnerships, ethical paradigms, the social, cultural and historical context of language research, and the relation of language research to pedagogy, policy and planning.

**LING 445 (3) Sociolinguistics**
The systematic study of language as a social phenomenon.  

**Prerequisite:** All of LING 200, LING 201.

**LING 447 (3/12) d Topics in Linguistics**
A capstone course for Linguistics and Speech Sciences majors, normally taken after three years of study. Individual sections will differ substantially; see online Course List for detailed descriptions and prerequisites. May be repeated for credit when content is different.

**LING 448 (3/6) d Directed Studies**
Supervisor and topic chosen by mutual agreement between student and Linguistics faculty member. Department Advisor approval is required.

**LING 449 (6) Honours Essay**

**LING 451 (3) Acquisition of Phonology**
Development of the phonological system in typical first language acquisition from the perspective of diverse linguistic topics.  
**Prerequisite:** All of LING 222, LING 311.

**LING 452 (3) Acquisition of Syntax**
Central issues in the first language acquisition of syntax, including early lexical and semantic development, acquisition of morphology, and syntactic development (e.g., word order, questions).  
**Prerequisite:** All of LING 222, LING 300.

**LING 469 (3) Clinical Topics in Speech, Language, and Hearing Sciences**
Introduction to speech and hearing sciences with emphasis on the clinical perspectives of audiology and speech pathology.

**LING 502 (4) Formal Foundations of Syntax & Semantics**
Conceptual underpinnings of the study of sentence structure and meaning; core issues in syntax and semantics; the place of syntax and semantics in a model of grammar; interface issues. *This course is not eligible for Credit/D/Fail grading.*
**Prerequisite:** LING 520 and 525 are recommended.

**LING 503 (3) Topics in Language Acquisition**
This course is not eligible for Credit/D/Fail grading.

**LING 505 (3/6) d Issues in Morphological Theory and Analysis**
Morphology from both historical and theoretical perspectives. *This course is not eligible for Credit/D/Fail grading.*

**LING 507 (4) Formal Foundations of Phonetics & Phonology**
Conceptual underpinnings of the study of speech sounds; core issues in phonetics and phonology; the place of phonetics and phonology in a model of grammar; interface issues. *This course is not eligible for Credit/D/Fail grading.*
**Prerequisite:** LING 508 and 510 are recommended.

**LING 508 (3) Phonetic Theory & Analysis**
Discussion and critical analysis of current issues in linguistic phonetics; instrumental analysis. *This course is not eligible for Credit/D/Fail grading.*

**LING 510 (3) Phonological Theory and Analysis**
Discussion and critical analysis of current issues in phonological theory. *This course is not eligible for Credit/D/Fail grading.*

**LING 511 (3) Topics in Phonology**
This course is not eligible for Credit/D/Fail grading. **Prerequisite:** LING 510.

**LING 512 (3) Topics in Phonetics & Phonology**
Advanced topics in phonetics and phonology; in-depth analysis of specific issues and problems. *This course is not eligible for Credit/D/Fail grading.*
**Prerequisite:** One of LING 508, LING 510.

**LING 513 (3) Topics in Phonetics**
This course is not eligible for Credit/D/Fail grading. **Prerequisite:** LING 508.

**LING 518 (3-9) d Advanced Research Seminar**
This course is not eligible for Credit/D/Fail grading. **Prerequisite:** One of LING 512, LING 522 or equivalent.

**LING 519 (3/6) d Problems in Comparative and Historical Linguistics**
This course is not eligible for Credit/D/Fail grading.
LING 520 (3) Syntactic Theory and Analysis
Discussion and critical analysis of current issues in syntactic theory. This course is not eligible for Credit/D/Fail grading.

LING 521 (3) Topics in Syntax
This course is not eligible for Credit/D/Fail grading. Prerequisite: LING 520.

LING 522 (3) Topics in Syntax and Semantics
Advanced topics in syntax and semantics; in-depth analysis of specific issues and problems. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of LING 520, LING 525.

LING 525 (3) Semantic Theory and Analysis
Discussion and critical analysis of current issues in semantic theory. This course is not eligible for Credit/D/Fail grading.

LING 527 (3) Topics in Semantics
This course is not eligible for Credit/D/Fail grading. Prerequisite: LING 525.

LING 530 (3-12) d Linguistic Problems in a Special Area
This course is not eligible for Credit/D/Fail grading.

LING 531 (3) Field Methods in Linguistics I
This course is not eligible for Credit/D/Fail grading.

LING 532 (3) Field Methods in Linguistics II
This course is not eligible for Credit/D/Fail grading. Prerequisite: LING 531.

LING 533 (3/6) d Indian Languages of the Northwest
This course is not eligible for Credit/D/Fail grading.

LING 538 (3/6) d Seminar on Language Acquisition in Children
Linguistic analysis of data from children learning a first language. Intensive examination of a topic that will vary each year dealing with advanced research into phonological, syntactic, and semantic aspects of language acquisition. This course is not eligible for Credit/D/Fail grading.

LING 545 (3/6) d Problems in Sociolinguistics
This course is not eligible for Credit/D/Fail grading.

LING 546 (3/6) c Directed Reading in Topics related to Linguistics
This course is not eligible for Credit/D/Fail grading.

LING 548 (0) Major Essay

LING 549 (3-18) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

LING 649 (0) Doctoral Dissertation

Language and Literacy Education, Faculty of Education

LLED: Language and Literacy Education

LLED 200 (3) Introduction to Writing in Academic and Professional Registers
Examination of sociolinguistic knowledge and skills that are central to the production of academic and professional texts.

LLED 201 (3) Critical Reading and Writing in Academic and Professional Registers

LLED 206 (3/6) d Language Field Experience
Guided individual and group projects related to concurrent studies. Field-based assignments related to language study.

LLED 210 (3) Introduction to Analyzing Meanings of Images in Texts
Systematic analysis of visual and verbal modalities in academic and professional registers through a "grammar" designed for this purpose.

LLED 211 (3) Field Research in Social Processes of Inclusion and Exclusion: Discourse Perspectives
Roles that social discourses of inclusion and exclusion play in intercultural integration.
LLED 212 (3) Introduction to Language Communities and Variation in Language Practices
Sociolinguistic analysis of language variation according to age, ethnicity, class, race, and gender, and how these variations function in both reflecting and constructing specific identities and memberships in society.

LLED 213 (3) Introduction to Intercultural Communication and Socialization in Multicultural Contexts
The processes by which individuals become competent members of society through the use of language.

LLED 220 (3) Introduction to Translating in a Globalized Society
Basic tenets of translation as a methodology for increasing students’ sociocultural understanding, intercultural communication, pragmatics, and written English.

LLED 221 (3) Language Maintenance and the Integration of Immigrants in Canada: An Introduction
The concept of societal and individual bilingualism/multilingualism in a variety of settings, including Canada in particular.

LLED 222 (3) Introduction to Public and Private Language Practices in a Globalized Society
Exploration of the interrelationships between language structure, usage and social context and the interpretive differences that may result from their interaction.

LLED 223 (3) Introduction to the Nature of World Englishes
Exploration of the emergence of new English varieties, as well as a critical examination of main reasons linked to the rise of English worldwide and its proposed role as a neutral global language.

LLED 226 (3/6) d Introduction to Language Across the Curriculum
Understanding text structure within, and language diversity among, subject areas. Analysis of oral and written language from various curriculum areas in which English is the medium of instruction; implications for learning and instruction. [1.5-3-0]

LLED 300 (5) Foundations of Language and Literacy Education: Elementary and Middle Years

LLED 301 (4) Language Across the Curriculum in Multilingual Classrooms: Secondary
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 310 (3) Introduction to Reading and Language Arts Instruction: Elementary and Middle Years
Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Corequisite: All of EDUC 310, EDUC 315.

LLED 312 (4/5) d Curriculum and Instruction in French: Secondary
Taught in French. Pass/fail. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: A completed concentration in French or permission of the Head.

LLED 313 (4/5) d Curriculum and Instruction in Theatre and Drama: Secondary
Pass/fail. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: A completed concentration in theatre or drama or permission of the Head.

LLED 315 (3-5) d English as a Second Language - Secondary: Curriculum and Pedagogy
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 318 (4/5) d Curriculum and Instruction in Modern Languages: Secondary
A completed concentration in a modern language (Chinese, German, Italian, Japanese, Russian, Spanish, or Punjabi) or permission of the Head. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 320 (4) Curriculum and Instruction in Language and Literacy Education: Elementary and Middle Years
Pass/Fail. This course is not eligible for Credit/D/Fail grading. [2-4-0]
Prerequisite: LLED 310.

LLED 323 (3) Teaching and Learning Modern Languages: Elementary and Middle Years
Curriculum and methods of teaching in modern languages (including Chinese, French, German, Italian, Japanese, Punjabi, Russian, and Spanish). This course is not eligible for Credit/D/Fail grading.

LLED 324 (3) Teaching and Learning French: Elementary and Middle Years
An introduction to communicative core French teaching and learning for generalists. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: French 12, or equivalent prior French experience.

LLED 325 (4/6) d Teaching and Learning French in Elementary Schools
Taught in French. Strategies, theoretical foundations, and approaches related to teaching elementary French (Immersion, Core, Intensive) programs. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: A completed concentration in French or permission of the Head.

**LLED 326 (3) Introduction to Teaching and Learning Mandarin: Elementary/Secondary**  
Pass/Fail for B.Ed. students. Non-B.Ed. students are eligible for percentage grading or Credit/D/Fail.  
*Prerequisite:* Grade 11 Mandarin or equivalent.

**LLED 336 (3) Communication: Voice, Audience, Message**  
Knowledge and development of skills necessary to create a transactional style of teaching. *This course is not eligible for Credit/D/Fail grading.*

**LLED 350 (3) Classroom Discourses: Elementary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 351 (2) Literacy Practices and Assessment: Elementary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 352 (2) Introduction to Teaching and Learning French: Elementary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 353 (2) Teaching and Learning English as an Additional Language: Elementary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 350 (3) Classroom Discourses and Teaching English Language Learners: Secondary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 361 (3) Literacy Practices and Assessment: Secondary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 363 (1) Teaching and Learning English as an Additional Language: Secondary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 366 (3) Teaching Literature**  
Curriculum and pedagogy related to the theories, concepts, and strategies relevant in secondary school classrooms. *This course is not eligible for Credit/D/Fail grading.*

**LLED 367 (3) Teaching Writing**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 368 (3) Multiliteracies in English Language Arts Classrooms**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 371 (3) Foundations of Teaching French: Secondary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*  
*Prerequisite:* A completed concentration in French of permission of the Department Head.

**LLED 372 (3) Teaching French Language and Literacy: Secondary**  
Language of instruction is French. Pass/Fail for B.Ed. students. Non-B.Ed. students are eligible for percentage grading or Credit/D/Fail grading.

**LLED 381 (3) Foundations of Teaching Modern Languages: Secondary**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 382 (3) Teaching Language and Literacy - Modern Languages: Secondary**  
Pass/Fail for B.Ed. students. Non-B.Ed. students are eligible for percentage grading or Credit/D/Fail grading.

**LLED 386 (3) Secondary Theatre: Introduction to Curriculum & Pedagogy**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 387 (3) Secondary Theatre: Applications to Curriculum**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 388 (3) Secondary Theatre: Principles and Design**  
Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**LLED 391 (3) Theory and Practice in Reading Instruction**  
Credit may be obtained for only one of LLED 310, 391, 300.

**LLED 399 (3) Practicum in Teaching English as a Second Language**
This course is not eligible for Credit/D/Fail grading.

LLED 402 (3) Living Language: Science and Society
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance.
Prerequisite: Fourth-year standing or permission of the instructor.

LLED 420 (3/4) d Using Canadian Children's Literature in the French Education Classroom
Taught in French. Credit will be given for one of LLED 440, LLED 420.

LLED 421 (3) Gramligne: Learning and Teaching Grammar in Text for the Second Language Classroom
Taught in French.

LLED 422 (3) Language Assessment in the French as a Second/Additional Language Classroom
This course is not eligible for Credit/D/Fail grading. Prerequisite: A completed concentration or major in French or permission of Department Head.

LLED 423 (3) Teaching French Adolescent Literature: Secondary
This course is not eligible for Credit/D/Fail grading. Prerequisite: A completed concentration or major in French or permission of Department Head.

LLED 426 (3) Principles and Practice of French Program Development
Taught in French. The development and implementation of French Immersion, Program Cadre, and French as a Second language Programs for preschool, elementary, secondary, or adult.

LLED 428 (3) Applied Linguistics for Teachers of French
Prerequisite: Either (a) FREN 220 or (b) all of FREN 222, FREN 223.

LLED 429 (3/6) c Advanced Studies in Modern Language Education
Credit will be given for only 6 credits of LLED 480 and LLED 429.

LLED 433 (3) Drama in Education: Creative Approaches and Strategies
Drama-based activities relevant to a wide range of classroom contexts; involves reading about, practicing, and discussing various creative drama approaches and strategies developed by contemporary scholars and practitioners. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 434 (3) Drama in Education: Cross-Curricular Learning and Story
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 435 (3/6) d Drama in Education: Community, Inquiry, and Performance
Pass/Fail. This course is not eligible for Credit/D/Fail grading. [2-2-0]

LLED 436 (3/6) c Advanced Speech Communication
This course is not eligible for Credit/D/Fail grading.

LLED 440 (3) Using Canadian Children's Literature in the Classroom
Equivalency: LLED 420.

LLED 441 (3) Introduction to Teaching Children's Literature

LLED 442 (3) Trends and Issues in Teaching Children's Literature

LLED 443 (3) Teaching Folklore in the Elementary Classroom

LLED 444 (3) Transcultural Children's Literature
Ways in which children's literature is informed by diverse, complex influences including culture(s) and language(s), and related problems, issues and controversies.

LLED 445 (3) Teaching Poetry
Instructional methodologies and theories in teaching all forms of poetry.

LLED 446 (3) Teaching with Illustrated Materials, K-12: From Picture Books to Information Texts
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>LLED 449 (3)</td>
<td>Teaching Adolescents Literature</td>
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<td>Instructional methodologies and theories in teaching literature to adolescents.</td>
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<tr>
<td>LLED 450 (3)</td>
<td>Teaching and Learning Language and Literacy: Kindergarten and Primary Grades</td>
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<tr>
<td></td>
<td>Prerequisite: An introductory-level reading or language arts education course</td>
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<tr>
<td>LLED 451 (3)</td>
<td>Teaching and Learning Language and Literacy: Intermediate and Middle Years</td>
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<tr>
<td></td>
<td>Prerequisite: An introductory-level reading or language arts education course.</td>
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<tr>
<td>LLED 452 (3)</td>
<td>Disciplinary Literacies: Intermediate Through Secondary</td>
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<td>How teachers can support students to develop disciplinary literacies that will enable them to understand, analyze, interpret and critique ideas, genres, and language in discipline-specific texts in and beyond the intermediate and secondary school contexts.</td>
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<tr>
<td>LLED 453 (3)</td>
<td>Materials and Texts of Literacy Instruction: Elementary</td>
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<td>This course is not eligible for Credit/D/Fail grading. Prerequisite: An introductory-level reading or language arts education course.</td>
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<tr>
<td>LLED 454 (3)</td>
<td>Adolescent Literacies: Processes and Practices</td>
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<td>Prerequisite: or corequisite: an introductory-level reading, language arts, or English education course.</td>
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<tr>
<td>LLED 455 (3)</td>
<td>Supporting Language and Literacy for First Nations Learners (K-12)</td>
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<tr>
<td>LLED 456 (3/6)</td>
<td>Identifying and Supporting Learners with Literacy Difficulties</td>
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<td>Individualized assessment, diagnosis, and instructional planning for students with literacy difficulties. Intensive practicum is included in the 6-credit version of this course. Prerequisite: An introductory-level reading or language arts course; successful completion of an extended practicum or one year of teaching experience.</td>
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<tr>
<td>LLED 457 (3/6)</td>
<td>Special Topics in Reading</td>
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<tr>
<td>LLED 459 (3)</td>
<td>Trends and Issues in Literacy Instruction</td>
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<td>Prerequisite: An introductory-level reading or language arts education course.</td>
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<tr>
<td>LLED 462 (3)</td>
<td>School Library Resource Centre Programs</td>
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<td>LLED 469 (3)</td>
<td>Inquiry-Based Pedagogy in School Library Programs</td>
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<td>Principles and practices of teachers and teacher-librarians designing and teaching curriculum using inquiry-based pedagogy. LLED 469 is a core course for the Teacher Librarian Diploma.</td>
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<tr>
<td>LLED 478 (3-6)</td>
<td>Introduction to Teaching English as a Second Language</td>
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<td>This course is not eligible for Credit/D/Fail grading. Prerequisite: For B.Ed. TESL, LLED 315.</td>
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<tr>
<td>LLED 479 (3)</td>
<td>The Education of Immigrant Students</td>
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<td>An examination of the cultural backgrounds of major ethnic groups. Instructional techniques for meeting the needs of immigrant students in the regular classroom with respect to culture and language.</td>
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<tr>
<td>LLED 480 (1-6)</td>
<td>Advanced Studies in Language and Literacy Education</td>
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<td>Credit will be given for only 6 credits of LLED 480 and 429.</td>
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<tr>
<td>LLED 481 (3)</td>
<td>Digital Media in English Language Arts Education</td>
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<tr>
<td>LLED 482 (3)</td>
<td>Language, Education, and Gender</td>
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<tr>
<td>LLED 486 (3)</td>
<td>Supporting Children’s Oral Language Development</td>
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<tr>
<td>LLED 487 (3/6)</td>
<td>Special Topics in English Education</td>
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<td>Prerequisite: An introductory-level reading, language arts, or English education course.</td>
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<tr>
<td>LLED 489 (3/6)</td>
<td>Applied Linguistics for Teachers</td>
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<tr>
<td>LLED 491 (3/6)</td>
<td>Supervised Study in English Education</td>
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<tr>
<td>LLED 492 (3/6)</td>
<td>Supervised Study in Reading</td>
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<tr>
<td>LLED 493 (3/6)</td>
<td>Supervised Study in Modern Languages Education</td>
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<tr>
<td>LLED 501 (3)</td>
<td>Analyzing Discourse and Talk: An Overview of Methods</td>
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<td>Credit will be granted for only one of LLED 501, LLED 575, and EPSE 586. This course is not eligible for Credit/D/Fail grading. Equivalency: EPSE 586.</td>
</tr>
</tbody>
</table>
LLED 502 (3) Analyzing Discourse in Education: Descriptive and Critical Approaches
Credit will be granted for only one of LLED 502, LLED 576, and EPSE 587. This course is not eligible for Credit/D/Fail grading. Equivalency: EPSE 587.

LLED 503 (3) Qualitative Research Interviewing in Education: Theories and Methods
This course is not eligible for Credit/D/Fail grading.

LLED 510 (3) Language, Discourse and Identity
This course is not eligible for Credit/D/Fail grading. Prerequisite: Preference to students admitted to TESL graduate program.

LLED 511 (3/6) d Child Language in Education
Language development in preschool and early school years: influence in education, heritage language, English as an Additional Language and multilingual contexts for development are explored across multiple theoretical approaches. This course is not eligible for Credit/D/Fail grading.

LLED 512 (3) Multilingual Literacy and International Development
This course is not eligible for Credit/D/Fail grading.

LLED 513 (3) Indigenous Storytelling in Education
This course is not eligible for Credit/D/Fail grading.

LLED 520 (3/6) d Theory and Research in Teaching of Modern Languages
This course is not eligible for Credit/D/Fail grading.

LLED 522 (3) Asia-Pacific Narratives as Inquiry on Intercultural Aspects of Language Education
This course is not eligible for Credit/D/Fail grading.

LLED 523 (3) Teacher Action Research in Language and Literacy Education
Taught in French. Understanding of the literature and methods associated with teacher (action) research in language and literacy. This course is not eligible for Credit/D/Fail grading.

LLED 525 (3) Bilingual Education: Theory and Practice
This course is not eligible for Credit/D/Fail grading.

LLED 526 (3) Second Language Assessment: Conceptual and Empirical Approaches
This course is not eligible for Credit/D/Fail grading.

LLED 527 (3) MATERIALS DEVELOPMENT FOR INDIGENOUS LANGUAGE LEARNING & TEACHING
Conceptual understanding and practical experience in designing and developing language print materials and interactive multimedia. Overview of production, publication, dissemination, and accessibility of language resources, and pedagogical approaches for language revitalization and education efforts using multimodal resources. This course is not eligible for Credit/D/Fail grading.

LLED 534 (3/6) c Theory and Research in Teaching Written Composition
This course is not eligible for Credit/D/Fail grading.

LLED 535 (3) Theory and Research in Drama in Education
This course is not eligible for Credit/D/Fail grading.

LLED 536 (3) Drama, Literacies and Literature in Education
This course is not eligible for Credit/D/Fail grading.

LLED 540 (3) Introduction to Research in the Teaching of Literature
This course is not eligible for Credit/D/Fail grading.

LLED 541 (3) Theories and Perspectives in Teaching Literature
This course is not eligible for Credit/D/Fail grading.

LLED 550 (3/6) c Review of Reading Research
This course is not eligible for Credit/D/Fail grading.

LLED 552 (3) Theoretical Foundations of Reading Research and Practice
This course is not eligible for Credit/D/Fail grading.

LLED 553 (3) Theoretical Foundations of ESL/EL Reading Pedagogy
This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.
LLED 554 (3/6) d Assessment in Reading and Other Language Arts

This course is not eligible for Credit/D/Fail grading. Prerequisite: LLED 456.
Corequisite: LLED 562.

LLED 555 (6) Supervision of Reading

Curriculum analysis and planning. Implications for the administrator, the consultant and supervisor of reading. This course is not eligible for Credit/D/Fail grading.
Equivalency: LLED 574.

LLED 556 (3/6) d Theory and Research in Early Literacy

This course is not eligible for Credit/D/Fail grading.

LLED 557 (3) Family and Community Literacy: Issues and Perspectives

Literacy learning, teaching, policy and research across the lifespan. This course is not eligible for Credit/D/Fail grading.

LLED 558 (3) Literacy and Multimodality

This course is not eligible for Credit/D/Fail grading.

LLED 559 (3) Early Literacies with Digital Technologies and Media

This course is not eligible for Credit/D/Fail grading.

LLED 560 (3) Picturebooks and Literacy Development

Explore, analyze and critique recent developments in picturebooks, ways of engaging with these texts and bridging picturebook forms and innovations with theories of literacy development in children. This course is not eligible for Credit/D/Fail grading.

LLED 561 (3-12) c Laboratory Practicum

This course is not eligible for Credit/D/Fail grading.

LLED 562 (3) Practicum in Assessment in Reading and Other Language Arts

Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 565 (3-12) d Special Course in Subject Matter Field

Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field. This course is not eligible for Credit/D/Fail grading.

LLED 570 (3) Theory and Research in English Language Education: Discourse Perspectives

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.

LLED 571 (3) Research in Language Curriculum: Social Practice Perspectives

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.

LLED 572 (3/6) d Theory and Research in Teaching English as a Second Language

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.

LLED 573 (3/6) d Theories of Second Language Acquisition

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.

LLED 574 (3) Theory and Research in Teaching Second Language Writing

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission into the TESL Graduate Program or permission of instructor.

LLED 577 (3) Culture and Politics in Second Language Education

This course is not eligible for Credit/D/Fail grading.

LLED 580 (3/6) c Problems in Education

Investigation and report of a problem. This course is not eligible for Credit/D/Fail grading.

LLED 590 (3) Graduating Paper

Pass/Fail. This course is not eligible for Credit/D/Fail grading.

LLED 598 (3-12) c Field Experiences

For those on master's, doctoral, and diploma programs. This course is not eligible for Credit/D/Fail grading.
LLED 599 (9) Master's Thesis

This course is not eligible for Credit/D/Fail grading.

LLED 601 (3) Theories for Language and Literacy Research

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission to the Ph.D. program in LLED.

LLED 602 (3) Critical Analysis of Issues and Methodology in Language and Literacy Education

This course is not eligible for Credit/D/Fail grading. Prerequisite: Admission to the Ph.D. program in LLED.

LLED 699 (0) Doctoral Dissertation

Faculty of Land and Food Systems

LWS: Land and Water Systems

LWS 501 (3) Advanced Soil Processes
Integration of soil physics, chemistry, and biology in understanding essential soil processes. This course is not eligible for Credit/D/Fail grading.
Equivalency: SOIL 501.

LWS 510 (3) Land and Water Seminar
Credit will be granted for only one of LWS 510 or SOIL 510. This course is not eligible for Credit/D/Fail grading.

LWS 515 (3) Watershed Science
Watershed evaluation, key aspects of hydrology, water quality, land use impacts on water resources and integration of multiple land use activities and their cumulative impacts. This course is not eligible for Credit/D/Fail grading.
Equivalency: SOIL 515.

LWS 517 (3) Land and Water Resource Evaluation
Topics in land and water system evaluations and assessing resource development options: monitoring and modeling environmental systems. This course is not eligible for Credit/D/Fail grading.
Equivalency: SOIL 517.

LWS 548 (6) Major Project
Professional paper on topics focusing on emerging issues in water and land resources. This course is not eligible for Credit/D/Fail grading.

LWS 550 (3) Professional Communications Strategies
Credit will be granted for only one of LWS 550 or SOIL 550. This course is not eligible for Credit/D/Fail grading.

Mathematics, Faculty of Science

MATH: Mathematics

The first digit in the number of a course is intended to convey the level of mathematical maturity at which the course is conducted rather than the year in which it must be taken. Students who expect to follow an Honours Science program or one with high mathematical content are urged to apply for admission to MATH 120 and 121. The following courses are for students in the Faculty of Applied Science: MATH 152, MATH 253, MATH 255, MATH 256, MATH 257, MATH 263, MATH 265, MATH 267. Secondary-school calculus is a prerequisite for MATH 100, 102, and 104. Students with this qualification should see "UBC-SFU-UVIC-UNBC Calculus Examination Certificate" in the Admissions section. MATH 180 and 184 are designed for students without high-school calculus. Continuing Studies offers MATH 001, 002, 003, and 004, refresher courses in pre-calculus material. For further information see the department's website at www.math.ubc.ca.

MATH 001 (0) Algebra
Numbers and their properties; exponents, radicals, absolute value, inequalities, functions and their graphs; factoring; solving polynomial, rational, and exponential equations; and the sine and cosine law. Non-credit Math course offered by Continuing Studies in consultation with the Mathematics Department and taught by Continuing Studies instructors.
Prerequisite: Mathematics 11 is recommended.
MATH 002 (0) Pre-Calculus
Composite, inverse, polynomial, rational, trigonometric, exponential, and logarithmic functions; sequences and series; and analytical geometry. Non-credit Math course offered by Continuing Studies in consultation with the Mathematics Department and taught by Continuing Studies instructors.
Prerequisite: MATH 001 or a score of 73% or higher in Principles of Mathematics 11 or Pre-calculus 11.

MATH 100 (3) Differential Calculus with Applications to Physical Sciences and Engineering
Derivatives of elementary functions. Applications and modeling: graphing, optimization. Consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: High-school calculus and one of (a) a score of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12, or (b) a satisfactory score in the UBC Mathematics Basic Skills Test.

MATH 101 (3) Integral Calculus with Applications to Physical Sciences and Engineering
The definite integral, integration techniques, applications, modeling, infinite series. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

MATH 102 (3) Differential Calculus with Applications to Life Sciences
Functions, derivatives, optimization, growth and decay, discrete probability. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: High-school calculus and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12, or (b) a satisfactory score in the UBC Mathematics Basic Skills Test.

MATH 103 (3) Integral Calculus with Applications to Life Sciences
Antiderivatives and definite integrals, infinite series, applications to probability and dynamical systems. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

MATH 104 (3) Differential Calculus with Applications to Commerce and Social Sciences
Derivatives and rates of change, exponential and trigonometric functions, Newton's method, Taylor polynomials, maxima and minima, and graphing. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: High-school calculus and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12, or (b) a satisfactory score in the UBC Mathematics Basic Skills Test.

MATH 105 (3) Integral Calculus with Applications to Commerce and Social Sciences
Antiderivatives, the definite integral, techniques of integration, infinite series, partial derivatives, maxima and minima with constraints, discrete and continuous random variables. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

MATH 110 (6) Differential Calculus
Topics as for MATH 100, but including relevant topics from algebra, geometry, functions, trigonometry, logarithms, and exponentials. [3-0-1.5]
Prerequisite: Pre-requisite: BC Principles of Mathematics 12 or Pre-calculus 12 (or equivalent), plus permission of the Mathematics Department; permission will normally be based on a low grade in BC Principles of Mathematics 12 or Pre-calculus 12 (or equivalent) and a low score in the optional UBC Mathematics Basic Skills Test if taken. See http://www.math.ubc.ca/Ugrad/m110.shtml for details.

MATH 120 (4) Honours Differential Calculus
Limits, derivatives, Mean Value Theorem and applications, elementary functions, optimization, Taylor series, approximation. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [4-0-0]
Prerequisite: High-school calculus and one of (a) a score of 95% or higher in BC Principles of Mathematics 12 or Pre-calculus 12; or (b) permission from the Mathematics Department Head.

MATH 121 (4) Honours Integral Calculus
Definite integrals and the Fundamental Theorem of Calculus, techniques and applications of integration, infinite series. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [4-0-0]
Prerequisite: Either (a) a score of 68% or higher in MATH 120 or (b) a score of 80% or higher in one of MATH 100, MATH 102, MATH 104, MATH 180, MATH 184 or (c) a score of 5 in AP Calculus AB.
MATH 152 (3) Linear Systems
2D and 3D geometry, vectors and matrices, eigenvalues and vibration, physical applications. Laboratories demonstrate computer solutions of large systems. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-1*-0]
Corequisite: MATH 101.

MATH 180 (4) Differential Calculus with Physical Applications
Topics as for Math 100; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. Not for credit with students with AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination. [3-0-1.5]
Prerequisite: One of BC Principles of Mathematics 12 or Pre-calculus 12 and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12, (b) a satisfactory score in the UBC Mathematics Basic Skills Test.

MATH 184 (4) Differential Calculus for Social Science and Commerce
Topics as for Math 104; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. Not for credit for students with AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination. [3-0-1.5]
Prerequisite: One of BC Principles of Mathematics 12 or Pre-calculus 12 and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12, or (b) a satisfactory score in the UBC Mathematics Basic Skills Test.

MATH 190 (4) Calculus Survey
Functions, derivatives, integrals, curve sketching growth functions, volume calculations. Only for credit in the Faculty of Forestry. Students with credit for MATH 100, 102, 104, 120, 180, or 184 cannot in the same term or later terms obtain credit for MATH 190. [3-0-2]
Prerequisite: Principles of Mathematics 12 or Pre-calculus 12 and registration in the B.S.F. or B.Sc.N. programs.

MATH 200 (3) Calculus III
Analytic geometry in 2 and 3 dimensions, partial and directional derivatives, chain rule, maxima and minima, second derivative test, Lagrange multipliers, multiple integrals with applications. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

MATH 210 (3) Introduction to Mathematical Computing
Introduction to numerical computation, computer algebra, mathematical graphics. Primarily for second year students taking a degree in mathematics. One hour laboratory each week. [3-1-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.
Corequisite: One of MATH 215, MATH 255, MATH 256, MATH 265 and one of MATH 152, MATH 221, MATH 223.

MATH 215 (3) Elementary Differential Equations I
First-order equations; linear equations; linear systems; Laplace transforms; numerical methods; trajectory analysis of plane nonlinear systems. Applications of these topics will be emphasized. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 and one of MATH 152, MATH 221, MATH 223.
Corequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 217 (4) Multivariable and Vector Calculus
Partial differentiation, extreme values, multiple integration, vector fields, line and surface integrals, the divergence theorem, Green's and Stokes' theorems. Intended for students in Honours Physics and Engineering Physics. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [4-0-0]
Prerequisite: A score of 68% or higher in one of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157, SCIE 001 and a score of 68% or higher in one of PHYS 102, PHYS 108, PHYS 118, PHYS 153, PHYS 158, SCIE 001 and a score of 68% or higher in one of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.
Corequisite: One of MATH 152, MATH 221, MATH 223.

MATH 220 (3) Mathematical Proof
Sets and functions; induction; cardinality; properties of the real numbers; sequences, series, and limits. Logic, structure, style, and clarity of proofs emphasized throughout. [3-0-0]
Prerequisite: Either (a) a score of 64% or higher in one of MATH 101, MATH 103, MATH 105, SCIE 001 or (b) one of MATH 121, MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 221 (3) Matrix Algebra
Systems of linear equations, operations on matrices, determinants, eigenvalues and eigenvectors, diagonalization of symmetric
matrices. Please consult the Faculty of Science Credit Exclusion List:
www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: Either (a) a score of 64% or higher in one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184 or (b) one of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 or (c) advanced credit for MATH 100.

MATH 223 (3) Linear Algebra
Matrices, eigenvectors, diagonalization, orthogonality, linear systems, applications. Intended for Honours students. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: Either (a) MATH 121 or (b) a score of 68% or higher in one of MATH 101, MATH 103, MATH 105, SCIE 001.

MATH 226 (3) Advanced Calculus I
Functions of several variables: limits, continuity, differentiability; implicit functions; Taylor's theorem; extrema; Lagrange multipliers; multiple integration, Fubini's theorem; improper integrals. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: Either (a) a score of 68% or higher in MATH 121 or (b) a score of 80% or higher in one of MATH 101, MATH 103, MATH 105, SCIE 001.

Corequisite: One of MATH 152, MATH 221, MATH 223.

MATH 227 (3) Advanced Calculus II
Parametrization of curves and surfaces; line and surface integrals; theorems of Green, Gauss, Stokes; applications to physics and/or introduction to differential forms. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: A score of 68% or higher in MATH 226.

MATH 230 (3) Introduction to Finite Mathematics
Difference equations, number theory, counting. Intended primarily for students not in the Faculty of Science who wish to have some exposure to mathematical thinking. Students who obtain credit for MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184, or SCIE 001 cannot in the same year or in later years obtain credit for MATH 230. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: Principles of Mathematics 11.

MATH 253 (3) Multivariable Calculus
Partial and directional derivatives; maxima and minima; Lagrange multipliers and second derivative test; multiple integrals and applications. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

MATH 255 (3) Ordinary Differential Equations
Review of linear systems; nonlinear equations and applications; phase plane analysis; Laplace transforms; numerical methods. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 and one of MATH 152, MATH 221, MATH 223.

Corequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 256 (3) Differential equations
Linear ordinary differential equations, Laplace transforms, Fourier series and separation of variables for linear partial differential equations. Tutorial session focuses on examples from chemical and biological engineering. Consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-1]

Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 and one of MATH 152, MATH 221, MATH 223.

Corequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 257 (3) Partial Differential Equations
Introduction to partial differential equations; Fourier series; the heat, wave and potential equations; boundary-value problems; numerical methods. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 and one of MATH 152, MATH 221, MATH 223.

MATH 264 (1) Vector Calculus for Electrical Engineering
Divergence, gradient, curl, theorems of Gauss and Stokes. Applications to Electrostatics and Magnetostatics. MATH 264 content is strongly coupled to ELEC 211 with topics and student evaluations weighted accordingly. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.
Corequisite: One of ELEC 211, EECE 261.

MATH 265 (2) Linear Differential Equations
Linear ordinary differential equations. Complex numbers, Laplace transforms, frequency response, resonance, step response, systems. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [2-0-1*]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001 and one of MATH 152, MATH 221, MATH 223.
Corequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 267 (3) Mathematical Methods for Electrical and Computer Engineering
Fourier series and transforms, wave equation, d'Alembert's solution, modes. Discrete Fourier transform. Recurrence relations, z-transform, generating functions, applications. [3-0-1*]
Prerequisite: One of MATH 215, MATH 255, MATH 256, MATH 265 and one of MATH 152, MATH 221, MATH 223.

MATH 300 (3) Introduction to Complex Variables
Functions of a complex variable, Cauchy-Riemann equations, elementary functions, Cauchy's theorem and contour integration, Laurent series, poles and residues. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.
Corequisite: One of MATH 217, MATH 227, MATH 263, MATH 317.

MATH 301 (3) Applied Analysis
Integrals involving multi-valued functions, conformal mapping and applications, analytic continuation, Laplace and Fourier transforms. [3-0-0]
Prerequisite: One of MATH 300, MATH 305 and one of MATH 215, MATH 255, MATH 256, MATH 265.
Corequisite: One of MATH 256, MATH 257, MATH 316.

MATH 302 (3) Introduction to Probability
Basic notions of probability, random variables, expectation and conditional expectation, limit theorems. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.
Equivalency: STAT 302.

MATH 303 (3) Introduction to Stochastic Processes
Discrete-time Markov chains, Poisson processes, continuous time Markov chains, renewal theory. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 305 (3) Applied Complex Analysis
Prerequisite: One of MATH 200, MATH 217, MATH 226, MATH 253 and one of MATH 215, MATH 255, MATH 256, MATH 265.
Corequisite: One of MATH 256, MATH 257, MATH 316.

MATH 307 (3) Applied Linear Algebra
Applications of linear algebra to problems in science and engineering; use of computer algebra systems for solving problems in linear algebra. [3-0-0]
Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

MATH 308 (3) Euclidean Geometry
Classical plane geometry, solid geometry, spherical trigonometry, polyhedra, linear and affine transformations. Linear algebra proofs are used. It is suggested that MATH 307 be taken concurrently. [3-0-0]
Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 226, CPSC 121.

MATH 309 (3) Topics in Geometry
Topics chosen by the instructor. These may include conic sections, projective configuration, convexity, non-Euclidean geometries, fractal geometry, combinatorial problems of points in the plane. [3-0-0]
Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of MATH 220, MATH 226, CPSC 121.

MATH 310 (3) Abstract Linear Algebra
Linear spaces, duality, linear mappings, matrices, determinant and trace, spectral theory, Euclidean structure. Consult the
Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

Prerequisite: One of MATH 152, MATH 221 and one of MATH 220, MATH 226, CPSC 121.

MATH 312 (3) Introduction to Number Theory
Euclidean algorithm, congruences, Fermat's theorem, applications. Some diophantine equations. Distribution of the prime numbers. Please consult the Faculty of Science Credit Exclusion List:
www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 220, MATH 226, CPSC 121 and 9 additional credits of mathematics courses.

MATH 313 (3) Topics in Number Theory
Topics chosen by the instructor. These might include: division algorithms, group theory, continued fractions, primality testing, factoring. Please consult the Faculty of Science Credit Exclusion List:
www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: MATH 312.

MATH 316 (3) Elementary Differential Equations II
Power series methods (ordinary and regular singular points, Bessel's equation); boundary value problems and separation of variables (Fourier series and other orthogonal series), applications to the vibrating string, heat flow, potentials. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 215, MATH 255, MATH 265.

MATH 317 (3) Calculus IV
Parametrizations, inverse and implicit functions, integrals with respect to length and area; grad, div, and curl, theorems of Green, Gauss, and Stokes. Please consult the Faculty of Science Credit Exclusion List:
www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 200, MATH 226, MATH 253. MATH 221 is recommended.

MATH 318 (3) Probability with Physical Applications
Random variables, discrete and continuous distributions. Random walk, Markov chains, Monte Carlo methods. Characteristic functions, limit laws. Please consult the Faculty of Science Credit Exclusion List:
www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of MATH 215, MATH 255, MATH 256, MATH 265.
Corequisite: One of MATH 256, MATH 257, MATH 267, MATH 316.

MATH 320 (3) Real Variables I
The real number system; real Euclidean n-space; open, closed, compact, and connected sets; Bolzano-Weierstrass theorem; sequences and series. Continuity and uniform continuity. Differentiability and mean-value theorems. [3-0-0]
Prerequisite: Either (a) a score of 68% or higher in MATH 226 or (b) one of MATH 200, MATH 217, MATH 226, MATH 225, MATH 263 and a score of 80% or higher in MATH 220.

MATH 321 (3) Real Variables II
The Riemann or Riemann-Stieltjes integrals. Sequences and series of functions, uniform convergence. Approximation of continuous functions by polynomials. Fourier series. Functions from R^n to R^n, inverse and implicit function theorems. [3-0-0]
Prerequisite: MATH 320.

MATH 322 (3) Introduction to Group Theory
Groups, cosets, homomorphisms, group actions, p-groups, Sylow theorems, composition series, finitely generated Abelian groups. [3-0-0]
Prerequisite: Either (a) a score of 68% or higher in one of MATH 223, MATH 310 or (b) one of MATH 152, MATH 221, MATH 223 and a score of 80% or higher in MATH 210.

MATH 323 (3) Introduction to Rings and Modules
Rings, ideals, unique factorization, Euclidean rings, fields, polynomial rings, modules; structure theory of modules over a principal ideal domain. [3-0-0]
Prerequisite: MATH 322.

MATH 335 (4) Introduction to Mathematics
Intensive course with required tutorial. Combinatorics, probability, geometry and elementary number theory. Not for credit in the Faculty of Science. Students who obtain credit at UBC for any other mathematics course cannot in the same or later years obtain credit for MATH 335. Please consult the Faculty of Science Credit Exclusion List:

MATH 340 (3) Introduction to Linear Programming
Linear programming problems, dual problems, the simplex algorithm, solution of primal and dual problems, sensitivity analysis. Additional topics chosen from: Karmarkar's algorithm, non-linear programming, game theory, applications. [3-0-0]  
Prerequisite: One of MATH 152, MATH 221, MATH 223.

MATH 341 (3) Introduction to Discrete Mathematics  
Introduction to ideas and methods of discrete mathematics and their application. [3-0-0]  
Prerequisite: One of MATH 220, MATH 223, MATH 226, CPSC 121.

MATH 342 (3) Algebra and Coding Theory  
Error-correcting codes via abstract and linear algebra. Emphasis on proofs and computation. Finite fields, Hamming distance and error-correction, upper and lower bounds on the size of a code, linear codes, groups and cosets, encoding and decoding schemes. [3-0-0]  
Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of MATH 220, MATH 226, CPSC 121.

MATH 344 (3) Mathematical Game Theory  
Introduction to mathematical game theory and its applications. [3-0-0]  
Prerequisite: Either (a) one of MATH 152, MATH 221 and one of MATH 220, MATH 226, CPSC 121; or (b) MATH 223.

MATH 345 (3) Applied Nonlinear Dynamics and Chaos  
Phase plane methods, bifurcation and stability theory, limit-cycle behavior and chaos for nonlinear differential equations with applications to the sciences. Assignments involve the use of computers. [3-1-0]  
Prerequisite: A score of 68% or higher in one of MATH 215, MATH 255, MATH 256, MATH 265.

MATH 358 (3) Engineering Analysis  
Fourier series; auto- and cross-correlation; power spectra; discrete Fourier transform; boundary-value problems; numerical methods; partial differential equations; heat, wave, Laplace, Poisson, and wave equations. Applications to mechanical engineering and practical computing applications emphasized. Credit will be granted for only one of MECH 358 or MATH 358.

Prerequisite: All of MECH 224, MECH 225.  
Equivalency: MECH 358.

MATH 360 (3) Mathematical Modeling in Science  
Principles of model selection and basic modeling techniques in biology, earth science, chemistry and physics. Optimization, dynamical systems and stochastic processes. Preference will be given to Combined Major in Science students, or to students in Year 3 or higher. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

MATH 361 (3) Introduction to Mathematical Biology  
Mathematical modeling of basic biological processes in ecology, physiology, neuroscience and genetics. Dynamic behavior of difference equations, differential equations, and partial differential equations, explained with reference to concrete biological examples. [3-0-0]  
Prerequisite: One of BIOL 301, MATH 215, MATH 255, MATH 256, MATH 265.

MATH 398 (3) Co-operative Work Placement I  
Approved and supervised technical work experience involving mathematics in industry for a minimum of 3.5 months. Technical report required. Restricted to students admitted to the Mathematics Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.

MATH 399 (3) Co-operative Work Placement II  
Approved and supervised technical work experience involving mathematics in industry for a minimum of 3.5 months. Technical report required. Restricted to students admitted to the Mathematics Co-operative Education Program. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: MATH 398.

MATH 400 (3) Applied Partial Differential Equations  
Separation of variables, first order equations, Sturm-Liouville theory, integral transform methods. [3-0-0]  
Prerequisite: One of MATH 300, MATH 305 and one of MATH 256, MATH 257, MATH 316.

MATH 401 (3) Green's Functions and Variational Methods  
Prerequisite: Either (a) a score of 80% or higher in one of MATH 256, MATH 257, MATH 316 or (b) MATH 400.
MATH 402 (3) Calculus of Variations
Classical variational problems; necessary conditions of Euler, Weierstrass, Legendre, and Jacobi; Erdmann corner conditions, transversality, convex Lagrangians, fields of extremals, sufficient conditions for optimality, numerical methods; applications to classical mechanics, engineering and economics. [3-0-0]
Prerequisite: A score of 68% or higher in one of MATH 301, MATH 320.

MATH 403 (3) Stabilization and Optimal Control of Dynamical Systems
Dynamical systems; stability by Liapunov's direct method; controllability and eigenvalue assignment for autonomous linear systems; linear-quadratic regulator, time optimal control, Pontryagin maximum principle, dynamic programming; applications in engineering, economics and resource management. [3-0-0]
Prerequisite: A score of 68% or higher in one of MATH 301, MATH 320. MATH 402 is recommended.

MATH 405 (3) Numerical Methods for Differential Equations
Interpolation, numerical integration, numerical solution of ordinary and partial differential equations. Practical computational methods emphasized and basic theory developed through simple models. See Faculty of Science credit exclusion list: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of MATH 256, MATH 257, MATH 316.

MATH 406 (3) Variational and Approximate Methods in Applied Mathematics
Variational and Green's function methods for ordinary and partial differential equations, introduction to finite difference, finite element and boundary element methods. See Faculty of Science Credit exclusion list: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 [3-0-0]
Prerequisite: One of MATH 307, CPSC 302 and either (a) a score of 80% or higher in one of MATH 256, MATH 257, MATH 316 or (b) MATH 400.

MATH 412 (3) Advanced Linear Algebra
Topics include decompositions of linear operators, multi linear algebra, bilinear forms, metric spaces. [3-0-0]
Prerequisite: A score of 68% or higher in all of MATH 320, MATH 322.

MATH 414 (3) Mathematical Demonstrations
Students will prepare material illustrating ideas and applications of mathematics and present it to audiences outside the University. Intended for third or fourth year Mathematics students and Math/Science Education students. [2-0-0; 1-0-0] or [3-0-0]
Prerequisite: 24 credits in MATH.

MATH 418 (3) Probability
Probability spaces, random variables, distributions, expectation, conditional probabilities, convergence of random variables, generating and characteristic functions, weak and strong laws of large numbers, central limit theorem. [3-0-0]
Prerequisite: A score of 68% or higher in MATH 321.

MATH 419 (3) Stochastic Processes
Random walks, Markov chains, branching processes, Poisson processes, continuous time Markov chains, martingales, Brownian motion. [3-0-0]
Prerequisite: MATH 418.

MATH 420 (3) Real Analysis I
Sigma-algebras, Lebesgue measure, Borel measures, measurable functions, integration, convergence theorems, $L^p$ spaces, Holder and Minkowski inequalities, Lebesgue and/or Radon-Nikodym differentiation. [3-0-0]
Prerequisite: A score of 68% or higher in MATH 321.

MATH 421 (3) Real Analysis II
Banach spaces, linear operators, bounded and compact operators, strong, weak, and weak* topology, Hahn-Banach, open mapping, and closed graph theorems. Hilbert spaces, symmetric and self-adjoint operators, spectral theory for bounded operators. [3-0-0]
Prerequisite: MATH 420.

MATH 422 (3) Fields and Galois Theory
Field extensions, the Galois correspondence, finite fields, insolvability in radicals, ruler and compass constructions, additional topics chosen by instructor. [3-0-0]
Prerequisite: MATH 323.

MATH 423 (3) Topics in Algebra
Commutative algebra, algebraic geometry, algebraic number theory, Lie theory, homological algebra and category theory, or some other advanced topic in algebra. [3-0-0]
**Prerequisite:** A score of 68% or higher in one of MATH 412, MATH 422.

**MATH 424 (3) Classical Differential Geometry**

The differential geometry of curves and surfaces in three-dimensional Euclidean space. Mean curvature and Gaussian curvature. Geodesics. Gauss's Theorema Egregium. [3-0-0]

**Prerequisite:** Either (a) a score of 68% or higher in MATH 223 or (b) a score of 80% or higher in one of MATH 152, MATH 221; and either (a) a score of 68% or higher in MATH 227 or (b) a score of 80% or higher in one of MATH 217, MATH 263, MATH 317.

**MATH 425 (3) Introduction to Modern Differential Geometry**

Riemannian manifolds, tensors and differential forms, curvature and geodesics. [3-0-0]

**Prerequisite:** MATH 424.

**MATH 426 (3) Introduction to Topology**

General topology, combinatorial topology, fundamental group and covering spaces, topics chosen by the instructor. [3-0-0]

**Prerequisite:** A score of 68% or higher in all of MATH 321, MATH 322.

**MATH 427 (3) Topics in Topology**

Homology theory, homotopy theory, manifolds, and other topics chosen by the instructor. [3-0-0]

**Prerequisite:** MATH 426.

**MATH 428 (3) Mathematical Classical Mechanics I**

Newton's equation, conservation laws, the Euler-Lagrange equation; Hamilton's principle of least action, Hamilton's equations, Lagrangian mechanics on manifolds. [3-0-0]

**Prerequisite:** MATH 215 and one of PHYS 216, PHYS 306.

**Corequisite:** MATH 320.

**MATH 430 (2-6) c Special Topics in Analysis**

The student should consult the Mathematics Department for the particular topics offered in a given year. [3-0-0]

**MATH 432 (2-6) c Special Topics in Algebra**

The student should consult the Mathematics Department for the particular topics offered in a given year. [3-0-0]

**MATH 437 (3) Number Theory**

Divisibility, congruences, Diophantine equations, arithmetic functions, quadratic reciprocity, advanced topics. Please consult the Faculty of Science Credit Exclusion List: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]

**Corequisite:** One of MATH 320, MATH 322.

**MATH 440 (3) Complex Analysis**

The residue theorem, the argument principle, conformal mapping, the maximum modulus principle, harmonic functions, representation of functions by integrals, series, and products. Other topics at the discretion of the instructor. [3-0-0]

**Prerequisite:** MATH 300 and a score of 68% or higher in MATH 320.

**MATH 441 (3) Mathematical Modeling: Discrete Optimization Problems**

Formulation of real-world optimization problems using techniques such as linear programming, network flows, integer programming, dynamic programming. Solution by appropriate software. [3-0-0]

**Prerequisite:** MATH 340.

**MATH 442 (3) Optimization in Graphs and Networks**

Basic graph theory, emphasizing trees, tree growing algorithms, and proof techniques. Problems chosen from: shortest paths, maximum flows, minimum cost flows, matchings, graph colouring. Linear programming duality will be an important tool. [3-0-0]

**Prerequisite:** MATH 340.

**MATH 443 (3) Graph Theory**

Introductory course in mostly non-algorithmic topics including: planarity and Kuratowski's theorem, graph colouring, graph minors, random graphs, cycles in graphs, Ramsey theory, extremal graph theory. Proofs emphasized. Intended for Honours students. [3-0-0]

**Prerequisite:** A score of 68% or higher in one of MATH 220, MATH 226, CPSC 121. And at least 6 credits of Mathematics courses numbered 300 or above.

**MATH 444 (3) Mathematical Research and Writing**

Current research topics in pure and applied mathematics are explored at the undergraduate level. Technical communication and research skills are developed. [3-0-0]

**Prerequisite:** One of MATH 220, MATH 226 and 6 credits of MATH courses numbered 300 or higher.
MATH 446 (3) Topics in the History of Mathematics I
Historical development of concepts and techniques in areas chosen from Geometry, Number Theory, Algebra, Calculus, Probability, Analysis. The focus is on historically significant writings of important contributors and on famous problems of Mathematics. [3-0-0]
Prerequisite: 27 credits in Mathematics.

MATH 448 (3) Directed Studies in Mathematics
Introduction to the methods of mathematical research through an exploration of a mathematical topic under the supervision of a faculty member. Written report required. [3-0-0]
Prerequisite: Third- or fourth-year standing and permission of the Department Head.

MATH 449 (2-6) c Honours Reading
Independent reading by Honours students in Mathematics under the direction of a faculty member. Written report required.
Prerequisite: Permission of the Department Head

MATH 450 (3) Asymptotic and Perturbation Methods
Asymptotic expansions. Asymptotic evaluation of integrals; WKBJ methods. Regular and singular expansions. Boundary layer theory; matched asymptotic expansions. Multiple scale techniques. [3-0-0]
Prerequisite: All of MATH 301, MATH 400.

MATH 462 (3) Projects in Mathematical Biology
Development and analysis of mathematical models for complex systems in ecology, evolution, cell biology, neurophysiology, and other biological and medical disciplines. [3-0-0]
Prerequisite: One of MATH 361, MATH 345.

MATH 498 (3) Co-operative Work Placement III
Approved and supervised technical work experience involving mathematics in industry for a minimum of 3 1/2 months. Technical report required. Restricted to students admitted to the Mathematics Co-operative Education Program.This course is not eligible for Credit/D/Fail grading.
Prerequisite: MATH 399.

MATH 499 (3) Co-operative Work Placement IV
Approved and supervised technical work experience involving mathematics in industry for a minimum of 3 1/2 months. Technical report required. Restricted to students admitted to the Mathematics Co-operative Education Program.This course is not eligible for Credit/D/Fail grading.
Prerequisite: MATH 498.

MATH 501 (3) Algebra I
This course is not eligible for Credit/D/Fail grading.

MATH 502 (3) Algebra II
This course is not eligible for Credit/D/Fail grading.

MATH 503 (3) Discrete Mathematics
This course is not eligible for Credit/D/Fail grading.

MATH 507 (3) Measure Theory and Integration
This course is not eligible for Credit/D/Fail grading.

MATH 508 (3) Complex Analysis
This course is not eligible for Credit/D/Fail grading.

MATH 510 (3) Functional Analysis
This course is not eligible for Credit/D/Fail grading.

MATH 511 (3) Operator Theory and Applications
This course is not eligible for Credit/D/Fail grading.

MATH 512 (3) Quantum Theory
This course is not eligible for Credit/D/Fail grading.

MATH 513 (3) Mathematical Classical Mechanics
This course is not eligible for Credit/D/Fail grading.

MATH 514 (3) Ordinary Differential Equations
This course is not eligible for Credit/D/Fail grading.

MATH 515 (3) Partial Differential Equations of Fluid Mechanics
This course is not eligible for Credit/D/Fail grading.

MATH 516 (3) Partial Differential Equations I
This course is not eligible for Credit/D/Fail grading.

MATH 517 (3) Partial Differential Equations II
This course is not eligible for Credit/D/Fail grading.

MATH 519 (3) Fluid Mechanics I
This course is not eligible for Credit/D/Fail grading.

MATH 520 (3) Fluid Mechanics II
This course is not eligible for Credit/D/Fail grading.

MATH 521 (3) Numerical Analysis of Partial Differential Equations
This course is not eligible for Credit/D/Fail grading.

MATH 522 (3) Numerical Analysis
This course is not eligible for Credit/D/Fail grading.

MATH 523 (3) Combinatorial Optimization
This course is not eligible for Credit/D/Fail grading.

MATH 525 (3) Differential Geometry I
This course is not eligible for Credit/D/Fail grading.

MATH 526 (3) Differential Geometry II
This course is not eligible for Credit/D/Fail grading.

MATH 527 (3) Algebraic Topology I
This course is not eligible for Credit/D/Fail grading.

MATH 528 (3) Algebraic Topology II
This course is not eligible for Credit/D/Fail grading.

MATH 529 (3) Differential Topology
This course is not eligible for Credit/D/Fail grading.

MATH 530 (3) Geometric Topology
This course is not eligible for Credit/D/Fail grading.

MATH 532 (3) Algebraic Geometry I
This course is not eligible for Credit/D/Fail grading.

MATH 533 (3) Algebraic Geometry II
This course is not eligible for Credit/D/Fail grading.

MATH 534 (3) Lie Theory I
This course is not eligible for Credit/D/Fail grading.

MATH 535 (3) Lie Theory II
This course is not eligible for Credit/D/Fail grading.

MATH 537 (3) Elementary Number Theory
This course is not eligible for Credit/D/Fail grading.

MATH 538 (3) Algebraic Number Theory
This course is not eligible for Credit/D/Fail grading.

MATH 539 (3) Analytic Number Theory
This course is not eligible for Credit/D/Fail grading.

MATH 541 (3) Harmonic Analysis I
This course is not eligible for Credit/D/Fail grading.

MATH 542 (3) Harmonic Analysis II
This course is not eligible for Credit/D/Fail grading.

MATH 543 (3) Discrete Harmonic Analysis
This course is not eligible for Credit/D/Fail grading.

MATH 544 (3) Probability I
This course is not eligible for Credit/D/Fail grading.

MATH 545 (3) Probability II
This course is not eligible for Credit/D/Fail grading.

MATH 546 (3) Continuous Time Stochastic Processes
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of MATH 544, MATH 545.

MATH 547 (3) Optimal Control Theory
Optimal control of systems governed by ordinary differential equations. The control problem will be carefully stated, and existence results and necessary conditions will be established. Hamilton-Jacobi-Bellman theory will be introduced. This course is not eligible for Credit/D/Fail grading.

MATH 548 (3) Discrete Random Processes
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of MATH 544, MATH 545.

MATH 549 (6/12) c Thesis for Master's Degree
This course is not eligible for Credit/D/Fail grading.

MATH 550 (3) Methods of Asymptotic Analysis
This course is not eligible for Credit/D/Fail grading. Prerequisite: Applied complex analysis (MATH 301 or equivalent) and ordinary and partial differential equations (MATH 400 or equivalent).

MATH 551 (3) Perturbation Methods for Differential Equations
This course is not eligible for Credit/D/Fail grading. Prerequisite: MATH 550. Ordinary and partial differential equations (MATH 400 or equivalent).

MATH 552 (3) Introduction to Dynamical Systems
Ideas, methods and applications of bifurcation theory and dynamical systems: differential and difference equations, local bifurcations, perturbation methods, chaos. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of MATH 215, MATH 255, MATH 256 and one of MATH 256, MATH 257, MATH 316.

MATH 553 (3) Advanced Dynamical Systems
Topics from: hyperbolic invariant sets and symbolic dynamics, global bifurcations, local bifurcations for partial differential equations, multiple bifurcations, bifurcations and symmetry, applications. This course is not eligible for Credit/D/Fail grading. Prerequisite: MATH 552.

MATH 554 (3) Symmetries and Differential Equations
Dimensional analysis, modelling, and invariance. Lie groups of transformations, infinitesimal transformations. Applications to ordinary and partial differential equations. No knowledge of group theory will be assumed. This course is not eligible for Credit/D/Fail grading. Prerequisite: Elementary courses in differential equations and linear algebra.

MATH 555 (3) Compressed Sensing
This course is not eligible for Credit/D/Fail grading.

MATH 556 (3) Industrial Mathematical Modelling
This course is not eligible for Credit/D/Fail grading.

MATH 557 (3) Linear and Nonlinear Waves
Classical and recent results in linear and nonlinear waves. Geometrical acoustics and kinematic waves; large amplitude waves in weakly stratified media; small amplitude waves in strongly stratified media. Dispersive waves; group velocity; applications. This course is not eligible for Credit/D/Fail grading. Prerequisite: MATH 400 and some knowledge of either fluid mechanics or elasticity.

MATH 559 (3) Complex Fluids
This course is not eligible for Credit/D/Fail grading.

MATH 560 (3) Mathematical Biology
Mathematical methods in modeling biological processes, at levels from cell biochemistry to community ecology. This course is not
eligible for Credit/D/Fail grading.

**MATH 561 (3) Mathematics of Infectious Diseases and Immunology**
Mathematical models for disease spread in populations. Within-host infectious disease dynamics. Models of the immune system and immune cells. This course is not eligible for Credit/D/Fail grading.

**MATH 562 (3) Mathematical Electrophysiology**
Formulation and analysis of models of excitable media. FitzHugh-Nagumo model, ionic models of membrane excitability (e.g., Hodgkin-Huxley), calcium excitability, bursting phenomena. This course is not eligible for Credit/D/Fail grading.

**MATH 563 (3) Modeling of Cell-Scale Biology**
Concepts and techniques for modeling cellular and subcellular dynamics in biological systems. Topics may include complex biochemical systems, biopolymers in cell motility and division, continuum mechanics, and membrane dynamics. This course is not eligible for Credit/D/Fail grading.

**MATH 564 (3) Evolutionary Dynamics**
Mathematical models of evolution and evolutionary game theory. Stochastic dynamics in finite populations, dynamics in spatially structured populations, and adaptive dynamics. Applications include the origin of species and the problem of cooperation. This course is not eligible for Credit/D/Fail grading.

**MATH 566 (3) Theory of Optimal Transportation**
This course is not eligible for Credit/D/Fail grading.

**MATH 567 (3) Nonlinear Wave Equations**
This course is not eligible for Credit/D/Fail grading.

**MATH 589 (3) M.Sc. Major Essay**
This course is not eligible for Credit/D/Fail grading.

**MATH 590 (2-6) c Graduate Seminar**
Presentation and discussion of recent results in the mathematical literature. This course is not eligible for Credit/D/Fail grading.

**MATH 591 (2) Graduate Seminar in Applied Mathematics**
This course is not eligible for Credit/D/Fail grading.

**MATH 592 (2-15) d Topics in Automorphic Forms**
This course is not eligible for Credit/D/Fail grading.

**MATH 599 (1) Mathematics Teaching Techniques**
This course is not eligible for Credit/D/Fail grading. [3-0-0]

**MATH 600 (2-15) c Topics in Algebra**
This course is not eligible for Credit/D/Fail grading.

**MATH 601 (2-15) c Topics in Analysis**
This course is not eligible for Credit/D/Fail grading.

**MATH 602 (2-15) c Topics in Geometry**
This course is not eligible for Credit/D/Fail grading.

**MATH 603 (2-15) c Topics in Topology**
This course is not eligible for Credit/D/Fail grading.

**MATH 604 (2-15) c Topics in Optimization**
This course is not eligible for Credit/D/Fail grading.

**MATH 605 (2-15) c Topics in Applied Mathematics**
This course is not eligible for Credit/D/Fail grading.

**MATH 606 (2-15) c Topics in Differential Equations**
This course is not eligible for Credit/D/Fail grading.

**MATH 607 (2-15) c Topics in Numerical Analysis**
This course is not eligible for Credit/D/Fail grading.

**MATH 608 (2-15) c Topics in Probability**
This course is not eligible for Credit/D/Fail grading.
MATH 609 (2-15) c Topics in Mathematical Physics
This course is not eligible for Credit/D/Fail grading.

MATH 610 (2-15) c Topics in Pure Mathematics
This course is not eligible for Credit/D/Fail grading.

MATH 612 (2-15) c Topics in Mathematical Biology
This course is not eligible for Credit/D/Fail grading.

MATH 613 (2-15) d Topics in Number Theory
This course is not eligible for Credit/D/Fail grading.

MATH 615 (2-15) d Topics in Algebraic Geometry
This course is not eligible for Credit/D/Fail grading.

MATH 616 (2-15) d Topics in Discrete Mathematics
This course is not eligible for Credit/D/Fail grading.

MATH 620 (2-15) c Directed Studies in Mathematics
Advanced study under the direction of a faculty member may be arranged in special situations. This course is not eligible for Credit/D/Fail grading.

MATH 649 (0) Doctoral Dissertation

Faculty of Arts

MDVL: Medieval Studies

See Medieval Studies under the Faculty of Arts section of the Calendar for other acceptable courses.

MDVL 210 (3) Introduction to Medieval Studies
A survey of the study of the medieval period in Western Europe (400-1550), integrating history, literature, and the arts; topics vary from year to year; interested students should consult the Medieval Studies Advisor.

MDVL 301 (3) European Literature from the 5th to the 14th Century
Selected works from the 5th to the 14th centuries in their cultural and social contexts. Prerequisite: Third-year standing in the Faculty of Arts.

MDVL 302 (3) European Literature from the 14th to the 16th Century
Selected works of the Late Middle Ages and Renaissance in their cultural and social contexts. Prerequisite: Third-year standing in the Faculty of Arts.

MDVL 310 (3/6) d Topics in Medieval Studies
Interdisciplinary approaches to selected topics in medieval history, literature, and the arts; topics vary from year to year; interested students should consult the Medieval Studies advisor.

MDVL 449 (6/12) c Graduating Essay or Supervised Study

MDVL 490 (3/6) d Research Seminar in Medieval Studies
An intensive research seminar in a specific period, area, or issue integrating topics in medieval history, literature, and the arts; topics vary from year to year; interested students should consult the Medieval Studies advisor.

Mechanical Engineering, Faculty of Applied Science

MECH: Mechanical Engineering

MECH 220 (4) Technical Skills Practicum
Engineering graphics, spatial visualization, CAD, equation solvers, machine shop practice, electronic circuit construction and troubleshooting, elements of engineering science. This course is not eligible for Credit/D/Fail grading. [1-3-3]
Prerequisite: All of MATH 101, MATH 152, PHYS 170 and one of APSC 150, APSC 151 and either (a) PHYS 153 or (b) all of
PHYS 157, PHYS 158, PHYS 159.
Corequisite: All of ENGL 112, MECH 221.

MECH 221 (12) Engineering Science I
Rigid body kinetics and kinematics, basic electrical circuits, work and power, stress and strain, torsion, bending, engineering materials, probability and statistics. This course includes the content of ELEC 203. This course is not eligible for Credit/D/Fail grading. [11-2-1]
Prerequisite: All of MATH 101, MATH 152, PHYS 170 and either (a) PHYS 153 or (b) all of PHYS 157, PHYS 158, PHYS 159.
Corequisite: All of MECH 220, MECH 224 and one of ENGL 112, APSC 176.

MECH 222 (6) Engineering Science II
Fluid properties, equations of state. Pressure, buoyancy, hydrostatic forces. Conservation of mass, momentum, and energy. Work and heat; internal energy and enthalpy. Bernoulli's equation. Dimensional analysis, modeling. Turbulent flow in pipes; turbomachinery. Second law and the Carnot cycle; entropy; first and second law analysis of systems. This course is not eligible for Credit/D/Fail grading. [5-2-1]
Prerequisite: All of MECH 220, MECH 221.
Corequisite: All of MECH 223, MECH 225.

MECH 223 (7) Introduction to the Mechanical Design Process
Design methodology, synthesis and analysis. Design projects representing both mechanical mechanism design and thermofluid systems. This course is not eligible for Credit/D/Fail grading. [3-8-0]
Prerequisite: All of MECH 220, MECH 221.
Corequisite: MECH 222.

MECH 224 (1) Integration of Engineering Concepts I
Integration of the theory and practice of Mechanical Engineering to illustrate the commonality and conceptual connectivity of seemingly different technical areas. Emphasis on dynamics, solid mechanics, materials, electronics, and mathematics. This course is not eligible for Credit/D/Fail grading. [1-0-1]
Corequisite: MECH 221.

MECH 225 (1) Integration of Engineering Concepts II
Integration of the theory and practice of Mechanical Engineering to illustrate the commonality and conceptual connectivity of seemingly different technical areas. Emphasis on thermodynamics, fluid mechanics, and mathematics. This course is not eligible for Credit/D/Fail grading. [1-0-1]
Corequisite: MECH 222.

MECH 226 (3) Technical Communication for Mechanical Engineers
Written and oral communication. Preparation of design reports, business correspondence, verbal, online, and visual presentation of technical material. Restricted to students in the second year of Mechanical Engineering. This course is not eligible for Credit/D/Fail grading. [1-0-1;1-0-1]
Prerequisite: A score of 65% or higher in one of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: All of MECH 220, MECH 221, MECH 222, MECH 223, MECH 224, MECH 225.

MECH 227 (5) Approaches to Technical Communication for Mechanical Engineers
Written and oral communication. Preparation of design, business correspondence, verbal, online and visual presentation of technical material. Focus on the linguistic structure and style of technical communication. Restricted to students in Mechanical Engineering. Credit will be granted for only one of MECH 226 or MECH 227. This course is not eligible for Credit/D/Fail grading. [3-0-4]
Prerequisite: MECH 220 and one of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.

MECH 260 (3) Introduction to Mechanics of Materials
Statically determinate frames and trusses; normal and shear stresses and strains; shear force and bending moment diagrams; theory of beam bending, torsion of circular rods; transformation of stress and strain in two and three dimensions, Mohr's circle; yield and ultimate failure criteria. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: All of MATH 101, PHYS 170.

MECH 280 (3) Introduction to Fluid Mechanics
Fluid properties; statics; kinematics, dynamics, energy, and momentum principles for control volumes; dimensional analysis and similarity; laminar and turbulent flow; pipe flow; principles of centrifugal pumps. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: All of MATH 152, PHYS 170 and one of MATH 217, MATH 253 and either (a) all of PHYS 101, PHYS 102 or (b) PHYS 153 or (c) all of PHYS 157, PHYS 158, PHYS 159.
MECH 305 (6) Data Analysis and Mechanical Engineering Laboratories
The use of probability and statistical methods for engineering applications. Mechanics of materials, heat transfer, and fluid dynamics. Instrumentation, data acquisition, and data manipulation using modern computational tools. This course is not eligible for Credit/D/Fail grading. [3-6-0]
Prerequisite: All of MECH 220, MECH 223, MECH 224, MECH 225.

MECH 306 (4) Data Analysis and Mechatronics Laboratories
The use of probability and statistical methods for engineering applications. Mechanics of materials and heat transfer. Instrumentation, data acquisition, and data manipulation using modern computational tools. Common mechanical devices. For students in the Mechatronics Option only. This course is not eligible for Credit/D/Fail grading. [3-3*-0]
Prerequisite: All of MECH 220, MECH 223, MECH 224, MECH 225.

MECH 325 (4) Mechanical Design I
Selection of flexible drives, bearings, hydraulic system components, and couplings. Design of bolted joints and power screws. Design and selection of gears, gear trains, and mechanisms. This course is not eligible for Credit/D/Fail grading. [3-0-3]
Prerequisite: One of MECH 223, MECH 260.
Corequisite: MECH 360 and one of MECH 328, ENPH 253, IGEN 330.

MECH 326 (3) Mechanical Design II
Design of shafts and welded joints. Fatigue and fracture considerations in design: failure types, failure under static and dynamic loading, fatigue failure, crack initiation, and propagation. Introduction to the FEM in mechanical design. This course is not eligible for Credit/D/Fail grading. [2-0-3]
Prerequisite: One of MECH 223, MECH 260.
Corequisite: All of MECH 325, MECH 360 and one of MECH 328, ENPH 253, IGEN 330.

MECH 327 (3) Thermodynamics II
Air standard and vapor cycles; first and second law of cycles. Exergy. Gas mixtures. Energy conservation. Equilibrium. Reacting systems. Application to thermofluid systems such as power plants. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: Either (a) MECH 225 or (b) one of CHBE 241, ENPH 257 and one of CHBE 251, CIVL 215, MECH 280.
Corequisite: MECH 325 and one of MECH 328, ENPH 479, IGEN 330.

MECH 328 (3) Mechanical Engineering Design Project
Design project course linked to MECH 325, MECH 326, or MECH 327. Applying the design process, making educated assumptions and decisions, and working in teams to provide a new mechanical design. Weekly lecture discussing product development and various factors affecting the design. This course is not eligible for Credit/D/Fail grading. [1-4-1]
Corequisite: MECH 325.

MECH 329 (3) Materials for Mechanical Design
Selection of material properties and processing techniques for mechanical design. Metals and alloys, ceramics, polymers, composites and other hybrid materials. This course is not eligible for Credit/D/Fail grading. [3-0-2*]
Prerequisite: Either (a) MECH 224 or (b) all of APSC 278, MECH 260.

MECH 356 (3) Machine Components
Machines used for wood products manufacturing, design, maintenance, purchasing. Selection of components including drives, bearings, brakes, clutches, fasteners, springs. Not open to students in the Faculty of Applied Science. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: WOOD 376.
Corequisite: WOOD 386.

MECH 358 (3) Engineering Analysis
Fourier series; auto- and cross-correlation; power spectra; discrete Fourier transform; boundary-value problems; numerical methods; partial differential equations; heat, wave, Laplace, Poisson, and wave equations. Applications to mechanical engineering and practical computing emphasized. Credit will be granted for only one of MECH 358 and MATH 358. This course is not eligible for Credit/D/Fail grading. [3-2*-0]
Prerequisite: All of MECH 224, MECH 225.

MECH 360 (3) Mechanics of Materials
Beam deflections, singularity functions; use of tabulated solutions; column buckling; Castigliano's theorem, statically indeterminate beams, bending of beams with asymmetric cross-sections, shear centre; principal stresses and stress invariants in three dimensions. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: One of MECH 224, MECH 260.
MECH 366 (3) Modeling of Mechatronic Systems
Modeling of mechanical, electrical, thermal, fluid elements and mixed mechatronic systems. Signal processing, signal conditioning. Sensors, data acquisition systems, actuators. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: Either (a) all of MECH 220, MECH 223, MECH 224, MECH 225 or (b) all of ENPH 253, MECH 260 and one of ELEC 201, EECE 251.

MECH 368 (3) Engineering Measurements and Instrumentation
Industrial measurement needs including: architecture of electronic instrumentation systems; electrical representation of physical quantities; sensors and actuators; analog signal processing using linear and non-linear circuits; computer based readout including programming for user-interface and data acquisition. This course is not eligible for Credit/D/Fail grading. [3-1-0]
Prerequisite: Either (a) two of MECH 220, MECH 224, ELEC 203 or (b) two of MECH 220, MECH 224, EECE 263.

MECH 375 (3) Heat Transfer
Steady and transient conduction. Radiation heat transfer. Convective heat and mass transfer in pipes and from external surfaces. Design of heat exchangers. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: Either (a) MECH 225 or (b) one of CHBE 241, ENPH 257 and one of CHBE 251, CIVL 215, MECH 280.

MECH 380 (3) Fluid Dynamics
Review of principles, compressible flow, potential flow, simple laminar viscous flow, boundary layers, flow around bluff bodies. This course is not eligible for Credit/D/Fail grading. [3-0-1]
Prerequisite: Either (a) MECH 225 or (b) MATH 255 and one of CHBE 251, CIVL 215, MECH 280 and one of CHBE 241, ENPH 257.

MECH 386 (3) Industrial Fluid Mechanics
Analysis of piping networks. Review of pumps, turbines and hydraulic motors. Flow measurement devices such as flow meters and transducers for measuring velocity and pressure. Multiphase flows. Introduction to turbulence, mixing and buoyancy driven flows. This course is not eligible for Credit/D/Fail grading. [3-1*-0]
Prerequisite: MECH 380.

MECH 392 (2) Manufacturing Processes
Manufacturing characteristics of materials and their control. Metal forming processes, plastic deformations, rolling, forging, drawing, extrusion, sheet metal forming. Machining processes and machine tools, turning, milling, drilling, grinding. Metal fabrication, welding and casting. An introduction to process planning. This course is not eligible for Credit/D/Fail grading. [2-0-0]

MECH 405 (3) Acoustics and Noise Control
Wave properties; the decibel; hearing, deafness, and hearing protectors; noise criteria and regulations; sound measurement; source characterization; real noise sources, sound propagation outdoors, in ducts and pipes and in rooms; sound transmission; silencers; sound absorbers; partitions. This course is not eligible for Credit/D/Fail grading. [3-1-0]

MECH 410 (2-12) d Special Topics in Mechanical Engineering
Lectures and readings on specialized topics of current interest in Mechanical Engineering. This course is not eligible for Credit/D/Fail grading.

MECH 420 (3) Sensors and Actuators
Measurement of motion, stress, force, torque, temperature, flow and pressure; principles of sensors and signal conditioning methods; selection and sizing of actuators. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: All of MECH 360, MECH 463, MECH 366 and one of ELEC 343, EECE 376.

MECH 422 (3) Introduction to Microelectromechanical Systems
Fundamentals of MEMS (MicroElectroMechanical Systems). Microfabrication of MEMS with solid-state technology. LIGA and micro injection molding. Physics of MEMS. Operational principles of various MEMS devices. This course is not eligible for Credit/D/Fail grading. [3-1-0]
Prerequisite: One of ELEC 302, EECE 363, ELEC 344, EECE 365 and all of MECH 360, MECH 463.

MECH 423 (3) Mechatronic Product Design
Design of mechatronic systems for industrial and human-centric applications; compliant structures; electronic circuits to interface
with sensors and actuators; embedded systems; precision timing and control; data acquisition and processing; user interfaces; and product innovation.

Prerequisite: MECH 366 and one of ELEC 302, EECE 363. 4th year standing.

Corequisite: One of CPEN 312, EECE 355.

MECH 430 (3) Engineering Data Analysis
The use of probability and statistical methods for engineering applications. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MECH 431 (3) Engineering Economics
This course is not eligible for Credit/D/Fail grading. [3-0-0]

MECH 433 (3) Biofluids
Review of principles, biorheology, circulatory biofluid mechanics, synovial fluid in joints, biofluid dynamics of the human brain, respiratory biofluid mechanics, flow and pressure measurement techniques in human body. This course is not eligible for Credit/D/Fail grading. [3-0-1]

Prerequisite: MECH 380.

MECH 435 (3) Orthopaedic Biomechanics

Prerequisite: Either (a) MECH 221 or (b) all of APSC 278, MECH 260.

MECH 436 (3) Fundamentals of Injury Biomechanics
Introduction to injury biomechanics. Anatomy. Impact experiments. Multi-body dynamic simulation and finite element analysis. Skull, face, brain, spine, eye, pelvis, abdomen, and extremity injury. Anthropomorphic test devices, seat belts, airbags, child restraints, and helmets. Credit cannot be obtained for both MECH 436 and MECH 536. This course is not eligible for Credit/D/Fail grading. [3-0-1]

Prerequisite: All of MECH 360, MECH 463.

MECH 439 (1) Biomechanics Research
Seminar in Biomechanics research. This course is not eligible for Credit/D/Fail grading. [1-0-0]

MECH 445 (3) Fuel Cell Systems
Energy system architecture and electrochemical energy conversion: fuel cell thermodynamics and electrochemistry; Proton Exchange Membrane Fuel Cells (PMFCs) and Solid Oxide Fuel Cells (SOFCs); hydrogen production, storage, and distribution. Credit cannot be obtained for both MECH 445 and MECH 545. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of MECH 327, MECH 375.

MECH 454 (6) Thermofluids Capstone Design Project
A capstone course to provide students experience in the design/development of practical mechanical and thermofluids devices. Projects are provided by local industry and engineering research laboratories. Credit will be granted for only one of MECH 454, MECH 457, MECH 458, MECH 459, or APSC 496. This course is not eligible for Credit/D/Fail grading. [1-2-2; 1-2-2]

Prerequisite: MECH 328 and fourth-year standing in the Thermofluids Option.

MECH 457 (6) Mechanical Engineering Design Project
A capstone design project designed to give students experience in the design/development of practical mechanical devices. Projects are provided by local industry and engineering research laboratories. Credit will be granted for only one of MECH 454, MECH 457, MECH 458, MECH 459, or APSC 496. This course is not eligible for Credit/D/Fail grading. [1-2-2; 1-2-2]

Prerequisite: MECH 328 and fourth-year standing in Mechanical Engineering.

MECH 458 (6) Mechatronics Design Project
A capstone design program designed to give students experience in the design/development of practical mechanical and mechatronics devices. Projects are provided by local industry and engineering research laboratories. Credit will be granted for only one of MECH 454, MECH 457, MECH 458, MECH 459, or APSC 496. This course is not eligible for Credit/D/Fail grading. [1-2-2; 1-2-2]

Prerequisite: MECH 328 and fourth-year standing in the Mechatronics Option.

MECH 459 (6) Biomedical Design Project
A capstone design program designed to give students experience in the design and development of practical biomedical devices.
Projects are provided by local industry and engineering research laboratories. For students in the Biomedical Option only. Credit will be granted for only one of MECH 454, MECH 457, MECH 458, MECH 459, or APSC 496.

Prerequisite: MECH 328 and fourth-year standing in the Biomedical Option.

MECH 460 (3) Advanced Mechanics of Materials
Axissymmetric membrane stresses in thin shells of revolution, stresses in thick-walled cylinders and rotating disks, beams on elastic foundations, axissymmetric bending of cylindrical shells, axissymmetric bending of circular plates.

This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: MECH 360.

MECH 462 (3) Finite Element Analysis

This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: All of MECH 360, MECH 375.

MECH 463 (4) Mechanical Vibrations
Theory of vibration of mechanical systems. Undamped 1 degree of freedom vibration, forced vibrations and resonance, damping, multiple degree of freedom systems, mode shapes and orthogonality, continuous systems, vibration measuring instruments and frequency spectrum analysis.

This course is not eligible for Credit/D/Fail grading. [3-2*-1]

Prerequisite: One of MECH 224, MECH 260.

MECH 464 (3) Industrial Robotics
Definition and classification of industrial robotic devices. Selection and implementation issues. Workcell environments. Forward and inverse kinematics, dynamics, trajectory planning. Sensing and manipulation tasks. Control architectures. Credit will be granted for only one of ELEC 442, EECE 571R, EECE 589, MECH 464, or MECH 563.

This course is not eligible for Credit/D/Fail grading. [3-0-1]

Corequisite: One of MECH 466, MECH 467.

MECH 466 (4) Automatic Control
Process and system characteristics; transient response; the closed loop; block diagrams and transfer functions; control actions; stability; Nyquist diagrams; Bode diagrams; root locus methods; frequency response; system compensation; nonlinear control systems; digital computer control. Laboratory experiments to support the lecture content. Credit cannot be obtained for both MECH 466 and MECH 467.

This course is not eligible for Credit/D/Fail grading. [3-3*-0]

Prerequisite: Either (a) all of MECH 220, MECH 221, MECH 463 or (b) all of MATH 255, MECH 463 and one of ELEC 201, ELEC 202, EECE 251, EECE 253.

MECH 467 (4) Computer Control of Mechatronics Systems
Block diagrams and transfer functions, continuous and discrete domain transformations, feedback control system characteristics, control design in both continuous and discrete domain, absolute and relative stability, laboratory examples of Mechatronic systems design. Credit cannot be obtained for both MECH 466 and MECH 467.

This course is not eligible for Credit/D/Fail grading. [3-3*-0]

Prerequisite: MECH 366.

MECH 468 (3) Modern Control Engineering

Introduction to state space control methods for linear systems including modal control, controllability, observability, linear quadratic regulators, optimal control. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Corequisite: One of MECH 366, MECH 466.

MECH 469 (3) Dynamic System Modeling

Modeling of mechanical, electrical, fluid, and thermal systems; analytical models; model representations such as linear and bond graphs; response analysis; digital simulation. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MECH 470 (3) Energy Conversion Systems


Prerequisite: All of MECH 327, MECH 375.

MECH 473 (3) Heating, Ventilating and Air Conditioning
Principles of air conditioning; psychometrics and refrigeration. Heat transfer through building materials. Estimation of heating and cooling loads including the use of current software. System design. Ground, air and water source heat pumps. \textit{This course is not eligible for Credit/D/Fail grading.} [3-0-1]

Prerequisite: MECH 375.

MECH 475 (3) Heat Transfer II

Prerequisite: MECH 375.

MECH 478 (3) Internal Combustion Engines
Analysis of spark and compression ignition engines. Calculation of fuel economy, power, and emission. Practical and regulatory considerations in engine design. Engine emission and control systems. Credit will be granted for only one of MECH 478 or MECH 578. \textit{This course is not eligible for Credit/D/Fail grading.} [3-0-0]

Prerequisite: MECH 375.

MECH 479 (3) Computational Fluid Dynamics
Techniques for numerical solution of ordinary and partial differential equations, including an introduction to the finite difference, finite volume and finite element approaches. Simulation of laminar and turbulent flows, including common turbulent models. \textit{This course is not eligible for Credit/D/Fail grading.} [3-1-0]

Prerequisite: All of MECH 327, MECH 380.

MECH 481 (3) Aerodynamics of Aircraft I
Low speed aerodynamics of airfoils, wings, wind tunnels. \textit{This course is not eligible for Credit/D/Fail grading.} [3-1*-0]

Prerequisite: MECH 380.

MECH 484 (3) Aircraft Design: Aerodynamics
Aircraft performance, stability and control, loading and air worthiness. Detailed example. \textit{This course is not eligible for Credit/D/Fail grading.} [2-2-0]

MECH 485 (3) Aircraft Design: Structures
Development of aircraft wing structure, moments of inertia for complex shapes, crippling loads, shear lag. \textit{This course is not eligible for Credit/D/Fail grading.} [2-2-0]

MECH 488 (3) Introduction to Ship Hydrodynamics
Ship terminology, lines plans, ship hydrostatics, transverse and longitudinal stability of ships, dimensional analysis, ship resistance prediction; ship propulsion methods, propeller selection and design. \textit{This course is not eligible for Credit/D/Fail grading.} [3-0-0]

Prerequisite: One of MECH 380, CIVL 315 or permission of instructor.

MECH 489 (4) Experimental Thermofluids
Experimental uncertainty. Design of experiments. Test facilities. Temperature and pressure measurement techniques and instrumentation. Velocity and flow rate measurement techniques. Flow visualization. Case studies of industrial and research experimental practice. Credit will be granted for only one of MECH 489 or MECH 582. \textit{This course is not eligible for Credit/D/Fail grading.} [3-2-0]

Prerequisite: All of MECH 375, MECH 380.

MECH 491 (3) Computer-Aided Manufacturing
NC programming and machining with interactive CAD/CAM systems. Curve and surface geometry for tool-path generation. Tool-path generation methodologies. Geometric modeling techniques for simulation and verification of manufacturing processes. Introduction to Computer-Aided Process Planning. Supplementary tutorial laboratory experiments. \textit{This course is not eligible for Credit/D/Fail grading.} [2-2*-0]

Prerequisite: MECH 392.

MECH 492 (4) CAD/CAM
Introduction to computer assisted design and manufacturing with a focus on the fundamental issues of geometry and machine tools including an understanding of standard computer tools. Applications to secondary wood products manufacturing. Not open to students in the Faculty of Applied Science. \textit{This course is not eligible for Credit/D/Fail grading.} [3-4-0]

Prerequisite: WOOD 290.

MECH 493 (3) Introduction to Academic Research
Research project directed by a faculty member in Mechanical Engineering. \textit{This course is not eligible for Credit/D/Fail grading.}
MECH 495 (3) Industrial Engineering
Organizational structure. Manufacturing systems and group technology. Classification and coding. Scheduling and sequencing of operations. Forecasting. Quality control for variables and attributes. Plant location. System reliability analysis. Advanced manufacturing automation concepts. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MECH 496 (3) Engineering Management
Organization structures. Management styles. Cost systems and control. Financial statements; accounting procedures. Budgets and performance control. Project management. Human resources management. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MECH 501 (3) Thermodynamics
Thermodynamic principles, Maxwell relations, availability, irreversibility, and equilibrium. Introduction to statistical mechanics. This course is not eligible for Credit/D/Fail grading.

MECH 502 (3) Fluid Mechanics
Governing equations; viscous incompressible flow, incompressible potential flow; incompressible boundary layers, stability and turbulence; compressible potential flow. This course is not eligible for Credit/D/Fail grading.

MECH 505 (3) Industrial and Environmental Acoustics and Vibration
Fundamentals of acoustics and vibrations, physiologic effects, measurement, instrumentation, interpretation of data, industrial standards, and control. For students in Occupational and Environmental Hygiene; other graduate students may enrol with permission of the instructor. This course is not eligible for Credit/D/Fail grading. Equivalency: OCCH 515.

MECH 506 (3) Linear Vibrations

MECH 507 (3) Analytical Dynamics
Newtonian mechanics; generalized co-ordinates and analytical mechanics; Lagrange equations; Hamilton's Principle; rotational motion and rigid body dynamics; Gyroscopic motion; phase space, equilibrium, and stability of motion; stability characteristics of autonomous systems; Hamilton-Jacobi method; applications. This course is not eligible for Credit/D/Fail grading.

MECH 510 (4) Computational Methods in Transport Phenomena I
Analytical, computational, and experimental methods in fluid mechanics. Overview of CFD program development. Finite volume methods, spacial discretization and spatial accuracy analysis. Boundary conditions. Time advance methods, time accuracy, and stability. Application to model problems and to the incompressible laminar Navier-Stokes equations. Validation techniques for CFD code. This course is not eligible for Credit/D/Fail grading. [3-2]

MECH 511 (3) Computational Methods in Transport Phenomena II
Selected advanced topics in CFD, typically chosen from: Finite volume methods on curvilinear meshes and structured mesh generation. Finite volume methods on unstructured meshes. Multigrid methods for elliptic PDE's. Reynolds-averaged form of the Navier-Stokes equations and turbulence modeling. Three-dimensional flows. Compressible flow. This course is not eligible for Credit/D/Fail grading. Prerequisite: MECH 510.

MECH 514 (3) Linear FEA in Solids and Heat Transfer
Theory and element selection. Virtual work and weighted residual formulation. Linear elastic analysis. Heat transfer analysis. Isoparametric elements. Computer program development. Utilization of existing computer packages. Credit is given for one of MECH 514 and MECH 462. This course is not eligible for Credit/D/Fail grading.

MECH 515 (3) Finite Element Analysis of Non-linear and Field Problems

MECH 516 (3) Optimal Mechanical Design
Formulation of optimal design mechanical problems, unconstrained and constrained problems, search and quasi-Newton methods, finite element formulation for optimal design problems, optimal design of mechanical dynamic systems, interactive
design optimization, applications. This course is not eligible for Credit/D/Fail grading.

**MECH 520 (3) Control Sensors and Actuators**
Review of control, instrumentation and design. Performance specification of control components, component matching, error analysis. Operating principles, analysis, modelling, design considerations of control sensors and actuators such as analog sensors for motion measurement, digital transducers, stepper motors, DC motors, induction motors, synchronous motors, and hydraulic actuators. Control techniques pertaining to actuators. Application. This course is not eligible for Credit/D/Fail grading.

**MECH 521 (3) Modeling and Design of Mechatronics Systems**
Component interconnection and system integration. Performance specification and analysis. Role of sensors, transducers, and actuators in a mechatronic system. Control techniques. Case studies in mechatronic system development. This course is not eligible for Credit/D/Fail grading.

**MECH 522 (4) Foundations in Control Engineering**
State space model; stability; controllability; observability; Kalman decomposition; state feedback; observer; linear quadratic regulator; Kalman filter. Credit will be granted for only one of MECH 468 or 522. This course is not eligible for Credit/D/Fail grading.

**MECH 523 (3) Intelligent Control**
Review of traditional control techniques and comparison with intelligent control; methods of representing and processing knowledge; conventional sets and crisp logic; fuzzy logic; fuzzy logic control; hierarchical fuzzy control; control system tuning; industrial applications. This course is not eligible for Credit/D/Fail grading.

**MECH 527 (3) Advanced Mechatronics**
Quasi-static approximations, modulation and demodulation, reversal, reciprocity, motor transformation, stiffness method, spatial filtering, Maxwell stress tensor, guarding, control limitations. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: MECH 421. Or equivalent.

**MECH 528 (3) Multivariable Feedback Control**
Well-posedness and internal stability of feedback systems, performance limitations, uncertainty, LFT representations, robust stability and robust performance, model reduction, linear matrix inequalities, H-infinity control, multi-objective control, mu-analysis and synthesis, H-infinity gain- scheduling, control applications. Credit will be granted for only one of MECH 528 or EECE 508. This course is not eligible for Credit/D/Fail grading. Prerequisite: Completion of MECH 466, MECH 468, ELEC 341, or equivalent is recommended.

**MECH 529 (3) Modelling of Dynamic Systems**
Advanced modeling of mechanical, electrical, fluid, thermal and multi-domain systems; inter-domain analogies; analytical models in time and frequency domains; modeling tools; response analysis; digital simulation; practical project. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Prior undergraduate coursework in dynamics, vibration, or electrical circuits.

**MECH 533 (3) Biofluids**
Principles, biorehology, circulatory biofluid mechanics, synovial fluid in joints, biofluid dynamics of the human brain, respiratory biofluid mechanics, flow and pressure measurement techniques in the human body. Credit will be granted for only one of MECH 433 or 533. This course is not eligible for Credit/D/Fail grading.

**MECH 535 (3) Orthopaedic Biomechanics**
Musculoskeletal anatomy. Static and dynamic analysis of the musculoskeletal system. Gait. Musculoskeletal tissue mechanics. Biomaterials. Advanced study of relevant problems in orthopaedics, including joint replacement, fracture fixation, and spinal disorders. Credit given for only one of MECH 435 and MECH 535. This course is not eligible for Credit/D/Fail grading. [3-0-1]

**MECH 536 (3) Fundamentals of Injury Biomechanics**
Introduction to injury biomechanics. Anatomy. Impact experiments. Multi-body dynamic simulation and finite element analysis. Skull, face, brain, eye, pelvis, abdomen, and extremity injury. Anthropomorphic test devices, seat belts, airbags, child restraints, and helmets. Credit cannot be obtained for both MECH 436 and MECH 536. This course is not eligible for Credit/D/Fail grading. [3-0-1]

**MECH 543 (3) Acoustics and Noise Control**
Wave properties; the decibel; hearing, deafness and hearing protectors; noise criteria and regulations; sound measurement; sound-source characterization; real noise sources; sound propagation outdoors, in ducts and pipes and in rooms; sound transmission; silencers; sound absorbers; partitions. This course is not eligible for Credit/D/Fail grading. [3-1]

**MECH 545 (3) Fuel Cell Systems**
Energy system architecture and electrochemical energy conversion; fuel cell thermodynamics and electrochemistry; Proton Exchange Membrane Fuel Cells (PMFCs) and Solid Oxide Fuel Cells (SOFCs); hydrogen production, storage, and distribution. Credit cannot be received for both MECH 445 and MECH 545.

This course is not eligible for Credit/D/Fail grading. [3-0-1]

Prerequisite: All of MECH 327, MECH 375.

MECH 550 (2-6) d Special Advanced Courses
Special advanced lecture courses may be arranged for graduate students upon the approval of the department head. There will not be more than 6 credits in any one such course. This course is not eligible for Credit/D/Fail grading.

MECH 551 (6) Electro-Mechanical System Design Project I
The design, analysis, manufacturability, instrumentation and computer control of a selected dynamic machinery assembly will be studied. This course is not eligible for Credit/D/Fail grading.

Prerequisite: All of MECH 421, MECH 467.

MECH 552 (6) Electro-Mechanical System Design Project II
The full assembly, instrumentation, computer and electronic interfacing, and testing of a dynamic machine. This course is not eligible for Credit/D/Fail grading. [0-3-1]

Prerequisite: MECH 551.

MECH 555 (4) Fundamentals of Microelectromechanical Systems
Micro-fabrication of MEMS: solid-state technology and other micromachining techniques. Engineering principles of various MEMS devices. This course is not eligible for Credit/D/Fail grading. [3-2]

Prerequisite: MECH 551.

MECH 560 (3) Experimental Methods in Mechanics
Operating principles of transducers for measuring typical quantities; the construction of transducers and factors controlling their measurement accuracy; electronic signal conditioning equipment and computerized data acquisition system. This course is not eligible for Credit/D/Fail grading.

MECH 561 (3) Linear Elasticity
Stress and strain in three dimensions, fundamental field equations of linear elasticity; equilibrium, compatibility, Hooke's law; Papkovitch-Neuber solution, plane stress and plane strain; torsion, torsion of thin-walled members with warping restraint; plate theory. This course is not eligible for Credit/D/Fail grading.

MECH 563 (3) Robotics: Kinematics, Dynamics and Control
Definitions and classification of robot kinematics; homogeneous transformations, manipulator kinematic equations, forward and inverse kinematic solution methods, differential kinematic equations, motion trajectories. Dynamics: Lagrange-Euler formulations, Newton-Euler formulation. Control: methods, robot control hierarchy, control of single joint and multiple link manipulators, and advanced control methods. Credit will be granted for only one of ELEC 442, EECE 571R, EECE 589, MECH 464, or MECH 563.

This course is not eligible for Credit/D/Fail grading.

MECH 568 (3) Theory of Plasticity
Yield conditions and flow rules; upper and lower bound theorems; elastic-plastic analysis of circular disks, thick-walled cylinders and spheres; torsion; slip-line fields; rigid-plastic analysis of plates and shells. Credit will be given for only one of MECH 568 or CIVL 536. This course is not eligible for Credit/D/Fail grading.

MECH 569 (2/4) d Non-Linear Vibration
Phase plane representation, singular points, exact solutions, equivalent linearization, perturbation method, averaging method, variation of parameters, forced vibration, self-excited vibration. This course is not eligible for Credit/D/Fail grading.

MECH 572 (3) Convection Heat Transfer
Governing equations for laminar and turbulent flow. Forced convection in internal and external flow. Free, and combined free and forced convection. Heat transfer at high velocities, in rarefied gases and in two-phase flow. Mass transfer. This course is not eligible for Credit/D/Fail grading.

MECH 575 (1-3) d Directed Studies in Mechanical Engineering
This course is not eligible for Credit/D/Fail grading.

MECH 576 (3) Combustion
Thermodynamics of combustion, stoichiometry, heat of formation and reaction. Equilibrium composition and adiabatic flame temperature. Chemical kinetics of combustion. Flames in premixed gases; laminar and turbulent flame propagation. Diffusion flames, pollutant emissions and combustion in IC engines. This course is not eligible for Credit/D/Fail grading.

MECH 578 (3) Internal Combustion Engines
Analysis of spark and compression ignition engines. Calculation of fuel economy, power and emission. Practical and regulatory
considerations in engine design. Numerical engine modeling and analysis. Credit will be granted for only one of MECH 478 or MECH 578.

MECH 581 (3) Low Speed Aerodynamics

MECH 582 (4) Experimental Fluid Mechanics

MECH 584 (3) Advanced Engineering Acoustics
Sound sources waves and propagation; reflection and transmission at fluid and solid interfaces; sound propagation outdoors, in ducts and pipes, underwater, in rooms; sound-absorbing materials; experimental and numerical methods; acoustical signal processing. Credit will not be given for both MECH 489 and MECH 582.

MECH 586 (4) Turbulent Shear Flow
The basic equations of fluid motion; introduction to hydro-dynamic stability; Reynolds' equations; energy equations for turbulent motion; intermittency; similarity near a solid boundary and in free turbulence; approximate methods for predicting the growth of turbulent boundary layers and free symmetrical shear flows. Credit will not be given for both MECH 489 and MECH 582.

MECH 587 (3) Fracture Control for Design
Transition temperature, linear-elastic and elastic-plastic theory, experimental testing methods, fracture-resistant design methodology, application to mechanical and structural components. Credit will not be given for both MECH 489 and MECH 582.

MECH 588 (3) Fatigue
Review of smooth-body fatigue: high-cycle; low-cycle; cumulative damage; cycle counting methods; cracked-body fatigue theory; effects of load history and stress ratio; numerical crack-growth prediction models; application to components and structures; crack detection methods. Credit will not be given for both MECH 489 and MECH 582.

MECH 589 (4) Computer Control of Multi-Axis Machines
Digital control laws for servo drives; state space and transfer function models of feed drives; tracking errors; trajectory generation of multi-axis machines; contouring analysis of multi-axes servo drives; real time linear and circular interpolation methods supported by laboratory applications. Credit will be granted for only one of MECH 467 or MECH 589.

MECH 590 (3) Manufacturing Automation
Review of mechanics of metal cutting. Machine tool structures, static deformations, forced and self-excited vibrations and chatter. Design principles of CNC machines; state space and transfer function models of feed drivers, dc servo motors and amplifiers. Contouring analysis in multi-axes machining. Unmanned manufacturing topics: Sensors, adaptive control, and monitoring in metal-removing processes. Credit will not be given for both MECH 489 and MECH 582.

MECH 592 (3) Machine Tool Structures and Vibrations
Review of metal cutting mechanics, milling, static deformations of machine tools. Machine tool vibrations, forced and self excited vibrations in machining, chatter, stability. Sensors for machine tool monitoring and adaptive control. Sensor assisted intelligent machining techniques. Credit will not be given for both MECH 489 and MECH 582.

MECH 594 (3) Computer-Integrated Manufacturing
Objectives and elements of Computer-Integrated manufacturing, information control, computer/device networks. Sensor and sensor fusion, layout and material handling issues. Production line design, and design for manufacturing. Flexible automation, virtual manufacturing, rapid prototyping, quality control and reliability issues and Artificial Intelligence applications. Credit will not be given for both MECH 489 and MECH 582.

MECH 595 (2) Systems Modelling and Simulation
Modelling of discrete and continuous systems on digital computers. Application of discrete simulation languages to the analysis and design of service and manufacturing systems. Statistical concepts in analysis and validation. Application of continuous simulation languages to the analysis and design of dynamic and control systems. Integration methods and algorithms, optimization and iterative problems. Credit will not be given for both MECH 489 and MECH 582.
MECH 596 (3) CAD/CAM Principles and Practice
3D geometric modeling; parametric representation of curves and surfaces; CNC machine tool programming; milling operations and setup; tool path generation for three- and five-axis sculptured surface machining. This course is not eligible for Credit/D/Fail grading.

MECH 597 (6) Project for M.Eng. Studies
Project on assigned topic of specialization. For students registered in the M.Eng. program whose project is supervised by a faculty member in the department of Mechanical Engineering. This course is not eligible for Credit/D/Fail grading.

MECH 598 (2) Research Seminar
Current topics in mechanical engineering research for M.A.Sc. students. This course is not eligible for Credit/D/Fail grading.

MECH 599 (6-12) c Thesis
For M.A.Sc. This course is not eligible for Credit/D/Fail grading.

MECH 698 (3) Seminar
Current topics in mechanical engineering for doctoral students. This course is not eligible for Credit/D/Fail grading.

MECH 699 (0) Doctoral Dissertation

Medicine, Faculty of Medicine

MEDD: Doctor of Medicine

MEDD 411 (17) Foundations of Medical Practice I
Integrating foundational and clinical sciences and clinical practice themes. Case-based approach fostering the development of evidence-based clinical reasoning and clinical skills. Organized on the basis of clinical presentations. Pass/fail. This course is not eligible for Credit/D/Fail grading.

MEDD 412 (15) Foundations of Medical Practice II
Increasingly complex clinical presentations through integration of foundational and clinical sciences and clinical practice themes. Developmental, case-based approach fostering the development of evidence-based clinical reasoning and clinical skills. Pass/fail. This course is not eligible for Credit/D/Fail grading.

MEDD 419 (8) Foundations of Scholarship and Flexible Enhanced Learning I
Various medically-related learning experiences and scholarly activities. Emphasizes social accountability, introduces scholarly methods, and fosters innovation, creativity, and critical thought to prepare graduates for roles as scholars, life-long learners, and leaders. Pass/fail. This course is not eligible for Credit/D/Fail grading.

MEDD 421 (15) Foundations of Medical Practice III
Increasingly complex clinical presentations integrating foundational sciences and clinical practice themes. Developmental, case-based approach fostering the development of evidence-based clinical reasoning and clinical skills. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 422 (15) Transition into Clinical Education
Prepares students to transition from classroom-based to clinical learning environments. Increasingly complex clinical presentations integrating foundational sciences and clinical practice themes. Prepares students for clinical practice in Year 3 Clerkship. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 429 (6) Flexible Enhanced Learning II
Opportunity to build on scholarly activities initiated in MEDD 419, or start new ones. Emphasizes social accountability and fosters innovation, creativity, and critical thought to prepare graduates for roles as scholars, life-long learners, and leaders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 431 (48) Clerkship
Core experiences across the breadth of medicine through clinical and academic learning opportunities in ambulatory, hospital-based, and rural/remote settings. Interactions with patients under supervision. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 439 (4) Flexible Enhanced Learning III
Opportunity to build on scholarly activities initiated in MEDD 419 and 429, or start new ones. Emphasizes social accountability and fosters innovation and critical thought to prepare graduates for roles as scholars, life-long learners, and leaders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 439 (4) Flexible Enhanced Learning III
Opportunity to build on scholarly activities initiated in MEDD 419 and 429, or start new ones. Emphasizes social accountability and fosters innovation and critical thought to prepare graduates for roles as scholars, life-long learners, and leaders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
This course is not eligible for Credit/D/Fail grading.

MEDD 441 (4) Senior Elective
A senior clinical elective for fourth-year students. Students will participate in all relevant clinical and academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 442 (4) Senior Elective
A senior clinical elective for fourth-year students. Students will participate in all relevant clinical and academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 443 (4) Senior Elective
A senior clinical elective for fourth-year students. Students will participate in all relevant clinical and academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 444 (4) Senior Elective
A senior clinical elective for fourth-year students. Students will participate in all relevant clinical and academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 445 (4) Senior Elective
A senior clinical or academic elective for fourth-year students. Students will participate in all relevant clinical and/or academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 446 (4) Senior Elective
A senior clinical or academic elective for fourth-year students. Students will participate in all relevant clinical and/or academic activities associated with the particular elective. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 448 (13) Transition into Postgraduate Education and Practice
Enables students to effectively transition from medical school to residency and medical practice. Complex clinical presentations that integrate foundational sciences and practice themes. Prepares students for practice as residents and physicians. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MEDD 449 (4) Flexible Enhanced Learning III
Opportunity to build on scholarly activities initiated in MEDD 419 and 429, or start new ones. Emphasizes social accountability and fosters innovation and critical thought to prepare graduates for roles as scholars, life-long learners, and leaders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Medical Genetics, Faculty of Medicine

MEDG: Medical Genetics

MEDG 410 (3) Immunogenetics
Molecular basis of lymphocyte development, activation and adhesion; immunogenetics and the major histocompatibility complex. Consult the Credit Exclusion list within the Faculty of Science section of the Calendar. [3-0-1]
Prerequisite: MICB 302 and one of BIOL 334, BIOL 335. A standing of "B" or better is recommended.
Equivalency: MICB 402.

MEDG 419 (3) Developmental Origin of Human Disorders
Genetic and epigenetic determinants of development from conception to birth. Topics include development of the neural tube, face, heart, endoderm, blastocyst, embryonic stem cells, gastrulation, genomic imprinting, placental complications, chromosomal abnormalities and prenatal diagnosis. Discussions based on published research articles. [3-0-1]
Prerequisite: BIOL 234 and one of BIOL 331, BIOL 335, BIOL 338. A standing of 'B' or higher recommended.

MEDG 420 (3) Human Genomics and Medical Genetics
Prerequisite: One of BIOL 335, BIOL 338. A standing of 'B' or higher is recommended, however, higher grades take priority in the registration process.

MEDG 421 (3) Genetics and Cell Biology of Cancer
Molecular mechanisms of oncogenes and tumor suppressors in cancer biology, methods of and insights from studying cancer genomes, and current topics in cancer research. [3-0-0]
Prerequisite: BIOL 335 and one of BIOC 302, BIOC 303.
MEDG 448 (3/6) Directed Studies
A supervised individual program of study of a topic to be agreed upon by a member of faculty and the student. Permission of the appropriate supervisor and the department head is required.

MEDG 505 (3) Genome Analysis
Investigation of genetic information as it is organized within genomes, genetic and physical map construction, sequencing technologies, gene identification, database accessing and integration, functional organization of genomes from contemporary, historic and evolutionary perspectives. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of BIOL 334, BIOL 300.

MEDG 510 (3) Advanced Immunogenetics
Cell-cell interaction, intracellular control mechanisms, analysis of complex physiological systems using transgenic animals and molecular approaches. This course is not eligible for Credit/D/Fail grading. [3-0]
Equivalency: MICB 502.

MEDG 515 (3) Mammalian Developmental Genetics
Genetic determination of morphology and differentiation in human and other mammalian embryos. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: BIOL 335.

MEDG 520 (3) Advanced Human Molecular Genetics
Gene structure and regulation, genetic and epigenetic variation, genome and epigenome analysis, stem cell genetics, personalized genetics, bioinformatics, pharmacogenetics and genomics. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: BIOL 335.

MEDG 521 (3) Molecular and Cell Biology of Cancer
Focuses on molecular and cell biology of cancer through a series of lectures, reviews, student presentations and discussion. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: One of BIOL 234, BIOL 335, BIOC 303. Or consent of instructor.
Equivalency: PATH 531.

MEDG 525 (3) Medical Population Genetics
Population genetics, genetic epidemiology and methodology in data analysis applicable to the study of human genes, traits or diseases. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: BIOL 335.

MEDG 530 (3) Human Genetics
Human Mendelian and non-Mendelian inheritance and clinical applications of genetics. This course is not eligible for Credit/D/Fail grading. [3-0]
Prerequisite: BIOL 335.

MEDG 535 (3) Genetics and Ethics
This course is intended to serve the diverse needs of genetic counseling students, research graduate students in genetics, genetic residents and clinical fellows, other health professional students, and graduate students from other sciences and humanities. This course is not eligible for Credit/D/Fail grading. [3-0]

MEDG 540 (3) Seminar
All seminars will be presented by graduate students in the Department of Medical Genetics. Although students will be encouraged to attend these seminars throughout their graduate studies, credit will only be available for one year. This course is not eligible for Credit/D/Fail grading. [2-0]

MEDG 545 (3) Current Topics in Medical Genetics Research
Critical discussion of current primary research literature in medical genetics. This course is not eligible for Credit/D/Fail grading.

MEDG 548 (3-6) Directed Studies
A series of laboratory sessions, directed readings and directed counselling interviews related to selected areas of Medical Genetics. This advanced course may be taken upon approval of the department head. This course is not eligible for Credit/D/Fail grading.

MEDG 549 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

MEDG 550 (6) Concepts in Clinical Genetics for Genetic Counselling
Practical applications, theories, and principles of medical genetics as they apply to genetic counselling. This course is not eligible
MEDG 560 (2) Genetic Counselling Seminar
Medical and genetic interviewing and family history taking; decision making; family dynamics; impact of congenital defects, genetic disease, and chronic disease on individuals and families; support groups and other community resources; computer resources; cross-cultural issues. This course is not eligible for Credit/D/Fail grading. [2-0-0]
Prerequisite: Acceptance into M.Sc. Genetic Counselling program.

MEDG 565 (2) Advanced Genetic Counselling Seminar
Patient attitudes toward genetic counselling; the grieving process in response to pregnancy loss, death, and disability; risk perception, attitudes toward prenatal testing, dealing with results of genetic testing, crisis counselling, giving bad news; ethical dilemmas; legal and professional issues. This course is not eligible for Credit/D/Fail grading. [0-2]
Prerequisite: MEDG 560. And acceptance into M.Sc. Genetic Counselling program.

MEDG 570 (3) Introductory Clinical and Laboratory Rotation
Clinical experience in prenatal procedures and counselling; teratogen counselling. Clinically relevant experience in cytogenetics, molecular, biochemical disease and embryopathology laboratories. This course is not eligible for Credit/D/Fail grading. [0-5]
Prerequisite: Acceptance into M.Sc. Genetic Counselling program.

MEDG 575 (10) Advanced Clinical Rotation
In-depth clinical experience in general and prenatal genetic counselling. This course is not eligible for Credit/D/Fail grading. [0-15]
Prerequisite: MEDG 570. And acceptance into M.Sc. Genetic Counselling program.

MEDG 649 (0) Doctoral Dissertation

MEDG 702 (0) Clinical Genetics Clinic
A rotation for three months through the Clinical Genetics Clinic dealing with the techniques of diagnosis and counselling, and of the prenatal diagnoses of genetic disease and genetic counselling relative to congenital malformations and failures of reproduction.

Medicine, Faculty of Medicine

MEDI: Medicine

See also courses listed under: Anatomy, Biochemistry, Family Practice, Health Care and Epidemiology, Health Sciences, History of Medicine, Interdepartmental, Medical Genetics, Medicine, Microbiology, Obstetrics and Gynaecology, Ophthalmology, Orthopaedics, Paediatrics, Pathology, Pharmacology and Therapeutics, Physiology, Psychiatry, Radiology, Surgery

MEDI 501 (3) Molecular and Cellular Biology of Experimental Medicine
Cell and molecular function in normal tissues and in specific disease processes, including, genetic, viral, bacterial, immune, and physiological disorders. This course is not eligible for Credit/D/Fail grading.

MEDI 502 (3) Experimental Medicine Methodology
Laboratory experience with experimental models of human disease; critical reviews of their relevance. Laboratory rotations, oral presentations and written reviews. Registration requires permission of the Department. This course is not eligible for Credit/D/Fail grading.

MEDI 503 (3) Introduction to Clinical, Patient Oriented and Translational Research
Framing appropriate research questions, appropriate research designs, protocol development, key concepts in regulatory approval and human ethical oversight in Canada, privacy and knowledge translation. For students pursuing clinical, patient oriented and translational research. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of Experimental Medicine Program Director

MEDI 510 (3) Nephrology
Mechanisms of regulation of acid-base balance, fluid and electrolyte content, excretion of proteins and organic substances in kidney disease; abnormal renal mechanisms in hypertension. This course is not eligible for Credit/D/Fail grading.

MEDI 530 (3) Gastroenterology
Pathogenesis and abnormal physiology in disease of the intestine and accessory organs; carcinogenesis; regulatory peptides;
liver disease; inflammatory bowel disease; oesophageal dysfunction. This course is not eligible for Credit/D/Fail grading.

**MEDI 535 (3) Research Seminar**
Reviews of research in selected areas of experimental medicine, including presentation of student's own research results. This course is not eligible for Credit/D/Fail grading.

**MEDI 540 (3) Advances in Neurology**
Pathogenesis and immunological mechanisms in acute and chronic virus infections of the central nervous system; immunologically induced non-infectious neurological disease. This course is not eligible for Credit/D/Fail grading.

**MEDI 548 (2-6) Directed Studies in Experimental Medicine**
This course is not eligible for Credit/D/Fail grading.

**MEDI 549 (18) M.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**MEDI 560 (3) Pulmonary Pathophysiology**
Same as PATH 518. This course is not eligible for Credit/D/Fail grading.

**MEDI 570 (3) Cardiovascular Pathophysiology**
Pathogenesis, abnormal physiology and therapeutic approaches in heart disease including cardiac arrhythmia, heart failure, myocardial infarction, hypertension, atherosclerosis. This course is not eligible for Credit/D/Fail grading. Equivalency: PATH 570.

**MEDI 580 (3/6) Experimental Medicine: Infectious Diseases**
Supervised individual program of directed studies in experimental aspects of pathogenesis, diagnosis and treatment of infectious diseases, and mechanisms of host defence against microbial infections. This course is not eligible for Credit/D/Fail grading.

**MEDI 590 (3) Molecular Regulation of Cell Growth and Differentiation**
Cytokines and signal transduction mechanisms in the growth and differentiation of germ line, haemopoietic and other eukaryotic cells; actions of oncogene and tumor-suppressor gene products; molecular concepts derived from experimental model systems; molecular strategies of cytokine therapy. This course is not eligible for Credit/D/Fail grading. Prerequisite: One of MICB 302, BIOC 402, BIOC 403. Permission of course coordinator is also acceptable.

**Vantage College**

**MGMT: Management**

**MGMT 100 (3) Introduction to Business**
Introduction to the Faculty of Management and traditional areas of business including accounting, economics, finance, marketing, organizational behaviour, operations, business policy, information systems and entrepreneurship. Identifies the steps needed to build and manage successful local, national, and international competitive businesses and organizations. Introduces ethical and policy decisions faced by businesses, organizations and government. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**MGMT 110 (3) Introduction to Management Thought and Social Responsibility**
Introduces management thought in business and organizations. Utilizes critical thinking in socially and ethically responsible decisions at a corporate and personal level. Includes managing responsibly through people, mass production, ethical and socially-responsible practices. Covers start-ups, entrepreneurs, family business, non-profit/for-profit organizations and governments in global regions. Credit will be granted for only one of MGMT 110 or MGMT 200. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Equivalent: MGMT 200.

**MGMT 200 (3) Introduction to Management Thought and Social Responsibility**
Introduces management thought in business and organizations. Utilizes critical thinking in socially and ethically responsible decisions at a corporate and personal level. Includes managing responsibly through people, mass production, ethical and socially-responsible practices. Covers start-ups, entrepreneurs, family business, non-profit/for-profit organizations and governments in global regions. Credit will be granted for only one of MGMT 200 or MGMT 110. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Equivalent: MGMT 110.
MICB: Microbiology

BIOL 112, MICB 201, or SCIE 001 is a prerequisite for all MICB courses except MICB 153 and MICB 353. Consult the Credit Exclusion List in the Faculty of Science section of the Calendar. Additional fees are charged for some courses.

MICB 201 (3) Introductory Environmental Microbiology
Prokaryotic diversity and the impact and applications of bacterial and archaeal metabolic, genetic, and growth processes in environmental contexts. [3-0-0]
Prerequisite: One of BIOL 112, BIOL 200, SCIE 001. For students with BIOL 112, CHEM 121 is recommended.

MICB 202 (3) Introductory Medical Microbiology and Immunology
Introduction to cellular and humoral immune responses, the properties of viruses and the principles of bacterial pathogenesis. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar.) [3-0-0]
Prerequisite: One of BIOL 112, BIOL 200, MICB 201, PHAR 201, SCIE 001.

MICB 203 (1) Basic Microbiology Laboratory
Procedures and principles associated with isolation, characterization and handling of microorganisms. Intended for students requiring a basic microbiology laboratory course. [1*-3-1*]
Prerequisite: One of MICB 153, BIOL 112, SCIE 001.

MICB 301 (3) Microbial Ecophysiology
Dynamics and control of prokaryotic cellular processes in response to the biotic and abiotic environment including metabolic interactions and metabolic cooperation between microorganisms. [3-0-1]
Prerequisite: Either (a) all of BIOL 201, MICB 201 or (b) BIOT 380.

MICB 302 (3) Immunology
Cells, molecules, and mechanisms of innate and adaptive immunity. Antigen presenting cells and the major histocompatibility complex, T and B lymphocytes and their antigen receptors, T and B cell development, innate and adaptive immune responses against pathogens, diseases associated with aberrant immune responses. [3-0-1]
Prerequisite: MICB 202 and third-year standing.

MICB 306 (3) Molecular Virology
Introduction to virus structure and replication. Detailed examination of selected viruses including polio, HIV and cancer-causing retroviruses. Development of vaccines and anti-viral drugs, the use of virus vectors to cure genetic diseases. [3-0-1]
Prerequisite: One of MICB 202, BIOT 380.

MICB 308 (3) Paradigms in Bacterial Pathogenesis
Mechanisms of bacterial pathogenesis including adherence, invasion, intracellular survival, toxins, host defenses and microbial evasion strategies, antibiotics, and vaccines. Introduction to experimental approaches used to study bacterial pathogens. [3-0-0]
Prerequisite: Either (a) all of BIOL 201, MICB 202 or (b) BIOT 380.

MICB 322 (3) Molecular Microbiology Laboratory
Aseptic handling and characterization of microbes, growth properties, enzyme assays, protein analysis and plasmid isolation. Restricted to students in Microbiology and Immunology specializations. [2-4-0]
Prerequisite: All of BIOL 200, BIOL 201, CHEM 233, MICB 201, MICB 202.

MICB 323 (3) Molecular Immunology and Virology Laboratory
Genetic manipulations of bacteria, introductory immunological and virological procedures, tissue culture. Restricted to students in Microbiology and Immunology specializations. [2-4-0]
Prerequisite: MICB 322.

MICB 325 (3) Analysis of Microbial Genes and Genomes
Genetic, molecular biological and bioinformatic approaches for the analysis of microbial genomes, gene structure-function and gene expression with emphasis on bacteria. [3-0-0]
Prerequisite: One of MICB 201, BIOL 234 and third-year standing or higher.

MICB 353 (1) Food Microbiology Laboratory
Procedures and principles associated with isolation, enumeration, characterization and handling of microorganisms. Restricted to students registered in the Food Science program. [1-2-0]

Prerequisite: One of BIOL 112, MICB 201, SCIE 001.

MICB 398 (3) Co-operative Work Placement I

Work experience in an industrial research setting, taken during the Winter Session (Term 2) of third year. Restricted to students admitted to the Co-operative Education Program of Biotechnology in Microbiology and Immunology. This course is not eligible for Credit/D/Fail grading.

Prerequisite: MICB 202.

MICB 399 (3) Co-operative Work Placement II

Work experience in an industrial research setting, taken during Summer Session (Terms 1 and 2) following third year. Restricted to students admitted to the Co-operative Education Program of Biotechnology in Microbiology and Immunology. This course is not eligible for Credit/D/Fail grading.

Prerequisite: MICB 202.

MICB 401 (3) Environmental Microbiology Laboratory

Microbiological analysis of environmental samples using culture-dependent and culture-independent methods. [2-4-0]

Prerequisite: MICB 322 and MICB 301.

MICB 402 (3) Advanced Immunology

Molecular basis of lymphocyte development, activation and adhesion; immunogenetics and the major histocompatibility complex. Consult the credit exclusion list within the Faculty of Science section of the calendar. [3-0-1]

Prerequisite: One of MICB 302, BIOT 380. If MICB 302 is used as the prerequisite for MICB 402, students are required to take one of the following as a corequisite: BIOL 234, BIOL 335, MICB 325.

MICB 404 (3) Topics in Molecular Bacterial Pathogenesis

A lecture/discussion/library research course. Topics such as antibiotic resistance, pathogen genomics; host-pathogen interactions; evolution of pathogens; host responses to infection, invasive mechanisms, resistance mechanisms. [1-0-4]

Prerequisite: MICB 302 and one of MICB 308, MICB 403, MICB 408.

MICB 405 (3) Bioinformatics

Computational methods to analyze genome and protein sequences to derive structural and functional information. Related topics in functional genomics. [3-0-1]

Prerequisite: One of MICB 301, MICB 325, BIOC 302, BIOC 303, BIOL 335, BIOT 380.

MICB 406 (3) Topics in Molecular Virology

Presentations, library research, paper reviews, class discussions about current research in virology. Topics such as molecular targets in viral therapy; chronic viral infection; virus-host cell interaction. [1-0-4]

Prerequisite: MICB 306.

MICB 407 (3) Viral Infections in Humans

Interactions between viruses and humans; pathogenesis; persistence and viral oncogenesis; virological diagnosis and treatment. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar.) [3-0-0]

Prerequisite: MICB 306.

MICB 408 (3) Advanced Bacterial Pathogenesis

Current and emerging themes in bacterial pathogenesis including cellular microbiology, bacterial cell biology processes and their role in virulence including secretion systems to deliver virulence factors and immune evasion strategies employed by pathogens. Development of antibiotics and resistance to antibiotics. [3-0-0]

Prerequisite: MICB 308. MICB 302 and MICB 325 are recommended.

MICB 412 (3) Topics in Immunological Research

Presentations, library research, paper reviews and class discussion on selected areas of advanced molecular and cellular immunological research. [1-0-4]

Prerequisite: MICB 302 and one of MICB 402, MEDG 410.

MICB 416 (3) Industrial Microbiology and Biotechnology

Exploitation of microbial and animal cells for the industrial production of chemicals ranging from alcohol to therapeutic proteins. Genetic manipulation of cellular characteristics, fermentation methods, patenting and governmental approval processes. [3-0-0]

Corequisite: One of BIOL 335, MICB 325.

MICB 421 (3) Experimental Microbiology
Research in microbial physiology and molecular genetics. Guided and independent laboratory projects are developed. [2-4-0]

Prerequisite: One of MICB 323, BIOT 380.

MICB 424 (3) Cellular Dynamics of Pathogenic and Environmental Bacteria
Regulatory and signalling networks in bacterial cells with emphasis on how cellular and environmental cues are detected and integrated during different growth or life history stages of important pathogenic and environmental bacteria. [3-0-0]

Prerequisite: Either (a) MICB 301 or (b) all of MICB 201, MICB 325.

MICB 425 (3) Microbial Ecological Genomics
Intrinsic and extrinsic forces driving prokaryotic genome evolution. Gene transfer; microbial species concepts; community genome structure, function and dynamics; ecological impacts of microbial genome diversity. Emphasis on problem solving and experimental design. [3-3-0]

Prerequisite: One of BIOL 335, MICB 325. One of MICB 201 or MICB 301 is recommended.

MICB 430 (3/6) c Seminar in Microbiological Literature
Student seminars on selected papers from the microbiological literature. Compulsory for Honours students. Major students may enrol with permission of the department head.

MICB 447 (3) Experimental Molecular Biology
A laboratory course with a choice of independent, supervised research projects. Students develop protocols to carry out investigation of selected molecular biology problems. [2-4-0]

Prerequisite: Either (a) BIOT 380 or (b) MICB 323 or (c) all of MICB 322, MICB 398.

MICB 448 (3/6) c Directed Research
A library (3 credits) or laboratory (3 or 6 credits) project. Requires permission of the Undergraduate Advisor. The results are presented in a written report to be reviewed by oral examination.

Prerequisite: Either (a) MICB 323 or (b) all of MICB 322, MICB 399.

MICB 449 (6) Research Problem
A laboratory investigation in the final year of the Honours program. The results are presented in a written report, to be reviewed by oral examination.

Prerequisite: Either (a) MICB 323 or (b) all of MICB 322, MICB 399.

MICB 498 (3) Co-operative Work Placement III
Work experience in an industrial research setting, taken during the Summer Session (Terms 1 and 2) following fourth year. Restricted to students admitted to the Co-operative Education Program of Biotechnology in Microbiology and Immunology. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of MICB 398, MICB 399.

MICB 499 (3) Co-operative Work Placement IV
Work experience in an industrial research setting, taken during the Winter Session (Term 1) of fifth year. Restricted to students admitted to the Co-operative Education Program of Biotechnology in Microbiology and Immunology. This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of MICB 399, MICB 498.

MICB 502 (3) Advanced Immunogenetics
Consult the Credit Exclusion List in the Faculty of Science section of the Calendar. This course is not eligible for Credit/D/Fail grading.

MICB 505 (3) Molecular Microbiology
This course is not eligible for Credit/D/Fail grading.

MICB 506 (3/6) c Microbiological and Immunological Research
Developing, discussing, and undertaking research projects. Oral communication skills, peer review skills, scientific ethics, and the ability to critically evaluate papers in the literature. To be taken only with permission of the department head. This course is not eligible for Credit/D/Fail grading.

MICB 507 (3) Topics in Molecular Pathogenesis and Immunology
This course is not eligible for Credit/D/Fail grading.

MICB 548 (6) Directed Studies on an Approved Problem
This course is not eligible for Credit/D/Fail grading.

MICB 549 (18) M.Sc. Thesis

This course is not eligible for Credit/D/Fail grading.
This course is not eligible for Credit/D/Fail grading.

MICB 649 (0) Doctoral Dissertation

Family Practice, Faculty of Medicine

MIDW: Midwifery

MIDW 101 (3) Counselling for Maternity Care Providers
Theory, knowledge, strategies, and skills of person-centered counselling including family systems, trauma theory, theory, grief counselling, motivational interviewing skills, self-awareness and mindfulness, interprofessional communication, and cultural competency in continuity of care. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MIDW 102 (4) Birth and its Meaning
An interdisciplinary study of pregnancy and childbirth drawing on and integrating the disciplines of psychology, sociology, philosophy of science, anthropology, women's studies, and cultural studies. This course is not eligible for Credit/D/Fail grading. [3-2-0]

MIDW 103 (3) Applied Health Services for Maternity Providers
Introduction to diagnostics related to cellular and humoral immune responses in pregnant women and newborns, the properties of viruses, epidemiology, the principles of bacterial pathogenesis, and related physiologic responses. This course is not eligible for Credit/D/Fail grading.

MIDW 104 (3) Lactation Consultation for Maternity Care Providers
Breastfeeding physiology, pathophysiology, and strategies for support of the dyad based on best-practice principles. Discussion of major Canadian and international initiatives for the support and protection of breastfeeding. This course is not eligible for Credit/D/Fail grading.

MIDW 106 (3) Reproductive Anatomy and Physiology
Physiology of conception, pregnancy, lactation, fetal growth, labour, birth, transition to extra-uterine life, postpartum. A series of lectures and lab sessions. This course is not eligible for Credit/D/Fail grading.

MIDW 107 (3) Physical Assessment
Principles of physical assessment, physical and psychological assessment of the mother and neonate. A series of lectures and clinical lab sessions. This course is not eligible for Credit/D/Fail grading.

MIDW 108 (7) Foundations for Midwifery Practice
Scope of practice of a midwife, regulatory framework, skills for basic midwifery practice. A series of lectures and clinical lab sessions. This course is not eligible for Credit/D/Fail grading.

MIDW 115 (3) Research Methods for Midwives
Research designs used in midwifery research, types of studies reported in the midwifery and health care literature, research methodology and basic principles of epidemiology, biostatistics and social research. This course is not eligible for Credit/D/Fail grading.

MIDW 125 (3) Pharmacology for Maternity Care Providers
An overview of basic concepts in pharmacology, pharmacy, and therapeutics relevant to the practice of midwifery in Canada. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MIDW 200 (6) Introduction to Midwifery Clinical Care
Clinical care of women experiencing normal pregnancy, labour, birth, and puerperium. Clinical education experiences in preventative and therapeutic midwifery care with emphasis on prenatal and postnatal midwifery care. Clinical practice education opportunities within the province. Pass/Fail This course is not eligible for Credit/D/Fail grading.

MIDW 201 (3) Clinical Skills for Midwifery Practice
Online situation-based learning tutorials occurring simultaneously with MIDW 200 clinical placement. This course is not eligible for Credit/D/Fail grading.

MIDW 205 (8) Midwifery Theory for Primary Care
Care of normal pregnancy, labour, birth, and puerperium with an emphasis on the intrapartum period and assessment and management skills. Includes a four-week intensive session in Vancouver, a series of online tutorials, and simulation and skills lab practice. This course is not eligible for Credit/D/Fail grading.
MIDW 210 (3) Evidence-Informed Midwifery
Principles of evidence-informed midwifery, what counts as evidence? Making sense of the evidence, applying the evidence in practice. This course is not eligible for Credit/D/Fail grading.

MIDW 215 (2) Ethics in Maternity Care
Ethics using ethical theory in health care and midwifery. This course is not eligible for Credit/D/Fail grading. [2-0-0]

MIDW 220 (10) Introduction to Midwifery Clinical Care
Clinical care of women experiencing normal pregnancy, labour, birth, and puerperium. Clinical education experiences in preventative and therapeutic midwifery care with emphasis on prenatal and postnatal midwifery care. Clinical practice education opportunities within the province. Pass/Fail This course is not eligible for Credit/D/Fail grading.

MIDW 221 (1) Clinical Skills
Online situation-based learning tutorials occurring simultaneously with MIDW 220 clinical placement. This course is not eligible for Credit/D/Fail grading.

MIDW 230 (6) Midwifery Theory for Primary Care
Care of normal pregnancy, labour, birth, and puerperium with an emphasis on the intrapartum period and assessment and management skills. Includes a four-week intensive session in Vancouver, a series of online tutorials, and simulation and skills lab practice. This course is not eligible for Credit/D/Fail grading.

MIDW 240 (9) Core Midwifery Clinical Care
Clinical education experiences with the preventative and therapeutic midwifery care of normal pregnancy, labour, birth, and puerperium with an emphasis on the intrapartum period and assessment and management skills. A clinical practicum in locations around the province. Pass/Fail This course is not eligible for Credit/D/Fail grading.

MIDW 2305 (6) Midwifery Theory for Variations in Primary Care
Theoretical principles of care for pregnancy, birth, and the puerperium with an emphasis on the recognition and management of variations of normal and findings outside of normal. Consists of a one-week intensive time in Vancouver, during which emergency skills certification is acquired, and weekly web-based tutorials. [3-4-3]

MIDW 310 (5) Senior Research Project
An original piece of scholarship that builds on knowledge and skills acquired from coursework and in consultation with faculty mentors. This course is not eligible for Credit/D/Fail grading. [1-0-8]

MIDW 320 (10) Variations in Midwifery Clinical Care
Clinical education experiences with the preventative and therapeutic midwifery care of pregnancy, birth, and the puerperium. Emphasis on the recognition and management of variations of normal and findings outside normal. A 12-week practicum in locations around the province. Pass/Fail This course is not eligible for Credit/D/Fail grading.

MIDW 322 (8) Midwifery Primary Care
Clinical course focusing on consolidation of skills and knowledge of all aspects of midwifery care. This course is not eligible for Credit/D/Fail grading.

MIDW 325 (3) Professional Issues in Midwifery
Professional issues in midwifery including responsibilities and conduct, self-care, peer review, inter-professional relations and communication, legal and business concepts, and continuous quality assurance and improvement in practice. A series of lectures and workshops delivered in an intensive format over two weeks. [3-0-0]

MIDW 350 (4-12) Inter-Professional Placement
Opportunities to explore health professions that partner with midwives to care for the childbearing family within the province. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

MIDW 360 (3) Global Maternal Infant Health
Social and economic determinants of maternal and infant health worldwide, innovative public health strategies to reducing maternal and infant mortality and morbidity, and the impact of conflict on the health of mothers and babies. Ethical considerations related to global clinical placements and medical tourism. Theoretical course in preparation for global clinical placement. This course is not eligible for Credit/D/Fail grading. [3-0-0] Prerequisite: MIDW 240.

MIDW 370 (9) Global Clinical Placement
Social and economic determinants of maternal and infant health worldwide, innovative public health strategies to reducing maternal and infant mortality and morbidity, and the impact of conflict on the health of mothers and babies. Ethical considerations related to global clinical placements and medical tourism. A global clinical placement. This course is not eligible for Credit/D/Fail grading.
MIDW 380 (10) Midwifery in Special Contexts
Clinical course providing opportunity to study midwifery in contexts beyond those usually offered on the program. Students select context and provide rationale for how the context will enhance their learning.

MIDW 405 (3) Advanced Topics in Midwifery Theory and Practice
Theoretical principles for midwifery care of pregnancy, labour, birth, newborns, and the puerperium. Emphasis on assessment and management skills for abnormal situations. Includes a five-day intensive session in Vancouver, a series of online tutorials, and lab practice.

MIDW 420 (12) Advanced Midwifery Clinical Care
Clinical education for midwifery care of pregnancy, birth, and the puerperium with an emphasis on abnormal situations in pregnancy, labour and birth, and in newborns. Clinical practicum around the province. Pass/Fail.

MIDW 430 (5) Comprehensive Midwifery Theory and Practice
In-depth review of the theoretical principles and evidence basis for comprehensive midwifery care. Tutorials are carried out in an online live classroom setting.

MIDW 435 (4) Comprehensive Midwifery Theory and Practice
Theoretical principles and evidence basis for comprehensive midwifery care. Tutorials are carried out in an online live classroom setting.

MIDW 440 (13) Clinical Clerkship
Students assume a primary care role in clinical placements in midwifery practices across the provinces. Demonstration of independent decision making and application of the full range of their academic knowledge to professional practice. A practicum under the supervision of a registered midwife. Pass/Fail.

MINE: Mining Engineering

MINE 224 (4) Mineralogy for Mining Engineering
Fundamentals of the rock and minerals formation. Exploring main techniques used to understand implications of mineralogy in mining and mineral processing.

MINE 291 (3) Introduction to Mining
Leading practices and technologies employed in the design, planning, and operation of mining systems. Life cycle of surface and underground mining systems.

MINE 293 (1) Seminar
Oral presentation of topics by students. Graded on basis of report and presentation.

MINE 302 (3) Underground Mining and Design
Selection, design and development of underground mining methods based upon physical, geological, economical and environmental constraints. Underground materials handling (ore, waste, slurry, water) with equipment selection, production requirements, performance and costs.

MINE 303 (3) Rock Mechanics Fundamentals
The study of the mechanical and structural properties of rock materials at the laboratory and field scale, with reference to common mining, geological and civil engineering problems.

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MINE 304 (3) Rock Fragmentation
Theory and practice of rock fragmentation by drilling and blasting; introduction to explosives and initiation systems; design of surface and underground blasts; machine excavation systems for tunneling and stoping; environmental impacts, safety, and risk assessment. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: MINE 291.

MINE 310 (3) Surface Mining and Design
Surface mining methods, production planning and scheduling; slope design and drainage; wall control; materials handling and equipment selection; production control and automation, waste disposal and closure. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: All of MINE 291, MINE 292.

MINE 331 (3) Physical Mineral Processes
Mineral processing unit operations and sampling, crushing, grinding, screening, classification, gravity separation, magnetic separation, electrostatic separation, concentrate dewatering practices. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: MINE 292.

MINE 333 (3) Flotation
Theory and technology of flotation and ancillary processes. This course is not eligible for Credit/D/Fail grading. [2-3-0]
Prerequisite: MINE 292.

MINE 350 (3) Modeling and Simulation
Methods for determining the behaviour of large scale industrial systems and their application to the design and analysis of such systems. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: STAT 251.

MINE 393 (1) Seminar
Oral presentation of topics by instructor and guest lecturers. This course is not eligible for Credit/D/Fail grading. [1-0-0]
Prerequisite: Third-year standing in Mining Engineering.

MINE 395 (3) Mineral Deposit Modeling
Types of mineral deposits. Exploration and sampling methods. Methods for data analysis and computer modeling of mineral deposits and their use in production planning and design. This course is not eligible for Credit/D/Fail grading. [2-1-1]
Prerequisite: All of MINE 291, MINE 292.
Corequisite: STAT 251.

MINE 396 (3) Engineering Economics
Discrete and continuous cash flow models, discounted cash flow analysis, effects of depreciation and taxes, economic analysis of projects, sensitivity and risk analysis, financing and cost of capital. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Second-year standing in Engineering.

MINE 402 (3) Mine Ventilation and Occupational Health and Safety
Design and analysis for ventilation systems for mining. Topics such as ventilation design, ventilation surveys, thermodynamic aspects, psychrometry of air and air conditioning. This course is not eligible for Credit/D/Fail grading. [3-2-0]
Prerequisite: MINE 291.

MINE 403 (3) Rock Mechanics Design
The design of rock slopes and underground openings with respect to stress, structure and the rock mass. Stabilization and monitoring of rock movement. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of MINE 303, MINE 305.

MINE 404 (3) Mine Management
Human relations in an organization; types of organizations; personnel evaluations and job rating systems; impact of manpower planning on decision-making; union negotiations; public relations; dealing with the media; corporate responsibilities to society and employees. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: Third- or Fourth-year standing in Mining Engineering.

MINE 406 (3) Mine Project Valuation and Risk Assessment
Mineral economics and finance. Analytical tools and techniques used in the valuation of mining companies and the financial analysis and risk assessment methods. [2-2-0]
Prerequisite: MINE 396.

MINE 420 (3) Applied Geostatistics
Geostatistical analysis and simulation of spatiotemporal phenomena in natural and engineered systems with applications to mining problems. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: STAT 251.

MINE 432 (3) Mineral Process Control
Automatic control theory, PID control, Laplace and z-transforms, loop tuning, frequency response, stability analysis, control strategies in flotation, comminution, dewatering, reagent and bin/sump levels, automated load-haul-dump and drilling equipment, instrumentation and soft sensors. This course is not eligible for Credit/D/Fail grading. [2-4-0]

MINE 434 (3) Processing Precious Metal Ores
Process alternatives and mineralogical considerations; physical and chemical recovery technologies; environmental protection; flowsheet studies. This course is not eligible for Credit/D/Fail grading. [2-2-0]

Prerequisite: MINE 331.

MINE 435 (3) Plant and Process Design
Design of unit operations in a mineral processing plant including crushing, grinding, classification, gravity separation, magnetic separation, flotation, thickening and filtration. Equipment selection and sizing, flowsheet design, circuit analysis and processing options. This course is not eligible for Credit/D/Fail grading. [2-3-0]

Prerequisite: MINE 331.

MINE 436 (3) Industrial Mixing
Fundamentals of mixing technology, and industrial mixing systems and equipment. Selection, design, monitor, and scale-up mixing systems for mining applications. This course is not eligible for Credit/D/Fail grading. [2-2-2*]

Prerequisite: MATH 255 and one of MECH 280, CIVL 215.

MINE 438 (3) Advanced Process Mineralogy
Textural parameters, such as mineral liberation size and mineral associations in connection with the mineral processing techniques for mineral recovery. This course is not eligible for Credit/D/Fail grading. [3-0-2]

Prerequisite: MINE 331.

MINE 455 (3) Mine Water Management
Mine water management covering integrated water resource management, water balances, sources, water use optimization, water quality and treatment and long term stewardship. [2-2-0]

Prerequisite: One of MINE 291, MINE 292.

MINE 462 (3) Coal Preparation Technology
Thermal and metallurgical coals: objectives of their cleaning; coal washability and flotability fundamentals; coal preparation unit operations; performance characteristics of coal washing equipment; products dewatering; plant flowsheets. This course is not eligible for Credit/D/Fail grading. [2-3-0]

Prerequisite: All of MINE 292, MINE 331.

MINE 465 (3) Materials Handling
Knowledge and understanding of equipment used in mining operations, including diesel, electro-mechanical, hydraulic and pneumatic equipment as well as conveyors, load-haul-dump trucks and pumps. [2-2-0]

Prerequisite: One of MINE 302, MINE 310.

MINE 480 (3) Mine Waste Management
Basic geotechnical, hydrological, and water management aspects of mine waste management. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: CIVL 210 and fourth-year standing.

MINE 482 (3) Maintenance Engineering
Analytical foundation for maintenance of industrial plant equipment and mobile equipment in various production environments; maintenance planning and management, life cycle analysis, reliability theory, total quality maintenance, condition monitoring. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Fourth-year standing.

MINE 485 (3) Cave Mining Systems: Design and Planning
Designs, planning, and leading practices are applied to underground mining systems reliant on induced and controlled rock mass caving. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Prerequisite: Two of MINE 302, MINE 303, EOSC 323.

MINE 486 (3) Mining and The Environment
Environmental topics of importance to engineers practicing within the mining, metallurgical and related industries including technical practices, regulatory and public issues. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MINE 488 (3) Heavy Oil Sand Mining and Processing
Life cycle of the production of Oil Sands resources, including mining, bitumen extraction, and reclamation. This course is not eligible for Credit/D/Fail grading. [2-3-0]
Prerequisite: MINE 310.

MINE 491 (4) Mine and Plant Feasibility Study
Design of a mining operation or a mineral processing plant as part of a realistic feasibility study project. This course is not eligible for Credit/D/Fail grading. [1-2-0; 1-2-0]
Prerequisite: All of MINE 302, MINE 303, MINE 304, MINE 310, MINE 331, MINE 333, MINE 350, MINE 396. Fourth-year standing in Mining Engineering is required.

MINE 493 (1) Seminar
Oral presentation of a technical nature. Use of closed circuit television for personal evaluation. This course is not eligible for Credit/D/Fail grading. [0-0-1]
Prerequisite: Fourth-year standing in Mining Engineering.

MINE 497 (1-6) d Directed Studies
Requires approval of the department head. This course is not eligible for Credit/D/Fail grading.

MINE 501 (1-4) d Topics for Engineers in the Mining Industry
Leading practices and technologies employed in the Canadian Mining Industry. Topics include: mining, mineral processing, mine finance and mining and the environment. This course is not eligible for Credit/D/Fail grading.

MINE 504 (2) Rock Fragmentation
Theory and practice of drilling and blasting; explosive types and strengths. Blast pattern design for underground and surface operations. Credit will be granted for only one of MINE 504 or MINE 565. This course is not eligible for Credit/D/Fail grading.

MINE 505 (3) Advanced Topics in Rock Engineering
Rock mass properties and numerical modelling applied to rock engineering design with particular emphasis on applications in rock slopes and tunneling. This course is not eligible for Credit/D/Fail grading.

MINE 506 (3) Mining Methods
A more advanced study of some aspects of mining methods. Credit will be granted for only one of MINE 506 or MINE 550. This course is not eligible for Credit/D/Fail grading.

MINE 507 (3) Block Caving Systems
Mass mining (caving) methods, their design and operation, the value proposition and the key value drivers. This course is not eligible for Credit/D/Fail grading.

MINE 508 (3) Integrated Mining and Processing Systems
Methods and systems for integrated mining and processing, conceptual model development, simulation, economic and technical evaluation. Credit will be granted for only one of MINE 508 or MINE 557. This course is not eligible for Credit/D/Fail grading.

MINE 509 (2) Mine Ventilation
Mine air conditioning, ventilation network analysis, radioactivity in mining, case studies in mine ventilation and control of dust, fumes and diesel exhausts. Credit will be granted for only one of MINE 509 or MINE 560. This course is not eligible for Credit/D/Fail grading.

MINE 515 (3) Mining in the Future
Sustainability of mining and the future of the industry. Mineral resources and consumption. Possible future sources such as recycling, municipal or mine waste, or small, low grade, deep, ocean floor ore deposits, and asteroids. This course is not eligible for Credit/D/Fail grading.

MINE 520 (3) Advanced Coal Preparation
Thermal and metallurgical coals. Desulphurization Theory of coal beneficiation. Dense media separation. Coal surface properties and their effect on fine coal processing by flotation and oil agglomeration; coal/water slurries. Plant performance testing and instrumentation. Credit will be granted for only one of MINE 520 or MINE 566. This course is not eligible for Credit/D/Fail grading.

MINE 521 (3) Advanced Flotation Technology
This course is not eligible for Credit/D/Fail grading.

MINE 522 (2/4) d Processing of Mineral Fines
Particulate systems. Role of particle size and interfacial phenomena in properties of disperse systems. Stability of colloids and suspensions DLVO (Dejaguin-Landau-Vervey-Overbeek). Credit will be granted for only one of MINE 522 or MINE 572. This course is not eligible for Credit/D/Fail grading.

MINE 524 (3) Processing of Precious Metal Ores
Advances in science and technology for recovering gold, silver, and platinum group elements. Credit will be granted for only one of MINE 524 or MINE 577. This course is not eligible for Credit/D/Fail grading.

MINE 526 (3) Mathematical Modelling of Mineral Processes
Emphasis on crushing, grinding, screening, classification and flotation. Credit will be granted for only one of MINE 526 or MINE 575. This course is not eligible for Credit/D/Fail grading.

MINE 527 (3) Simulation and Optimization of Mineral Processes
Mineral process simulators including off-line optimization strategies; optimal flow sheet design. Credit will be granted for only one of MINE 527 or MINE 576. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of MINE 526, MINE 575.

MINE 529 (3) Rheology of Mineral Suspensions
Rheological measurements, flow curve modelling, micro-rheology, control of rheological properties. Application to mineral processing unit operations. Credit will be granted for only one of MINE 529 or MINE 579. This course is not eligible for Credit/D/Fail grading.

MINE 533 (2) Treatment of Mineral Industry Effluents
Characteristics of mineral dispersions in gases and in water; dust suppression in mining and in mineral transport facilities; solid-liquid separations; removal of noxious chemicals; waste disposal systems. Credit will be granted for only one of MINE 533 or MINE 573. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of instructor is required.

MINE 540 (3) Acid Rock Drainage
Lectures and seminars on topics of importance in acid rock drainage including fundamentals of ARD generation, prediction, prevention, control, treatment and monitoring for waste management and regulatory control in the mining industry. Credit will be granted for only one of MINE 540 or MINE 580. This course is not eligible for Credit/D/Fail grading.

MINE 541 (3) Environmental Technologies and Issues in Mining
Advanced topics related to mining environment selected in consultation with the instructor. Credit will be granted for only one of MINE 541 or MINE 581. This course is not eligible for Credit/D/Fail grading.

MINE 544 (3) Mining Environment Case Studies
Regulatory requirements for mine-mill environmental protection in design, operation and closure. Studies of environmental impact statements and closure plans. Credit will be granted for only one of MINE 544 or MINE 574. This course is not eligible for Credit/D/Fail grading.

MINE 547 (3) Industrial Expert Systems
The use of artificial intelligence to solve complex problems in industry. Topics include knowledge acquisition, knowledge representation, knowledge accumulation, and conflict resolution. Credit will be granted for only one of MINE 547 or MINE 578. This course is not eligible for Credit/D/Fail grading.

MINE 551 (3) Applied Underground Rock Mechanics
Study of design methods; underground engineering of openings, pillars and support. Emphasis on design with input being stress, structure and rock mass, employing analytical, empirical and numerical tools. This course is not eligible for Credit/D/Fail grading.

MINE 552 (3) Mining Geostatistics
Basic geostatistical concepts. Applications of geostatistical techniques and stochastic simulation to orebody modelling and grade control. This course is not eligible for Credit/D/Fail grading.

MINE 553 (3) Modeling of Industrial Systems
Use of mathematical programming, network theory, queueing models and simulation to model service and production operations in industry. Use of models in decision-making. This course is not eligible for Credit/D/Fail grading.

MINE 554 (3) Mine Economics and Finance
Mine valuation using discounted cash flow analysis and option pricing methods. Sources of mine finance and requirements. Sensitivity and risk assessment. Introduction to metals marketing, hedging and risk management. This course is not eligible for Credit/D/Fail grading.
MINE 555 (3) Mining and Society
Discussion of social, political and technical topics concerning mining-related activities. Credit will be granted for only one of MINE 555 or MINE 583. This course is not eligible for Credit/D/Fail grading.

MINE 556 (2) Rock Slope Engineering
Geologic investigations and field and laboratory testing; detailed review of the mechanisms of rock slope instability; the influence of geology, ground water and blasting on rock slope stability; design of stable rock slopes; monitoring of rock slope behaviour; stabilization or rock slope failure. This course is not eligible for Credit/D/Fail grading.

MINE 559 (3) Mineral Resource Development and Canadian Aboriginal People
Credit will be granted for only one of MINE 559 or MINE 585. This course is not eligible for Credit/D/Fail grading.

MINE 561 (2) Mine Shafts and Hoisting

MINE 562 (2) Equipment Selection
Methods of selecting equipment for underground and surface mining. Case studies and applications. This course is not eligible for Credit/D/Fail grading.

MINE 564 (1.5) Mine Exploration, Development and Operation
Basic geological concepts, where ore deposits are found, exploration methods and strategies. Reporting standards and regulatory regimes. Mining operations. This course is restricted to students in the Executive MBA degree. This course is not eligible for Credit/D/Fail grading.

MINE 565 (1.5) Mineral Processing and Mine Waste Management
Methods of mineral and metal processing. Operations and material flows. Mine waste production and management to closure. This course is restricted to students in the Executive MBA degree. This course is not eligible for Credit/D/Fail grading.

MINE 567 (1.5) Models of Mine Operations
Modeling and simulation techniques used to design or improve mining and mineral processing operations. Applications are illustrated by examples and cases. This course is restricted to students in the Executive MBA degree. This course is not eligible for Credit/D/Fail grading.

MINE 569 (3) Maintenance Engineering
The analytical foundation for maintenance of industrial plant equipment and mobile equipment in various production environments. Reliability theory, sensing technology and theory, risk analysis, and operations research applied to maintenance management. This course is not eligible for Credit/D/Fail grading.

MINE 570 (2) Energy from the Earth: Renewable Versus Conventional
Coal, oil, gas, uranium, hydro, wind, geothermal, and geosolar. This course is not eligible for Credit/D/Fail grading.

MINE 590 (1-6) c Special Advanced Topics
A special advanced course may be arranged upon the approval of the department head. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of instructor is required.

MINE 591 (1) Communication Skills and Workplace Readiness
Preparation for mining and mineral processing engineering internships. The course includes workshops on the following topics: developing a synopsis of qualifications, written communication and interviewing skills for the engineering professional. Pass/fail. This course is not eligible for Credit/D/Fail grading.

MINE 592 (3/9) d Mining Industry Internship
Mining or mineral processing engineering internship in which concepts, theory and practice of mining and mineral processing engineering are applied by working with industry on appropriate technical projects. Pass/fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: MINE 591.

MINE 597 (6) Engineering Project
A project involving laboratory, pilot plant or field work is to be completed in close collaboration with an academic adviser. For M.Eng. students only. This course is not eligible for Credit/D/Fail grading.

MINE 598 (2) Seminar
Topics in mining, mineral processing and the environment for M.A.Sc. and M.Eng. students. This course is not eligible for Credit/D/Fail grading.

MINE 599 (6-12) c M.A.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

MINE 698 (2) Seminar
Topics in mining and mineral processing for Ph.D. students. This course is not eligible for Credit/D/Fail grading.

MINE 699 (0) Doctoral Dissertation

Biology, Faculty of Science

MRNE: Marine Science

All MRNE courses are field-based courses offered at the Bamfield Marine Sciences Centre for upper-level Biology credit. Please visit www.bamfieldmsc.com for more information.

MRNE 400 (3/6) d Directed Studies
A research project approved by the supervisor in the field of interest of the student designed to take advantage of the opportunities offered by the Bamfield Marine Sciences Centre. Note: the supervisor may be teaching at the Marine Centre; or a member of faculty of WCUMSS whether at the Marine Centre as a research investigator or as one of the members of WCUMSS.

MRNE 401 (6) Special Topics in Marine Biology
This course will be offered, as opportunities arise, by distinguished scientists visiting at the Bamfield Marine Sciences Centre. It is expected that the course will generally be of a specialized nature and be at a level appropriate to graduate or senior undergraduate students.

MRNE 402 (3-12) d Special Topics in Marine Biology
This course will be offered, as opportunities arise, by distinguished scientists visiting at the Bamfield Marine Sciences Centre. This course will be of a specialized nature and at a level appropriate to graduate or senior undergraduate students.

MRNE 410 (6) Marine Invertebrate Zoology
A survey of the marine phyla, with emphasis on the benthic fauna in the vicinity of the Marine Station. The course includes lectures, laboratory periods, field collection, identification and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

MRNE 411 (6) Comparative Invertebrate Embryology
A comprehensive study of development of marine invertebrates available at the Bamfield Marine Sciences Centre, including all major phyla and most of the minor phyla. 
Prerequisite: course in invertebrates or embryology.

MRNE 412 (6) Biology of Fishes
Classification, physiology, ecology, behaviour and zoogeography of fishes with particular emphasis on those in the marine environment of the British Columbia coast. 
Prerequisite: A course in comparative vertebrate anatomy.

MRNE 415 (3) Structure and Function in Marine Animals
Principles of classification, evolution, morphology, biomechanics, physiology and biochemistry will be illustrated in representatives from a variety of animal phyla. [3-3-0]
Prerequisite: Completion of second year in a biology program.

MRNE 420 (6) Marine Phycology
A survey of the marine algae, with emphasis on the benthic forms in the vicinity of the Marine Centre. The course includes lectures, laboratory periods, field collection, identification and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

MRNE 425 (3) Ecological Adaptations of Seaweeds
Morphological, physiological, genetic and reproductive adaptations of seaweeds to their environments. [3-3-0]
Prerequisite: Completion of second year in a biology program.
MRNE 430 (6) Marine Ecology
An analytical approach to biotic associations in the marine environment. Opportunities are provided for study of the intertidal realm in exposed and protected areas, and of beaches and estuaries in the vicinity of the Marine Centre; plankton studies and investigations of the subtidal and benthic environments by diving and dredging are envisaged.

MRNE 435 (6) Introduction to Biological Oceanography
An introduction to the biology of oceans, with supporting coverage of relevant physics and chemistry. Emphasis will be placed on plankton biology, community structure and life histories, and influencing environmental factors. Collections will be made from sheltered inlets, through Barkely Sound to offshore waters. The course will involve both field and laboratory.
Prerequisite: All of BIOL 320, BIOL 205.

MRNE 437 (3) Population and Community Ecology of Marine Organisms
Emphasis on interactions among organisms and between organisms and their physiochemical environment, and on biological diversity. [3-3-0]
Prerequisite: Completion of second year in a biology program.

MRNE 440 (6) Biology of Marine Birds
Study of interrelationship of birds and the marine environment. Census techniques and observation of birds in the field will be emphasized.
Prerequisite: Completion of a course in vertebrate zoology or permission of the instructor.

MRNE 445 (6) Biology of Marine Mammals
Survey course covering systematics and distribution of marine mammals, their sensory capabilities and physiology, with special emphasis on the Cetacea. The course will involve an independent field study.
Prerequisite: Introductory vertebrate zoology.

MRNE 480 (3) Seminars and Papers in Marine Science
Instruction in the critical analysis of published research papers and of oral seminars. [2-2-0]
Prerequisite: Completion of second year in a biology program.

MRNE 501 (6) Special Topics
6 weeks. Offered, as opportunities arise, by distinguished scientists who are visiting at the Bamfield Marine Sciences Centre. The course will be of a specialized nature. This course is not eligible for Credit/D/Fail grading.

MRNE 502 (3) Special Topics
3 weeks. Offered, as opportunities arise, by distinguished scientists who are visiting at the Bamfield Marine Sciences Centre. The course will be of a specialized nature. This course is not eligible for Credit/D/Fail grading.

Materials Engineering, Faculty of Applied Science

MTRL: Materials Engineering

MTRL 201 (3) Technical Communication
Written and oral communication in business correspondence, engineering design methods, report preparation, and oral presentations of technical material. Restricted to students in second year of the Materials Engineering Program. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of APSC 176, ENGL 110, ENGL 111, ENGL 112, ENGL 120, ENGL 121.
Corequisite: MTRL 280.
Equivalency: APSC 201.

MTRL 250 (4) Principles and Calculations in Materials Engineering
Basic heat and mass balances applied to materials engineering; thermodynamic principles applied to materials processing: heat of reaction, free energy, activity, phase equilibrium. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Equivalency: MMAT 250.

MTRL 252 (4) Thermodynamics of Materials I
High temperature equilibria: reactions involving gases, Ellingham diagrams, phase diagrams; thermodynamics of combustion systems relevant to materials engineering; advanced heat and mass balances applied to materials engineering. This course is not eligible for Credit/D/Fail grading. [3-0-2]
Equivalency: MMAT 252.
MTRL 263 (3) Transport Phenomena I - Fluid Mechanics
Fluid statics; fluid mechanics; laminar and turbulent flow; equations of continuity and motion; boundary layers; flow in conduits and packed and fluidized beds; flow measurements. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]
Equivalency: MMAT 263.

MTRL 264 (3) Transport Phenomena II - Heat Transport
Conduction, forced and natural convection, and radiation. Heat transfer with fluid flow, applications of heat exchange, and solidification of castings. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]

MTRL 280 (3) Materials in Design
The process of materials selection for different design criteria; the importance of shape and processing variables; the use of computer software in the selection process. *This course is not eligible for Credit/D/Fail grading.* [2-0-3]
Equivalency: MMAT 280.

MTRL 340 (3) Manufacturing in Materials Engineering
Manufacturing processes from a materials perspective; metal casting, heat treating processes, forming processes, machining, and joining. Role of manufacturing in microstructure and material properties development and on component performance. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]
Prerequisite: APSC 278.

MTRL 350 (4) Thermodynamics of Materials II
Low temperature equilibria: solution thermochemistry, electrochemistry, chemical potential and free energy diagrams applied to materials processing and thermodynamic modelling. *This course is not eligible for Credit/D/Fail grading.* [3-0-2]
Prerequisite: One of MMAT 250, MTRL 250.
Equivalency: MTRL 350.

MTRL 358 (3) Hydrometallurgy I
Aqueous extraction of metals from ores and concentrates. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]
Equivalency: MTRL 358.

MTRL 359 (1) Hydrometallurgy I Laboratory
Laboratory exercises on aqueous extraction of metals from ores and concentrates. *This course is not eligible for Credit/D/Fail grading.* [0-3*-0]
Corequisite: One of MMAT 358, MTRL 358.
Equivalency: MMAT 359.

MTRL 361 (4) Modelling of Materials Processes
Mathematical and physical modelling of processes employed in the production of materials. The application of models to analyse, design and improve materials production. *This course is not eligible for Credit/D/Fail grading.* [3-0-2]
Equivalency: MMAT 361.

MTRL 363 (3) Transport Phenomena III - Mass Transport
Diffusion and mass transfer with chemical reaction; gas-liquid, gas-solid and liquid-liquid systems; analysis of mass transfer processes in metallurgical operations; mixing in continuous and batch processes. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]
Prerequisite: All of MTRL 263, MTRL 264.

MTRL 365 (3) Mechanical Behaviour of Materials
Polycrystalline and single crystal deformation; dislocation theory; strengthening mechanisms; fracture mechanics; fatigue; high temperature deformation mechanisms. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]
Prerequisite: APSC 278.
Equivalency: MMAT 365.

MTRL 378 (3) Phase Transformations
Solidification and solid state transformations; nucleation and growth processes; segregation and structure in castings; phase changes in steel; transformation diagrams; diffusion equations. *This course is not eligible for Credit/D/Fail grading.* [3-0-2*]
Equivalency: MMAT 378.

MTRL 381 (1) Structure and Properties Laboratory
Structure and properties of ferrous and non-ferrous metals; heat treatment; hardenability; metallography; age hardening. *This course is not eligible for Credit/D/Fail grading.* [0-3*-0]
Corequisite: All of MTRL 365, MTRL 378.
Equivalency: MMAT 381.
MTRL 382 (4) Ceramics  
Fundamentals of engineering ceramics focusing on raw materials, forming, sintering and properties, characterization, and design 
with ceramics. This course is not eligible for Credit/D/Fail grading. [3-3*-0]  
Equivalency: MMAT 382.

MTRL 392 (2) Engineering Technical Communication  
Written and oral technical communication. Report preparation and oral presentation of technical information. This course is not 
eligible for Credit/D/Fail grading. [1-0-2]  
Prerequisite: One of APSC 201, MTRL 201.

MTRL 394 (4) Polymer and Polymer Matrix Composites  
The structure and properties of polymeric materials, reinforced polymers and polymer matrix composites with emphasis on their 
engineering properties and applications. This course is not eligible for Credit/D/Fail grading. [3-0-2]  
Equivalency: MMAT 394.

MTRL 398 (1) Engineering Written Communication  
Written communication in engineering. Reporting of technical material. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of APSC 201, MTRL 201.

MTRL 442 (3) Coatings and Surface Modification  
Strategies for ceramic and metallic coatings by melting-solidification, from the vapour state and from solution, and methods of 
surface modification. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: APSC 278.

MTRL 451 (3) Microstructural Analysis Laboratory  
Basic principles and techniques of microstructural analysis with particular reference to engineered materials including x-ray, SEM 
microprobe TEM and high energy electron analysis. This course is not eligible for Credit/D/Fail grading. [1-3*-2]  
Equivalency: MMAT 451.

MTRL 455 (3) Economic Aspects of Materials Engineering  
Time value of money, cash flows, capital and operating cost estimation, financial decision making and relevant case studies. This 
course is not eligible for Credit/D/Fail grading. [2-0-2]  
Equivalency: MMAT 455.

MTRL 456 (3) Environmental Degradation of Materials  
Fundamental aspects of environmental degradation of metals (corrosion), ceramics, adn polymers, with an emphasis on aqueous 
environments. This course is not eligible for Credit/D/Fail grading. [2-0-2]

MTRL 458 (3) Hydrometallurgy II  
Leaching, purification, precipitation, regeneration; thermodynamics and kinetics of separation steps; electrochemical 
applications. This course is not eligible for Credit/D/Fail grading. [3-0-0]  
Prerequisite: One of MMAT 358, MTRL 358.  
Equivalency: MMAT 458.

MTRL 460 (3) Monitoring and Optimization of Materials Processing  
Measurement systems for materials processing and evaluation, methods of data collection and analysis in materials engineering, 
materials processing monitoring and control, design of experiments for materials processing and optimization. This course is not 
eligible for Credit/D/Fail grading. [2-0-2]  
Prerequisite: All of STAT 251, APSC 278.

MTRL 466 (3) Engineering Project I  
Design projects to illustrate the full spectrum of design encountered in Metals and Materials Engineering including the design of 
components, structures and processes used to manufacture materials. This course is not eligible for Credit/D/Fail grading. [1-0-5]  
Equivalency: MMAT 466.

MTRL 467 (3) Engineering Project II  
Design projects to illustrate the full spectrum of design encountered in Metals and Materials Engineering including the design of 
components, structures and processes used to manufacture materials. This course is not eligible for Credit/D/Fail grading. [1-0-5]  
Equivalency: MMAT 467.

MTRL 471 (3) Nanofibre Technology  
Introduction to nanomaterials in the form of fibres and composites, including processing, structure, characterization methods, 
properties, and modeling. Credit will only be given for one of MTRL 471 or MTRL 571. This course is not eligible for Credit/D/Fail
MTRL 472 (3) Welding and Joining of Materials
Case studies addressing temperature modelling in welding and joining, material selection for welds and joints, calculation of properties for welds and joints, mechanical analysis of joints, and design of welding and joining procedures. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: All of MTRL 365, MTRL 378.

MTRL 475 (3) Microstructure Engineering
Follows the production of metallurgical products, focusing on process design models used to describe solidification, recrystallization, and precipitation. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: All of MTRL 365, MTRL 378.

MTRL 478 (3) Electronic Materials
Semiconductor materials, MOSFET structure, operation and applications in digital circuits, fabrication techniques, basic mask and fabrication flow design and semiconductor fabrication process theories at an entry level. [3-0-0]

MTRL 485 (3) Failure of Materials
Failure by excess deformation, fracture, fatigue, and environmental effects. Failure theories and case studies of engineering failures. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: All of MECH 260, MTRL 365.

MTRL 486 (3) Nondestructive Evaluation
Principles of test methods; inspection techniques and equipment; quantitative flaw evaluation; reliability analysis. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Equivalency: MMAT 486.

MTRL 489 (1) Seminar III
Training and practice in public speaking and presentation of technical papers. This course is not eligible for Credit/D/Fail grading. [0-0-1]
Equivalency: MMAT 489.

MTRL 494 (3) Composite Materials
Understanding the properties and the mechanical behaviour of composite materials with emphasis on analysis, design, and manufacturing. Credit will only be given for one of MTRL 494, 594. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Equivalency: MMAT 494.

MTRL 495 (3) Biomaterials
Engineered materials in medical applications with an emphasis on material properties, functionality, design, and material response in the biological environment. This course is not eligible for Credit/D/Fail grading. [2-0-2]
Prerequisite: APSC 278.
Equivalency: MMAT 495.

MTRL 512 (3) Material Optimization for the Manufacture of Structural Metallic Components
Phase transformations and strengthening of advanced engineering alloys (e.g. steels, aluminum, magnesium and titanium alloys) with particular emphasis on structure-property development relevant to the latest materials manufacturing technologies. This course is not eligible for Credit/D/Fail grading.

MTRL 515 (3) Advanced Simulation and Modelling Tools for Materials Manufacturing
Mathematical modeling of manufacturing processes; Computer Aided Engineering tools; application examples will be drawn from a range of manufacturing operations. This course is not eligible for Credit/D/Fail grading.

MTRL 517 (3) Case Studies in Advanced Materials Manufacturing
The full spectrum of design encountered including the design of components, structures and processes used to manufacture materials. This course is not eligible for Credit/D/Fail grading.

MTRL 550 (2-4) c Metallurgical Thermodynamics
Application of advanced thermodynamic principles in metallurgical processes. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of MMAT 350, MTRL 350.
Equivalency: MMAT 550.
MTRL 557 (3) Separation Science in Aqueous Metal Processing
The theory of solvent extraction and ion exchange, membrane separations, chemical precipitation, electrochemical separations and other techniques for aqueous metal processing, applications from the metal processing literature. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 557.

MTRL 558 (3) Corrosion
Modern theories relating to corrosion and corrosion protection of metals. Thermodynamic and kinetic phenomena, corrosion measurements, inhibition and passivation, design for corrosive environments, stress corrosion cracking theory. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of MMAT 456, MTRL 456.
Equivalency: MMAT 558.

MTRL 559 (3) Advanced Hydrometallurgy
Advanced thermochemical modeling of hydrometallurgical unit operations to include extraction, separation, and recovery of base metals. Application to flow-sheet analysis. This course is not eligible for Credit/D/Fail grading.

MTRL 562 (3) Finite Elements in Heat Transfer
Application of the finite element method to heat transfer and solidification; steady state and transient heat conduction; latent heat evolution and radiation. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 562.

MTRL 564 (3) Hydrometallurgical Reactor Design and Analysis
Batch leaching kinetics, leaching mechanisms; statistical methods for design of multiparticle continuous leaching reactors; coupled heat and mass balances, mixing phenomena, redox and precipitation reactions, complex mineralogical feeds; heap and dump leaching. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 564.

MTRL 570 (3) Deformation of Crystalline Materials
Nature and properties of lattice imperfections; dislocation theory and its use to describe work hardening, creep, structure of grain boundaries and other phenomena. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 570.

MTRL 571 (3) Advanced Nanofibre Technology
Processing and properties of nanomaterials in the context of fibrous and composite materials. Credit will only be given for one of MTRL 471, 571. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MTRL 575 (3) Advanced Phase Transformations
Thermodynamic and kinetic bases for the theory of phase transformations in the condensed state. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 575.

MTRL 578 (3) Microstructural Evolution of Deformed Materials
Physical mechanisms of microstructure evolution; structure, energy and mobilities of grain boundaries, grain boundary segregation, precipitation, recovery, recrystallization, grain growth; microstructure engineering of steels. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 578.

MTRL 579 (3) Physics of Microfabrication: Front End Processing
Practical aspects, physical models, and simulations of Si-based nanofabrication processes such as oxidation, diffusion, ion implantation, chemical vapor deposition, etching, stress techniques. Semiconductor device physic basics will also be discussed. This course is not eligible for Credit/D/Fail grading.

MTRL 582 (3) Advanced Ceramics
Complex silicate structures; ion exchange in silicates; kinetics of solid state reactions; kinetics of high temperature processes. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 582.

MTRL 585 (3) Topics in Fracture Mechanics
The equations and concepts of linear elastic fracture mechanics. Fracture toughness testing, statistical theories of fracture and proof testing, stress corrosion cracking and static fatigue. Acoustic emission and other nondestructive testing methods. Case studies of large scale fractures of pressure vessels and structures. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 585.
MTRL 588 (3) Electrochemical Science, Engineering and Technology
Electrochemical interfaces; electrode reactions; thermodynamics; kinetics and transport processes in electrochemical systems; experimental techniques. Electrochemical reactors and processes; modelling, design and economics. Electrochemical technologies; electrosynthesis, batteries and fuel cells. Electro-metallurgy; electrowinning and refining of metals, corrosion, leaching and cementation. This course is not eligible for Credit/D/Fail grading.
Equivalency: CHBE 577, MMAT 588.

MTRL 592 (2-6) d Advanced Topics in Materials Engineering
May be arranged on approval of the department head. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 592.

MTRL 593 (1-6) c Directed Studies in Materials Engineering
This course is not eligible for Credit/D/Fail grading. Equivalency: MMAT 593.

MTRL 594 (3) Advanced Composite Materials
Processing and properties of advanced polymer based composite materials with emphasis on analysis, design, and manufacturing. Credit will only be given for one of MTRL 494, 594. This course is not eligible for Credit/D/Fail grading. [3-0-0]

MTRL 595 (3) Advanced Biomaterials
Formation and structure-function relations of biological materials, the interaction of tissue-synthetic biomaterials, advanced biomaterials design, biomimetic processing, and current progress in drug delivery systems and biomedical devices. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 595.

MTRL 596 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading. Equivalency: MMAT 596.

MTRL 597 (6) M.Eng. Project
This course is not eligible for Credit/D/Fail grading. Equivalency: MMAT 597.

MTRL 598 (0) Seminar
Presentation and discussion of current topics in metals and materials research. A required course for graduate students in metals and materials which carries no academic credit.
Equivalency: MMAT 598.

MTRL 599 (12) Thesis
For M.A.Sc. Degree. Research studies in chemical metallurgy, physical metallurgy, or ceramics. This course is not eligible for Credit/D/Fail grading.
Equivalency: MMAT 599.

MTRL 699 (0) Doctoral Dissertation
Equivalency: MMAT 699.

School of Music, Faculty of Arts

MUSC: Music

MUSC 100 (3) Principles of Musical Form
Fundamental materials and processes of music - rhythmic, melodic, textural and harmonic - and how they create small-scale structures in a variety of styles. Compositional and analytical applications.

MUSC 101 (3) Diatonic Harmony and Voice Leading
Harmonic and linear functions of diatonic chords; common progressions and sequences; introduction to tonal hierarchy and prolongation; simple modulation. Compositional and analytical exercises. Prerequisite: One of MUSC 100, MUSC 110.

MUSC 102 (2) Class Strings
Group instruction in music performance. Restricted to B.Mus. students.

MUSC 103 (3) Introduction to the Theory of Music
Concepts of rhythm, pitch, timbre, and texture. Notation and aural recognition of rhythmic and pitch patterns. Basic principles of melody and form. This course is not applicable to the B.Mus.
MUSC 104 (3) Introduction to Diatonic Harmony
Triads, key and elementary harmony in Western music. Elements of musical form. Aural training and exercises in composition, modeled on historical styles. Not for credit in the B.Mus.
Prerequisite: MUSC 103 or permission of the instructor.

MUSC 105 (1) Aural Skills I
Sight singing; melodic and harmonic dictation; rhythm production; error detection; tuning; perception of harmony, form, and tonality; improvisation in set idioms. Restricted to B.Mus. students. This course is not eligible for Credit/D/Fail grading.

MUSC 106 (1) Aural Skills II
Continuation of MUSC 105. Restricted to B.Mus. students. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of (a) a score of 68% or higher in MUSC 105, or (b) pass the MUSC 105 Challenge Test. Students may register for MUSC 106 prior to meeting the pre-requisite but will be required to withdraw if the pre-requisite is not met by the first day of class.

MUSC 107 (3/6) d Composition I
An introduction to musical composition.

MUSC 108 (3) Introduction to Contemporary Art Music
Contemporary music repertoire, emphasizing music from the past fifty years. Required of undergraduate Composition majors; open to other Bachelor of Music students by permission of instructor. This course is not eligible for Credit/D/Fail grading.

MUSC 110 (4) Intensive Tonal Theory and Form I
Continuity and form in tonal music, with attention to the development of aural imagery and writing skills. Foundational concepts are first applied cross-historically, then restricted to styles in which functional harmony emerges as a governing feature. Limited to B.Mus. students with strong preparation (as determined by B.Mus. admissions procedures) and students in other programs with permission of the instructor.

MUSC 111 (4) Intensive Tonal Theory and Form II
Two- and three-voice writing based on a four-part foundation; use of motivic diminution and imitation; dissonant chords; prolonging harmonies within phrases; modulating phrases and sequences; chromatic techniques; small binary and ternary forms, and formal functions of component phrases.
Prerequisite: MUSC 110.

MUSC 112 (2) Class Brasses and Percussion
Group instruction in music performance. Restricted to B.Mus. students.

MUSC 119 (3) Introduction to Music Technology
Practical and theoretical training in technologies that support current artistic and academic practice, such as MIDI, podcasts/videocasts, websites, social media, and software for score notation, music education, and basic audio/video editing.
[2-0-1]

MUSC 120 (3) History of Music I
An overview of Western music from antiquity through the Middle Ages and Renaissance, providing a framework for understanding musical styles and practices, and examining selected compositions in greater analytical and historical depth.

MUSC 121 (3) History of Music II
The development of Western music from circa 1600 to circa 1800.
Prerequisite: MUSC 120. Or permission of the instructor

MUSC 122 (2) Class Woodwinds
Group instruction in music performance. Restricted to B.Mus. students.

MUSC 128 (3) Musical Rhythm and Human Experience
A multidisciplinary survey of musical rhythm in selected world traditions and genres, connecting it to ideas of time, evolution, history, anthropology, philosophy, and contemporary globalised culture.

MUSC 131 (2) Class Voice
Group instruction in music performance. Required of all first-time secondary voice students. Restricted to B.Mus. students.

MUSC 135 (2) Opera Repertoire I
A musico-dramatic study and analysis of representative works in the international operatic theatre from 1600 to the present, through musical, literary and graphic sources. Each sequential year of study, the student is expected to show increased facility in musical and dramatic analysis as well as a greater understanding of the works under examination. Open to students outside the
B.Mus. program by permission of the instructor.

**MUSC 136 (2/4) d Piano Repertoire I**
Performance and discussion of the repertoire for string-keyboard instruments essential to the performer and teacher. Special attention to matters of structure, style, and performance practices. Required of piano performance majors and open to piano concentrators, space permitting. First term prerequisite to second term.

**MUSC 141 (2) Class Piano I**
Required of all first-time secondary piano students.

**MUSC 149 (2) Collaborative Piano I**
Skills and performance practice with primary emphasis on voice/piano partnership principles and repertoire. Strong sight-reading skills essential. For Piano majors; open to others by audition.

**MUSC 150 (2-16) d Large Instrumental Ensemble**
Symphony Orchestra, Symphonic Wind Ensemble, or Concert Winds. May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 151 (2-8) d University Chamber Orchestra**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 153 (4-16) d University Singers**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 154 (3-12) d University Choral Union**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 155 (2-8) d Vocal Chamber Ensembles**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 157 (2-8) d Early Music Ensemble**
Performance of early Western instrumental and vocal ensemble music. May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 159 (2-8) d University Chamber Strings**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 160 (2-8) d String Chamber Ensembles**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 161 (2-6) d Piano Chamber Ensembles**
May be repeated for credit in accordance with program requirements for B.Mus. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 162 (2-8) d Wind and Percussion Chamber Ensembles**
May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. Open to other students by audition, with credit, as stipulated by their faculties. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 163 (2-8) d Contemporary Players**
Performance of contemporary music. An ensemble of variable size, including both instrumentalists and singers, will be formed to present several concerts of 20th-century music during the academic year. May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 164 (2-8) d Jazz Ensemble**
Performance techniques and repertoire. May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 165 (2-8) d World Music Ensembles**
Training on traditional instruments and their techniques, with emphasis on ensemble performance. Different sections focus on the music of different cultures, e.g., Bali, China, Ghana, Korea. May be repeated for credit in accordance with program requirements for B.Mus. or B.A. in Music, or when permitted in other programs.

This course is not eligible for Credit/D/Fail grading.

**MUSC 167 (2)** Introduction to Piano Chamber Music
A survey of repertoire and performance issues.

**MUSC 169 (1-4)** Intensive Chamber Ensemble
Intensive coaching in chamber ensemble for advanced players. Performance of works prepared is expected.
Corequisite: Any small ensemble (MUSC 156-166) and permission of the instructor.

**MUSC 170 (2)** Lyric Diction
A study of the basic phonetics and accepted principles of lyric diction of the four languages most commonly used in concert and operatic repertoire: French, German, Italian, and English.

**MUSC 171 (2)** Music Performance (Secondary)
Private instruction, vocal or instrumental.

**MUSC 172 (4)** Music Performance (Secondary)
Private instruction, vocal or instrumental.

**MUSC 181 (2)** Music Performance (Concentration)
Private instruction, vocal or instrumental.

**MUSC 182 (4)** Music Performance (Concentration)
Private instruction, vocal or instrumental.

**MUSC 183 (6)** Music Performance (Concentration)
Private instruction, vocal or instrumental.

**MUSC 191 (2)** Music Performance (Major)
Private instruction, vocal or instrumental.

**MUSC 192 (4)** Music Performance (Major)
Private instruction, vocal or instrumental.

**MUSC 193 (6)** Music Performance (Major)
Private instruction, vocal or instrumental.

**MUSC 200 (3)** Chromatic Harmony and Voice Leading
Harmonic and linear functions of common chromatic chords; mixture; chords and progressions of linear origin; tonal plans. Compositional and analytical exercises.
Prerequisite: MUSC 101.

**MUSC 201 (3)** Musical Forms
Study of various forms in tonal music and the rhythmic, melodic, textural, and harmonic processes that create them on small and large scales. Compositional and analytical exercises.
Prerequisite: One of MUSC 111, MUSC 200.

**MUSC 205 (1)** Aural Skills III
Continuation of MUSC 106. Restricted to B.Mus. students.
Prerequisite: One of (a) a score of 68% or higher in MUSC 106, or (b) pass the MUSC 106 Challenge Test. Students may register for MUSC 205 prior to meeting the pre-requisite but will be required to withdraw if the pre-requisite is not met by the first day of class.

**MUSC 206 (1)** Aural Skills IV
Continuation of MUSC 205. Restricted to B.Mus. students. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of (a) a score of 68% or higher in MUSC 205, or (b) pass the MUSC 205 Challenge Test. Students may register for MUSC 206 prior to meeting the pre-requisite but will be required to withdraw if the pre-requisite is not met by the first day of class.

**MUSC 207 (3/6)** Composition II
Continuation of MUSC 107.
Prerequisite: MUSC 107 and permission of Composition Division based on submission of scores.

**MUSC 210 (4)** Intensive Tonal Theory and Form III
Writing exercises involving chromaticism and modulation. Theme and inter-theme types in Classical and Romantic music. Techniques of variation and development. Model-based composition of small forms and analysis of larger forms. Cultivation of score-reading ability.

Prerequisite: MUSC 111. Or MUSC 200 with permission of the instructor.

MUSC 220 (3) History of Music III
The development of Western music from circa 1800 to circa 1900.

Prerequisite: MUSC 121 and one of MUSC 100, MUSC 110.

MUSC 221 (3) History of Music IV
The development of Western music from circa 1900; an introduction to jazz and popular music and to music of selected non-Western societies.

Prerequisite: MUSC 220 and one of MUSC 100, MUSC 110.

MUSC 235 (2) Opera Repertoire II
See MUSC 135.

MUSC 236 (2/4) d Piano Repertoire II
Continuation of MUSC 136.

MUSC 241 (2) Class Piano II
Continuation of MUSC 141.

MUSC 249 (2) Collaborative Piano II
Further development of skills and performance practice with primary emphasis on voice/piano partnership principles and repertoire. Strong sight-reading skills essential. For Piano majors; open to others by audition.

Prerequisite: MUSC 149.

MUSC 271 (2) Music Performance (Secondary)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 272 (4) Music Performance (Secondary)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 281 (2) Music Performance (Concentration)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 282 (4) Music Performance (Concentration)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 283 (6) Music Performance (Concentration)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 291 (2) Music Performance (Major)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 292 (4) Music Performance (Major)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 293 (6) Music Performance (Major)
Private instruction, vocal or instrumental.

Prerequisite: One of MUSC 171-195.

MUSC 300 (3) Compositional and Analytical Approaches to Post-Tonal Music
Concepts essential to understanding and performing art music, since 1900, in which functional triadic harmony is absent or subsidiary to other musical processes. Detailed consideration of works of major composers up to the present, through analysis, composition, and musicianship exercises.

Prerequisite: Either (a) MUSC 201 or (b) MUSC 210.
MUSC 301 (3) Compositional and Analytical Approaches to Music Today
Technical and stylistic perspectives on contemporary art music and popular and world music idioms. Exercises in composition and production. Training in related listening, sight-singing and score reading skills.
Prerequisite: MUSC 300.

MUSC 305 (2) Readings in Orchestral Repertoire
A laboratory course for orchestral performance majors. Emphasis on reading a large cross-section of standard orchestral repertoire with further emphasis given to music currently being programmed by local professional orchestras. The course is restricted to Orchestral Instruments majors, except by permission of the instructor.

MUSC 307 (3/6) c Composition III
Continuation of MUSC 207.
Prerequisite: MUSC 207 and permission of Composition Division based on submission of scores.

MUSC 309 (2) Instrumentation
The study of string, woodwind, brass and percussion instruments; orchestral sections and scoring for various small ensembles. Activities include demonstrations of instruments, scoring projects, analysis and listening. For credit towards the B.Mus. and the B.A. in Music; not open to other students.
Prerequisite: One of MUSC 111, MUSC 200 and completion of the second-year piano requirement.

MUSC 310 (2) Orchestration
The study of orchestration through the analysis of orchestral works, listening and scoring projects. Activities also include choral arranging and scoring for stage band and wind ensemble.
Prerequisite: MUSC 309.

MUSC 311 (2) Fundamentals of Conducting
Basic conducting techniques: patterns, cueing, dynamic shading, and physical presentation.
Prerequisite: One of MUSC 111, MUSC 200 and completion of the second-year piano requirement.

MUSC 312 (2) Instrumental Conducting
The relation of conducting gestures to instrumental sound; development of practical skills in directing ensembles and reading scores, considering instruments' special characteristics.
Prerequisite: MUSC 311.

MUSC 313 (2) Choral Conducting
The relation of conducting gestures to choral sound; development of practical skills in directing ensembles and reading scores; attendant issues of vocal technique and pedagogy.
Prerequisite: MUSC 311.

MUSC 319 (3/6) d Introduction to Electroacoustic Music
Study of acoustics, audio technology, and electroacoustic composition. Composition of original works using facilities of the UBC Electroacoustic Music Studio.
Prerequisite: MUSC 119 and one of MUSC 100, MUSC 110. Permission of instructor is also required.

MUSC 320 (3) Computer Music
The study of computer applications to music, focusing on digital synthesis techniques and languages, methods of algorithmic composition, and the design of music editors.
Prerequisite: MUSC 319 or permission of instructor.

MUSC 321 (3/6) d Music Appreciation, Twentieth-Century
Designed for students with little or no musical background. Not for credit toward the B.Mus. or B.A. in Music.

MUSC 322 (3) Topics in Western Music
Study in one major genre of Western music (e.g., "The Symphony", "Women in Opera", "History of the Song Cycle"). No musical knowledge is required. Not for credit toward the B.Mus. or B.A. in Music.

MUSC 323 (3) History of Popular Music
Genres of popular music from 1950 to the present and their changing aesthetic, social, cultural, and historical dimensions. Prior experience with music notation and terminology is not required. This course is not acceptable for credit toward the B.Mus., or toward the B.A. major, honours, or minor in Music.

MUSC 324 (3-6) d The Guitar in History and Practice
Introduction to guitar performance and repertoire for non-majors. Lectures explore guitar repertoires from selected regions and eras. Not for credit toward the B.Mus. or the Major/Minor in Music (B.A., B.F.A., B.Sc.). Students are expected to provide their
own guitars.

**MUSC 326 (3/6) d Music Appreciation**
An introductory course for which previous musical background is helpful, but not required. Contents include a discussion of musical concepts, evolution of forms, style, and media and detailed study of selected works from the concert repertoire. Popular forms of music (jazz, folk, rock, etc) not included. Not for credit towards the B.Mus. or B.A. in Music.

**MUSC 328 (3/6) d World Music Cultures**
Introduction to the principles of ethnomusicology and an examination of at least two contrasting musical traditions. May be repeated once for credit if different traditions are covered.

**MUSC 330 (3) Music in Vancouver's Ethnic Communities**
Examination of music within the ethnic context as found in the urban environment of Vancouver. The musics of several traditions (e.g., Chinese, Jewish, English folk) will be studied together with the social issues surrounding their preservation. For credit toward the B.Mus. and the B.A. in Music, but open to students not majoring in music.

**MUSC 331 (2) Workshop in World Rhythm**
Theory and practice of selected rhythmic systems of world music cultures, focusing on West African drumming, and including other systems such as Indian Tala and Peking opera percussion.

*Prerequisite:* MUSC 201.

**MUSC 333 (2) Accompanying on the Harpsichord I**
Basic techniques and styles of continuo playing. Open to keyboard players with no previous harpsichord experience.

**MUSC 336 (4) Opera Theatre Techniques I**
Performance techniques associated with the musical theatre of various historical periods. Basic dance. Most operatic excerpts will be in English.

**MUSC 339 (3/6) d Opera Workshop I**
Participation in performances by the School. Open also to students outside Music without credit, after audition.

**MUSC 340 (3) Piano Pedagogy I: Theory and Studio Management**
Basic principles of teaching piano. Business aspects of establishing and maintaining a music studio. For piano majors.

**MUSC 345 (3) Aesthetics and Practice of Film Music**

**MUSC 349 (2) Keyboard Harmony and Transposition**
Designed for the keyboard performance major and keyboard concentrator in General Studies.

**MUSC 352 (3) History of Medieval Music**
Sacred and secular music, vocal and instrumental.

*Prerequisite:* All of MUSC 120, MUSC 121.

**MUSC 353 (3) History of Renaissance Music**
Sacred and secular music, vocal and instrumental.

*Prerequisite:* MUSC 120.

**MUSC 354 (3) Baroque Music**

*Prerequisite:* MUSC 121.

**MUSC 355 (3) Classical Music**

*Prerequisite:* MUSC 121.

**MUSC 356 (3) Romantic Music**

*Prerequisite:* MUSC 220.

**MUSC 357 (3) History of Music Since 1900**

*Prerequisite:* MUSC 221.

**MUSC 358 (3) History of Jazz**
Jazz styles and their cultural contexts; the relationship of performers and audiences; issues of race and gender; non-Western influences.

*Prerequisite:* MUSC 221.

**MUSC 363 (4) History and Repertoire of the Guitar and Related Instruments**
A chronological survey, from the Renaissance to the present day, of music for the guitar and related instruments and of the development of the instruments themselves. Instruments considered include Renaissance and Baroque lutes, the vihuela,
early types of guitar as well as the modern six-string guitar. Musical forms and genres, national schools and the works of principal composers of every period are explored and attention is given to national systems, continuo realization, historical ornamentation and pedagogical systems.

Prerequisite: MUSC 221.

MUSC 364 (1/2) d Chamber Music Repertoire
Perspectives on the performance of selected chamber music. Specific works vary from year to year. May be repeated for credit.

MUSC 365 (2) Song Repertoire I
An exploration of the solo art song repertoire from 1600 to the Romantic period. Repertoire essential to the performer and teacher will be studied through live and recorded performance with special attention given to poetic content and musical style. 
Prerequisite: MUSC 221.

MUSC 371 (2) Music Performance (Secondary)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 372 (4) Music Performance (Secondary)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 381 (2) Music Performance (Concentration)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 382 (4) Music Performance (Concentration)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 383 (6) Music Performance (Concentration)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 391 (2) Music Performance (Major)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 392 (4) Music Performance (Major)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 393 (6) Music Performance (Major)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 271-295.

MUSC 394 (8) Music Performance (Major)
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of MUSC 271-295.

MUSC 402 (2-6) d Special Projects
For fourth-year students who receive permission of the Director of the School of Music to do advanced studies in their major field.

MUSC 403 (3/6) d Selected Topics in Music
See School of Music schedule for description and prerequisites. Restricted to B. Mus. and B.A. in Music students.

MUSC 406 (2/4) d Conducting II
Advanced choral and orchestral conducting techniques and rehearsal practices.
Prerequisite: One of MUSC 311, MUSC 312. Permission of the instructor is required.

MUSC 407 (3/6) c Composition IV
Continuation of MUSC 307.

MUSC 409 (3/6) d Jazz Theory and Arranging
Jazz scales, chord relationships, substitutions, orchestration, listening, and score analysis. Restricted to B.Mus. and B.A. in Music students.
Prerequisite: One of MUSC 201, MUSC 210.
MUSC 410 (3) Introduction to Schenkerian Analysis
The key concepts of Schenker's theory of tonality. Applications to the analysis of short pieces in various tonal styles, emphasizing clear and correct graphing. Issues of interpretive scope.
*Prerequisite:* One of MUSC 201, MUSC 210.

MUSC 411 (3) Analysis of Tonal Music
Analytical approaches that complement Schenkerian analysis, including motivic construction, harmonic rhythm and phrase rhythm, chromaticism and enharmonicism, features of musical form, aspects of structure and hierarchy at the small and large scale.
*Prerequisite:* One of MUSC 201, MUSC 210.

MUSC 412 (3) Analytical Studies in the Development of Musical Modernism (1860 - 1940)
Analysis of late- and post-romantic works within a theoretical framework that bridges earlier to later works. Assignments in various formats, emphasizing analysis but possibly including composition.
*Prerequisite:* One of MUSC 201, MUSC 210.

MUSC 413 (3) Contemporary Art Music: Theory and Analysis
A technical approach to the diverse concert-music repertoire since 1950, including orchestral, chamber, solo, and electro-acoustic genres. Applicable theories of pitch and rhythm, with reference to composers' own writings.
*Prerequisite:* MUSC 300.

MUSC 414 (3) Counterpoint
Analysis and composition of pieces that rely on the control and development of imitative, polyphonic textures. Models to be taken from one or more European historical repertoires.
*Prerequisite:* MUSC 201.

MUSC 415 (3) Imagining Musical Performances
How performance and analysis engage the musical imagination, as complementary activities; how analytical observations can stimulate performance, and vice versa. Selected topics, with special emphasis on temporal factors.
*Prerequisite:* One of MUSC 201, MUSC 210.

MUSC 417 (3/6) d Musical Scoring for Film
Addresses the practical aspects of composing music for film through assignments of written scores.
*Prerequisite:* MUSC 319. Permission of instructor is required.

MUSC 419 (3-6) d Interactive Performance Systems
Collaborative projects developing new connections between sound and gestures in live concert performance or responsive environments using multiple digital technologies. May be repeated once for credit.
*Prerequisite:* MUSC 320.

MUSC 420 (3) Music Technology Capstone Project
Supervised individual music technology project on an approved topic. Restricted to students in the Minor in Applied Music Technology
*Prerequisite:* MUSC 419. And permission of the Instructor.

MUSC 428 (3/6) d Topics in World Music
The history, theory, style, organology, and forms of the music of a particular culture in its aesthetic and cultural context. Students should consult the School as to which music culture will be covered in a particular year. May be repeated once for credit if different cultures are covered.
*Prerequisite:* MUSC 328 or instructor's permission.

MUSC 430 (3/6) d Major Composers
The musical works of no more than two significant composers will be examined. Specific topics will be announced; may be repeated for credit.
*Prerequisite:* All of MUSC 120, MUSC 121, MUSC 220, MUSC 221.

MUSC 433 (2) Accompanying on the Harpsichord II
Continuation of MUSC 333 with emphasis on more advanced continuo and obbligato techniques.
*Prerequisite:* MUSC 333.

MUSC 436 (4) Opera Theatre Techniques II
Advanced studies in acting, movement, gesture, dance and stage combat. Emphasis on communication and the art of singing and acting recitative in foreign languages.
MUSC 439 (3/6) d Opera Workshop II
A continuation of MUSC 339.

MUSC 440 (3) Piano Pedagogy II: Applications
Teaching musical concepts and keyboard skills; observation of group and private lessons; supervised practicum.
Prerequisite: MUSC 340.

MUSC 441 (2) Vocal Techniques
A study of the scientific principles related to vocal performance: acoustical, physiological and psychological. Restricted to B.Mus. students.

MUSC 442 (4/8) d Song Interpretation
Survey of the literature for voice with keyboard accompaniment, with emphasis on performance problems. Open to piano and voice majors, and to others by permission of instructor. May be repeated once for credit.

MUSC 443 (3/6) d Opera Coaching
Principles and practice, focusing on current Opera Workshop repertoire. Reproducing orchestrations on the piano; preparing scores; study of the voice and the rehearsal process; coaching languages; related conducting skills.
Prerequisite: MUSC 249.

MUSC 444 (3) Establishing a Career in Music
Best practices of the contemporary business of music, focussing on understanding present market conditions, and on targeting specific opportunities through grant-writing, resumés, press kits, publicity, recordings, and marketing. Restricted to fourth-year B.Mus. students.

MUSC 449 (6) Graduating Essay

MUSC 450 (3/6) d Selected Topics in Vocal or Instrumental Genres
Intensive study of one genre of music (e.g., orchestral music 1760û1849; the Lied in Austria and Germany) through analysis and the consideration of cultural milieu and historical development. Specific topics will be announced. May be repeated for credit to a maximum of 6 credits.

MUSC 454 (3) History of Opera I
The development of opera between 1600 and 1800.
Prerequisite: All of MUSC 121, MUSC 220.

MUSC 455 (3) History of Opera II
The development of opera between 1800 and the present.
Prerequisite: All of MUSC 220, MUSC 221.

MUSC 465 (2) Song Repertoire II
A sequel to MUSC 365, exploring the solo art song repertoire from the Romantic era to the present.
Prerequisite: MUSC 221.

MUSC 468 (2) Chamber Music Master Class
Enrolment by audition only.

MUSC 469 (3/6) d Interdisciplinary Projects
Group projects and workshops with students majoring in other creative arts.
Prerequisite: Permission of instructor.
Equivalency: THTR 469, VISA 469, CRWR 440.

MUSC 471 (2) Music Performance (Secondary)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 371-395.

MUSC 472 (4) Music Performance (Secondary)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 371-395.

MUSC 481 (2) Music Performance (Concentration)
Private instruction, vocal or instrumental.
Prerequisite: One of MUSC 371-395.

MUSC 482 (4) Music Performance (Concentration)
Private instruction, vocal or instrumental. 
*Prerequisite:* One of MUSC 371-395.

**MUSC 483 (6) Music Performance (Concentration)**
Private instruction, vocal or instrumental. 
*Prerequisite:* One of MUSC 371-395.

**MUSC 491 (2) Music Performance (Major)**
Private instruction, vocal or instrumental. 
*Prerequisite:* One of MUSC 371-395.

**MUSC 492 (4) Music Performance (Major)**
Private instruction, vocal or instrumental. 
*Prerequisite:* One of MUSC 371-395.

**MUSC 493 (6) Music Performance (Major)**
Private instruction, vocal or instrumental. 
*Prerequisite:* One of MUSC 371-395.

**MUSC 494 (8) Music Performance (Major)**
Private instruction, vocal or instrumental. *This course is not eligible for Credit/D/Fail grading.* 
*Prerequisite:* One of MUSC 371-395.

**MUSC 500 (3/6) d Advanced Musical Analysis**
*This course is not eligible for Credit/D/Fail grading.* 
*Prerequisite:* One of MUSC 410, MUSC 411, MUSC 412, MUSC 413.

**MUSC 501 (3) Readings in Schenkerian Theory**
*This course is not eligible for Credit/D/Fail grading.* 
*Prerequisite:* MUSC 410.

**MUSC 502 (3) The Structure and Function of Music Theories**
*This course is not eligible for Credit/D/Fail grading.* 
*Prerequisite:* One of MUSC 410, MUSC 411, MUSC 412 or permission of the instructor.

**MUSC 503 (3/6) d Topics in the History of Music Theory**
*This course is not eligible for Credit/D/Fail grading.*

**MUSC 504 (3/6) d Theories of Non-Tonal Pitch Relationships**
*This course is not eligible for Credit/D/Fail grading.*

**MUSC 506 (2-6) d Readings in Orchestral Repertoire**
Standard repertoire for orchestral instrumentalists. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 507 (3/6) c Composition**
The composition of original music for conventional instruments and/or electronic media. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 508 (3/6) c Composition**
A continuation of MUSC 507. *This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* MUSC 507.

**MUSC 509 (3/6) c Advanced Orchestration and Arranging**
*This course is not eligible for Credit/D/Fail grading.*

**MUSC 511 (3) Topics in Musical Aesthetics**
*This course is not eligible for Credit/D/Fail grading.*

**MUSC 512 (3/6) c Directed Individual Studies**
Approval by the Director, School of Music, is required. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 520 (3/6) d Introduction to Music Research**
Principal resources of the research library. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 521 (3/6) d Seminar in Performance Practices**
Studies in the theoretical and practical problems of musical interpretation. *This course is not eligible for Credit/D/Fail grading.*

**MUSC 522 (3/6) d Seminar in Notation of Polyphonic Music**
*This course is not eligible for Credit/D/Fail grading.*
MUSC 523 (3/6) d Seminar in Medieval Music
This course is not eligible for Credit/D/Fail grading.

MUSC 524 (3/6) d Seminar in Renaissance Music
This course is not eligible for Credit/D/Fail grading.

MUSC 525 (3/6) d Seminar in Baroque Music
This course is not eligible for Credit/D/Fail grading.

MUSC 526 (3/6) d Seminar in Classical Period Music
This course is not eligible for Credit/D/Fail grading.

MUSC 527 (3/6) d Seminar in Nineteenth-Century Music
This course is not eligible for Credit/D/Fail grading.

MUSC 528 (3/6) d Seminar in Music Since 1900
This course is not eligible for Credit/D/Fail grading.

MUSC 529 (3) Introduction to Ethnomusicology
Preliminary studies in the discipline of ethnomusicology, with an emphasis on history and orientations. This course is not eligible for Credit/D/Fail grading.

MUSC 530 (3) Topics in Ethnomusicology
Topics involving methodology and fieldwork in non-Western traditions. Topics will vary and students should consult the School as to areas of focus in any given term. This course is not eligible for Credit/D/Fail grading.

MUSC 531 (3-12) d Seminar in Ethnomusicology
Research studies in selected areas or regions of world music cultures. May be repeated to a maximum of 12 credits if different topics are covered. This course is not eligible for Credit/D/Fail grading.
Prerequisite: MUSC 529.

MUSC 532 (3-12) d Advanced Studies in Music History and Musicology
Research seminar on a core or emerging topic in music history or musicology. May be repeated to a maximum of 12 credits if different topics are covered. This course is not eligible for Credit/D/Fail grading.

MUSC 533 (3-12) d Advanced Studies in Music Theory
Research seminar on a core or emerging topic in music theory. May be repeated to a maximum of 12 credits if different topics are covered. This course is not eligible for Credit/D/Fail grading.

MUSC 535 (4) Art Song: Interpretation, Collaboration, and Performance
This course is not eligible for Credit/D/Fail grading.

MUSC 537 (3/6) d Seminar in the Literature of Opera
Special topics related to the bibliography, history, repertoire and pedagogy of operatic music. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of MUSC 221, MUSC 301, MUSC 454, MUSC 455, MUSC 520.
Corequisite: MUSC 520.

MUSC 538 (3/6) d Staging and Directing Opera
This course is not eligible for Credit/D/Fail grading. Prerequisite: Permission of instructor is required.

MUSC 539 (6-12) d Opera Production
Stylistic and technical studies and participation in the production of opera performances. May be repeated for credit, in accordance with program requirements. This course is not eligible for Credit/D/Fail grading.
Prerequisite: MUSC 439.

MUSC 544 (4-8) d Seminar in Conducting and Repertoire I
Advanced study of conducting techniques and of representative major compositions and literature (earlier historical periods). Emphasis on knowledge and conducting skills that can communicate a thorough understanding of genre, idiom, form, texture, and style, in rehearsal and performance. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Restricted to M.Mus. Conducting (Choral, Orchestral, Wind) or permission of the instructor.

MUSC 545 (4-8) d Seminar in Conducting and Repertoire II
Advanced study of conducting techniques and of representative major compositions and literature (later historical periods). Emphasis on knowledge and conducting skills that can communicate a thorough understanding of genre, idiom, form, texture,
and style, in rehearsal and performance.

Prerequisite: Restricted to M.Mus. Conducting (Choral, Orchestral, Wind) or permission of the instructor.

MUSC 547 (3/6) d Seminar in the Literature of Song
Special topics related to the bibliography, history, repertoire and pedagogy of song. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of MUSC 221, MUSC 301, MUSC 365, MUSC 465, MUSC 520.
Corequisite: MUSC 520.

MUSC 549 (6/12) c Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

MUSC 550 (4-12) d Large Instrumental Ensemble
Symphony Orchestra or Wind Ensemble. Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 551 (2) University Chamber Orchestra
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 553 (4-12) d University Singers
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 554 (3-9) d University Choral Union
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 555 (4) University Chamber Singers
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 556 (2-6) d Vocal Chamber Ensemble
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 557 (2-6) d Early Music Ensemble
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 559 (2-6) d University Chamber Strings
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 560 (2-6) d String Chamber Ensembles
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 561 (2-6) d Piano Chamber Ensembles
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 562 (2-6) d Wind and Percussion Chamber Ensembles
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 563 (2-6) d Contemporary Players
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 564 (2-6) d Jazz Ensemble
Open only to graduate students. This course is not eligible for Credit/D/Fail grading.

MUSC 565 (2-8) d World Music Ensembles
Training on traditional instruments and their techniques, with emphasis on ensemble performance. Different sections focus on the music of different cultures, e.g., Bali, China, Ghana, Korea. This course is not eligible for Credit/D/Fail grading.

MUSC 566 (1) Intensive Chamber Ensemble
Intensive coaching. This course is not eligible for Credit/D/Fail grading.

MUSC 569 (1-3) d Intensive Specialized Chamber Ensemble
Intensive coaching. This course is not eligible for Credit/D/Fail grading.

MUSC 571 (2) Music Performance (Secondary)
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

MUSC 572 (4) Music Performance (Secondary)
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

MUSC 573 (6) Music Performance (Secondary)
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 591 (2) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 592 (4) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 593 (6-12) d Music Performance (Major)**
Private instruction, vocal or instrumental. May be repeated for credit, in accordance with program requirements. This course is not eligible for Credit/D/Fail grading.

**MUSC 594 (8) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 595 (10) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 600 (3) Seminar in Analytical Techniques**
Not open to Master's students or to Ph.D. students in Music Theory. This course is not eligible for Credit/D/Fail grading. **Prerequisite:** One of MUSC 500, MUSC 410, MUSC 411, MUSC 412, MUSC 413.

**MUSC 606 (2) Readings in Orchestral Repertoire**
Continuation of MUSC 506. This course is not eligible for Credit/D/Fail grading.

**MUSC 607 (3/6) c Composition**
Further study for doctoral candidates in Composition. This course is not eligible for Credit/D/Fail grading.

**MUSC 609 (3/6) c Advanced Orchestration and Arranging**
This course is not eligible for Credit/D/Fail grading. **Prerequisite:** MUSC 509.

**MUSC 649 (0) Ph.D. Dissertation or D.M.A. Thesis**

**MUSC 671 (2) Music Performance (Secondary)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 672 (4) Music Performance (Secondary)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 673 (6) Music Performance (Secondary)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 691 (2) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 692 (4) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 693 (6) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 694 (8) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

**MUSC 695 (10) Music Performance (Major)**
Private instruction, vocal or instrumental. This course is not eligible for Credit/D/Fail grading.

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**Mechanical Engineering, Faculty of Applied Science**

**NAME: Naval Architecture and Marine Engineering**

**NAME 501 (2) Advanced Ship Structures**
Pressure hull design; finite element analysis applications; classification rules; ice and ice loads; dynamic loads including slamming, risk and reliability. This course is not eligible for Credit/D/Fail grading.

**NAME 502 (4) Advanced Ship Hydrodynamics**
Advanced ship resistance; boundary layers; propeller design; numerical methods in hydrodynamics; advanced marine vehicles; ocean waves; cavitation; ship vibration. Includes a laboratory component involving a wave/towing tank and computational fluid dynamics project. This course is not eligible for Credit/D/Fail grading.

NAME 522 (3) Ship Production and Industrial Engineering
Build strategy; shipyard layout and equipment; manufacturing techniques; outfitting and painting techniques; material properties; corrosion; welding; fatigue; composite materials. This course is not eligible for Credit/D/Fail grading.

NAME 524 (3) Shipbuilding Project Management
Terminology; planning; scheduling; budgeting and cost accounting; risk management; quality control; shipbuilding applications. This course is not eligible for Credit/D/Fail grading.

NAME 566 (3) Ship Dynamics and Control
Equations of motion; ocean wave spectrums, response amplitude operators; seakeeping; maneuvering; stability; dynamic positioning. This course is not eligible for Credit/D/Fail grading.

NAME 578 (3) Marine Engineering
Marine propulsion systems; ship engines; shafting; ship vibrations; on-board systems (piping, HVAC, electrical); advanced propulsion systems. This course is not eligible for Credit/D/Fail grading.

NAME 581 (3) Ship Design
This course is not eligible for Credit/D/Fail grading. Corequisite: All of NAME 578, MECH 488, CIVL 437 and one of NAME 524, APPP 501.

NAME 591 (2) Computer-Aided Ship Design Project
A capstone design project designed to give students experience in the preliminary design of a special purpose ship. Students work individually and in teams, using advanced design software and databases, to design a vessel according to specified criteria. This course is not eligible for Credit/D/Fail grading. Prerequisite: All of NAME 581, NAME 578. Corequisite: All of NAME 502, NAME 522, NAME 501, NAME 566.

NAME 592 (2) Shipbuilding Internship
Twelve weeks full-time with a sponsoring company or agency. Focus on either Design or Production. This course is not eligible for Credit/D/Fail grading. Prerequisite: All of NAME 501, NAME 502, NAME 522, NAME 524, NAME 566, NAME 578, NAME 591.

Classical, Near Eastern and Religious Studies, Faculty of Arts

NEST: Near Eastern Studies

NEST 101 (3) Introduction to Near Eastern and Egyptian Archaeology
An overview of the past two centuries of archaeological investigations of the civilizations of the ancient Near East and Egypt.

NEST 301 (3) Early Empires of the Ancient Middle East
A history from 3100-333 BC with emphasis on Mesopotamia.

NEST 303 (3) History of Ancient Egypt
History and culture of Ancient Egyptian civilization from political, intellectual, social and environmental perspectives.

NEST 304 (3) Ancient Egypt: The Archaeology of the Land of the Pharaohs
The material remains of the ancient Egyptians from monumental tombs and temples to the artifacts of daily life; the development of Egyptian civilization from the rise of the first rulers to its incorporation into the Roman Empire. Equivalency: ARTH 325.

NEST 310 (3) History of Women in Early to Late Medieval Muslim Societies
Realities of Muslim Women's lives are reconstructed through a critical examination of a variety of literary and material sources.

NEST 311 (3) Prehistoric Egypt
A survey of the development and evolution of prehistoric humans and their material culture in Egypt from the Lower Paleolithic to the Chalcolithic.

NEST 312 (3) Religion in Ancient Egypt
A survey of the religious beliefs, cults, and religious institutions in Pharaonic Egypt.
NEST 313 (3) Introduction to Middle Egyptian  
Language of Ancient Egypt and the main literary texts composed during the Middle Kingdom.

NEST 315 (3) Introduction to Akkadian  
The basic grammar and introduction to the cuneiform writing system of the Akkadian language of the Ancient Near East.

NEST 317 (3) Introduction to Coptic  
An introduction to Coptic, the language of Christian Egypt from 100 AD.

NEST 318 (3) Egyptomania  
The adaptation and appropriation of ancient Egypt in ancient and modern art, architecture, film, and music; the development of Egyptology since the 19th century.

NEST 319 (3) The Archaeology of Ancient Iraq and Syria: Babylon and Beyond  
An overview of the archaeology of the ancient Near East, with special emphasis on the civilizations of Mesopotamia, from the appearance of the first cities (c. 3400 BCE) to the end of the Persian period (c. 330 BCE).  
Prerequisite: NEST 101 is highly recommended.  
Equivalency: ARTH 319.

NEST 400 (3) Materials and Technologies of the Ancient Near East and Egypt  
The natural resources and production technologies of the ancient Near East and Egypt. Credit will be granted for only one of NEST 400 or 504.

NEST 401 (3) Literature of Ancient Egypt or the Ancient Near East  
The main genres and texts of Egyptian and Ancient Near Eastern Literature and their modern Interpretation. Credit will be granted for only one of NEST 401 or 505.

NEST 402 (3) The Archaeology of the City in the Ancient Near East  
The material manifestations of urbanism in the ancient Near East, from the 4th millennium BC up to the 1st millennium BC. Credit will be granted for only one of NEST 402 or 506.

NEST 500 (3/6) d Studies in Near Eastern Archaeology in the Bronze Age  
This course is not eligible for Credit/D/Fail grading.

NEST 501 (3/6) d Studies in Near Eastern Archaeology in the Iron Age  
This course is not eligible for Credit/D/Fail grading.

NEST 502 (3/6) d Warfare and Diplomacy in Ancient Egypt  
This course is not eligible for Credit/D/Fail grading.

NEST 503 (3/6) d Studies in the Material Culture of Ancient Egypt  
This course is not eligible for Credit/D/Fail grading.

NEST 505 (3) Literature of Ancient Egypt and the Ancient Near East  
The main genres and texts of Egyptian and Ancient Near Eastern Literature and their modern interpretation. Credit will be granted for only one of NEST 401 or 505.  
This course is not eligible for Credit/D/Fail grading.  
Equivalency: NEST 401.

NEST 506 (3) The Archaeology of the City in the Ancient Near East  
This course is not eligible for Credit/D/Fail grading.

Surgery, Faculty of Medicine

NEUR: Neurosurgery

NEUR 512 (2) Advanced Neurosurgery I  
Selected topics in neurosurgery and the related basic sciences. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

NEUR 513 (2) Advanced Neurosurgery II  
The second year of the above program. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

NEUR 730 (0) Correlative Clinical Neurosurgery Rounds  
Residents meet with radiology, neuropathology, and active staff members for discussion of problem cases. One and one-half
hours weekly.

**NEUR 731 (0) Neurosurgery Professors Conference**
One one-hour session weekly with a member of the active staff, conducted at the bedside or in conference room. Cases reviewed with emphasis on the proper application of diagnostic methods and the indications for operative management.

**NEUR 732 (0) Neuroradiology**
Sessions conducted by members of the Department of Radiology in which case histories are reviewed and related to radiological investigation and interpretation. One hour weekly.

**NEUR 733 (0) Anatomy and Neuropathology in the Brain**
Sessions conducted by a neuropathologist, Department of Pathology. Attended weekly by neurosurgical resident staff. Two hours weekly.

**NEUR 734 (0) Operative Neurosurgery**
Technique of neurosurgical procedures. Anatomy, surgical judgement, pre- and post-operative care. From a general selection of neurosurgical procedures, approximately 950 major neurosurgical procedures per year are carried out under supervision.

**Faculty of Medicine**

**NRSC: Neuroscience**

**NRSC 500 (6) Neuroscience I**
Comprehensive multidisciplinary course with lectures, seminars, and laboratory demonstrations encompassing molecular, cellular, systemic, and behavioural approaches to the study of nervous systems. Emphasis is on the physiology, pharmacology, and biochemistry of excitable cells and their synaptic interactions. Permission of Neuroscience Chair is required. Normally to be taken in conjunction with NRSC 501. This course is not eligible for Credit/D/Fail grading.

**NRSC 501 (6) Neuroscience II**
Continuation of NRSC 500 with emphasis on the integrative functions of the brain, behaviour, and selected neural disorders. Permission of Neuroscience Chair is required. Normally to be taken in conjunction with NRSC 500. This course is not eligible for Credit/D/Fail grading.

**NRSC 549 (12) Master's Thesis**
This course is not eligible for Credit/D/Fail grading.

**NRSC 649 (0) Doctoral Dissertation**

**School of Nursing, Faculty of Applied Science**

**NURS: Nursing**

In the clinical nursing courses the ratio between class and supervised nursing experience varies but in the overall program it is approximately 1:3; the credit values for these courses are based on both instruction and supervised nursing experience.

**NURS 300 (3) Theoretical and Professional Foundations for Nursing Practice**
Introduction to knowledge fundamental to the discipline and practice of nursing. Students who take NURS300 may not also earn credit for NURS302. This course is not eligible for Credit/D/Fail grading.

**NURS 301 (3) Theoretical Perspectives in Nursing: Primary Health Care**
Analysis and application of theories, concepts, evidence and competencies guiding professional nursing practice in the context of primary health care. Students who take NURS 342 cannot earn credit for NURS 336 or NURS 402. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of NURS 300, NURS 310, NURS 321, NURS 330, NURS 360.

**NURS 302 (6) Foundations for Professional Nursing Practice**
Introduction to fundamental theories, concepts, evidence, and competencies pertaining to the discipline and practice of nursing. Corequisite: All of NURS 303, NURS 304, NURS 305, NURS 306.
NURS 303 (3) Theoretical Perspectives in Nursing: People Living with Mental Health Challenges and Their Families
Theory informing a life course perspective on nursing practice with people living with mental health challenges and their families is introduced. Students who take NURS 303 cannot earn credit for NURS 335 or NURS 424. This course is not eligible for Credit/D/Fail grading.

NURS 304 (2) Introduction to Relational Practice
Introduction to relational theories to guide nursing practice within the socio-political, historical, economic and cultural context of health and health care. Corequisite: All of NURS 302, NURS 303, NURS 305, NURS 306.

NURS 305 (1) Introduction to Critical Inquiry and Research
Introduction to fundamental theories, concepts, evidence, and competencies pertaining to scientific inquiry, evidence-based and informed practice, and research utilization in health care. Corequisite: All of NURS 302, NURS 303, NURS 304, NURS 306.

NURS 306 (1) Introduction to Leadership, Ethics, and Policy in Health Care
Introduction to fundamental theories, concepts, evidence and competencies pertaining to health care leadership, ethics and policy. Corequisite: All of NURS 302, NURS 303, NURS 304, NURS 305.

NURS 310 (2) Basic Principles of Pharmacology for Nursing Practice
Basic principles of pharmacology and the basic structure and function of each body system will be explored to demonstrate how drug interactions occur within systems. This course is not eligible for Credit/D/Fail grading.

NURS 321 (2) Foundational Skills and Competencies for Clinical Practice I
Skills and competencies for clinical practice using a variety of modalities and learning activities. This course is not eligible for Credit/D/Fail grading. Corequisite: All of NURS 300, NURS 310, NURS 330, NURS 360.

NURS 322 (1) Foundational Skills and Competencies for Clinical Practice II
Clinical practice through a variety of modalities and learning activities in the laboratory environment. This course is not eligible for Credit/D/Fail grading.

NURS 323 (1) Foundational Skills and Competencies for Clinical Practice III
Skills and competencies for clinical practice across the lifespan and health care continuum through a variety of modalities and learning activities. This course is not eligible for Credit/D/Fail grading. Prerequisite: All of NURS 300, NURS 310, NURS 321, NURS 330, NURS 360.

NURS 330 (3) Theoretical Perspectives in Nursing: Adults/Older Adults and their Families
Fundamental theories, concepts, evidence, and competencies pertaining to nursing practice with adults/older adults and their families. This course is not eligible for Credit/D/Fail grading. Corequisite: All of NURS 300, NURS 310, NURS 321, NURS 360.

NURS 331 (3) Theoretical Perspectives in Nursing: Adults/Older Adults Experiencing Acute Health Challenges and Their Families
Consolidation of fundamental theories, concepts, evidence, and competencies pertaining to acute care nursing practice with adults/older adults and their families. Students who take NURS 331 cannot earn credit for NURS 303, NURS 337 or NURS 420. This course is not eligible for Credit/D/Fail grading. Corequisite: All of NURS 300, NURS 310, NURS 321, NURS 360.

NURS 333 (6) Professional Nursing Practice with Childbearing Individuals and Families
Analysis and application of theories, concepts, evidence and competencies guiding professional nursing practice with childbearing individuals and families during the transition to parenthood in a variety of practice settings and contexts. Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306. Corequisite: Either (a) one of NURS 338, NURS 339, NURS 340 or (b) one of NURS 341, NURS 342, NURS 343. (depending on sequencing of NURS 333 with other professional practice courses.)

NURS 334 (6) Professional Nursing Practice with Infants, Children, Youth, and their Families
Analysis and application of theories concepts, evidence and competencies guiding professional nursing practice with infants, children, youth, and their families through childhood and adolescence in a variety of practice setting and contexts. Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306. Corequisite: Either (a) all of NURS 338, NURS 339, NURS 340 or (b) all of NURS 341, NURS 342, NURS 343. Depends on
sequencing of NURS 334 with other professional practice courses.

**NURS 335 (6) Professional Nursing Practice with Adults Living with Mental Illness and their Families**
Analysis and application of theories, concepts, evidence and competencies guiding professional nursing practice with mental illness and their families in a variety of practice settings and contexts. [3-0-9]

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** Either (a) all of NURS 338, NURS 339, NURS 340 or (b) all of NURS 341, NURS 342, NURS 343. Depends on sequencing of NURS 335 with other professional practice courses.

**NURS 336 (6) Professional Nursing Practice with Communities and Populations**
Analysis and application of theories and strategies for working in partnership with populations, health professionals, and community services providers. Students use primary health care principles and population health promotion approaches during community nursing practice. [3-0-9]

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** Either (a) all of NURS 338, NURS 339, NURS 340 or (b) all of NURS 341, NURS 342, NURS 343. Depends on sequencing of NURS 336 with other professional practice courses.

**NURS 337 (12) Professional Nursing Practice with Adults, Older Adults, and their Families**
Analysis and application of theories, concepts, evidence, and competencies guiding professional nursing practice with older adults and their families in a variety of practice settings and contexts. This course is not eligible for Credit/D/Fail grading. [3-0-9]

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** Either (a) all of NURS 338, NURS 339, NURS 340 or (b) all of NURS 341, NURS 342, NURS 343. Depends on sequencing of NURS 337 with other professional practice courses.

**NURS 338 (2) Relational Nursing Practice Across Diverse Health Experiences**
Exploration and analysis of opportunities and challenges of relational practice across multiple diverse health experiences and sites of health care.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** All of NURS 339, NURS 340.

**NURS 339 (2) Critical Inquiry and Research in Health Care Practice**
Exploration of the application of theories, concepts, evidence and competencies pertaining to scientific inquiry, and the role of evidence-informed practice in supporting health care across the range of healthcare disciplines.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** All of NURS 338, NURS 340.

**NURS 340 (2) Leadership, Ethics, and Policy in Health Care Practice**
Exploration and application of the interrelationship of leadership, ethics and policy in a variety of healthcare contexts.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306.

**Corequisite:** All of NURS 338, NURS 339.

**NURS 341 (2) Relational Nursing Practice as Praxis**
Critical analysis of the enactment of relational practice toward promotion of health and wellbeing at multiple levels.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 338.

**Corequisite:** All of NURS 342, NURS 343.

**NURS 342 (1) Critical Inquiry and Research in Nursing Practice**
Critical analysis of theories, concepts, evidence, and competencies pertaining to scientific inquiry, evidence-based and informed practice, and research utilization in nursing.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 339.

**Corequisite:** All of NURS 342, NURS 343.

**NURS 343 (2) Leadership, Ethics, and Policy in Nursing Practice**
Critical analysis of the enactment of nursing Leadership, ethics, and policy in practice.

**Prerequisite:** All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 340.

**Corequisite:** All of NURS 341, NURS 342.

**NURS 344 (2) Critical Inquiry and Leadership Synthesis**
Evidence is examined and synthesized to understand and identify theoretical insights to address a leadership challenge in professional practice. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** Seven of NURS 300, NURS 310, NURS 321, NURS 330, NURS 350, NURS 351, NURS 352, NURS 360.

**NURS 345 (3) Theoretical Perspectives in Nursing: Childbearing Individuals and their Families**
Analysis and application of theories, concepts, evidence and competencies guiding professional nursing practice with childbearing individuals and families during the transition to parenthood in a variety of practice settings and contexts. Students who take NURS 345 cannot earn credit for NURS 333 or NURS 422.

**NURS 346 (3) Theoretical Perspectives in Nursing: Infants, Children, Youth and their Families**
Analysis and application of theories, concepts, evidence and competencies guiding professional nursing practice with infants, children, youth and their families in a variety of practice settings and contexts. Students who take NURS 346 cannot earn credit for NURS 334 or NURS 422.

**NURS 350 (3) Critical Inquiry and Research in Health Care Practice**
The significance of critical inquiry and research in nursing and health care, and the fundamental concepts and processes pertaining to scientific inquiry, evidence-based practice, and research utilization in nursing. Students who take NURS 350 cannot earn credit for NURS 305, NURS 339 or NURS 342.

**NURS 351 (3) Leadership, Policy, and Informatics**
The enactment of nursing leadership and policy within different health sectors and jurisdictions and the relevance and application of informatics competencies to the delivery of nursing care. Students who take NURS 351 cannot earn credit for NURS 306, NURS 340 or NURS 342.

**NURS 352 (3) Relational and Ethical Nursing Practice**
Relational theoretical underpinnings of nursing practice and healthcare ethics are critically examined. Students who take NURS 352 cannot earn credit for NURS 304, NURS 338 or NURS 341.

**NURS 353 (2) Promoting the Health of Indigenous People**
Foundations to contribute to supporting and providing high quality, ethical, respectful and culturally safe health care in partnership with Indigenous people in Canada and around the globe.

**NURS 354 (3) Theoretical Perspectives in Nursing: Complexities in Seniors Care**
Research and clinical practice innovations in the care of Seniors and their families (e.g., philosophies of care; age-friendly initiatives) and provide strategies for improving their health through the purposeful integration of such practices in clinical settings.

**NURS 360 (4) Nursing Practice with Adults/Older Adults and their Families**
Clinical practice to integrate and consolidate professional nursing knowledge, skills and competencies in the care of adults/older adults with stable or expected health care challenges and their families. Students who take NURS 360 cannot earn credit for NURS 303, NURS 337 or NURS 422.

**NURS 361 (7) Nursing Practice with Adults/Older Adults Experiencing Acute Health Challenges and their Families**
Clinical practice to integrate and consolidate professional nursing knowledge, skills and competencies in the care of adults/older adults experiencing acute health challenges and their families. Students who take NURS 361 cannot earn credit for NURS 303, NURS 337 or NURS 422.

**NURS 362 (4) Nursing Practice in Primary Health Care Contexts**
Clinical practice to integrate and consolidate professional nursing knowledge, skills and competencies in the context of primary health care. Students who take NURS 362 cannot earn credit for NURS 336 or NURS 425.

**NURS 363 (4) Nursing Practice with People Living with Mental Health Challenges and Their Families**
Students will apply theory and concepts from a life course perspective in the provision of nursing care to persons living with mental health challenges and their families. Students who take NURS 363 cannot earn credit for NURS 335 or NURS 424.
Corequisite: NURS 303.

**NURS 365 (3) Nursing Practice with Childbearing Individuals and Families**
Clinical practice to integrate and consolidate professional nursing knowledge, skills and competencies in the care of childbearing individuals, infants, and their families. Students who take NURS 365 cannot earn credit for NURS 333 or NURS 422. *This course is not eligible for Credit/D/Fail grading.*
Corequisite: All of NURS 300, NURS 310, NURS 321, NURS 330, NURS 360.

**NURS 366 (3) Nursing Practice with Infants, Children, Youth and their Families: Practicum**
Clinical practice to integrate and consolidate professional nursing knowledge, skills and competencies in the care of infants, children, youth and their families. Students who take NURS 366 cannot earn credit for NURS 334 or NURS 423. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: All of NURS 300, NURS 310, NURS 321, NURS 330.
Corequisite: NURS 346.

**NURS 401 (1) Foundational Skills and Competencies for Clinical Practice IV**
Students are prepared with the skills and competencies for clinical practice in simulated acute and community settings through a variety of modalities and learning activities. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: All of NURS 300, NURS 321, NURS 330, NURS 360.

**NURS 402 (1) Foundational Skills and Competencies for Clinical Practice V**
Students are guided to consolidate skills and competencies for clinical practice through a variety of modalities and learning activities. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: All of NURS 300, NURS 321, NURS 322, NURS 323, NURS 330, NURS 360, NURS 361, NURS 362, NURS 363, NURS 365, NURS 366, NURS 401.
Corequisite: NURS 430.

**NURS 410 (3-6) Supplemental Guided Study**
Supplemental guided study to integrate and consolidate professional nursing knowledge, skills and competencies. For Bachelor of Science Nursing students only. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

**NURS 420 (6) Clinical Nursing Focus: Adults Experiencing Acute or Chronic Health Conditions**
Credit is given for one of NURS 420, 422, 423, 424, or 425.
Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 333, NURS 334, NURS 335, NURS 336, NURS 337, NURS 338, NURS 339, NURS 340, NURS 341, NURS 342, NURS 343.
Corequisite: NURS 344.

**NURS 422 (6) Clinical Nursing Focus: Childbearing Families**
Credit is given for one of NURS 420, 422, 423, 424, or 425.
Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 333, NURS 334, NURS 335, NURS 336, NURS 337, NURS 338, NURS 339, NURS 340, NURS 341, NURS 342, NURS 343.
Corequisite: NURS 344.

**NURS 423 (6) Clinical Nursing Focus: Children and their Families**
Credit is given for one of NURS 420, 422, 423, 424, or 425.
Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 333, NURS 334, NURS 335, NURS 336, NURS 337, NURS 338, NURS 339, NURS 340, NURS 341, NURS 342, NURS 343.
Corequisite: NURS 344.

**NURS 424 (6) Clinical Nursing Focus: Individuals and Families with Mental Health Concerns**
Credit is given for one of NURS 420, 422, 423, 424, or 425.
Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 333, NURS 334, NURS 335, NURS 336, NURS 337, NURS 338, NURS 339, NURS 340, NURS 341, NURS 342, NURS 343.
Corequisite: NURS 344.

**NURS 425 (6) Clinical Nursing Focus: Community and Population Health**
Credit is given for one of NURS 420, 422, 423, 424, or 425.
Prerequisite: All of NURS 302, NURS 303, NURS 304, NURS 305, NURS 306, NURS 333, NURS 334, NURS 335, NURS 336, NURS 337, NURS 338, NURS 339, NURS 340, NURS 341, NURS 342, NURS 343.
Corequisite: NURS 344.

**NURS 427 (9) Consolidated Practice Experience**
*This course is not eligible for Credit/D/Fail grading.* Prerequisite: All of NURS 425, NURS 430.
NURS 430 (2) Theoretical Perspectives in Nursing: Special Topics in Complex and Urgent Health Challenges across Settings/Populations
Consolidation of fundamental theories, concepts, evidence, and competencies pertaining to nursing practice across the life-span and care context. Students who take NURS 430 cannot earn credit for NURS 420, 422, 423, 424 or 425. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of NURS 300, NURS 301, NURS 303, NURS 310, NURS 321, NURS 322, NURS 323, NURS 330, NURS 331, NURS 344, NURS 345, NURS 346, NURS 350, NURS 351, NURS 352, NURS 353, NURS 354, NURS 360, NURS 361, NURS 362, NURS 363, NURS 365, NURS 366, NURS 401.
Corequisite: NURS 402.

NURS 502 (3) Ethics and Politics of Nursing
This course is not eligible for Credit/D/Fail grading.

NURS 504 (3) Research and Evidence-Based Practice
This course is not eligible for Credit/D/Fail grading.

NURS 506 (3) Health Promotion in Practice
This course is not eligible for Credit/D/Fail grading.

NURS 507 (3) Pharmacology and Therapeutics in Primary Care
This course is not eligible for Credit/D/Fail grading.

NURS 508 (3) Pathophysiological Processes for Nurse Practitioners
This course is not eligible for Credit/D/Fail grading.

NURS 509 (2) Clinical Procedures in Primary Care Settings
This course is not eligible for Credit/D/Fail grading.

NURS 510 (6) Advanced Health Assessment Across the Life Span
This course is not eligible for Credit/D/Fail grading.

NURS 511 (3) Theoretical Foundations of Nursing Practice
This course is not eligible for Credit/D/Fail grading.

NURS 512 (3) Leadership in Nursing
This course is not eligible for Credit/D/Fail grading.

NURS 520 (3) Administrative Leadership in Nursing
Study of organizational behaviour, management methods and administrative processes in health care. This course is not eligible for Credit/D/Fail grading.
Corequisite: NURS 511.

NURS 530 (3) Advanced Practice in Nursing
Study of advanced practice nursing models, their development and implementation with a changing health care system. This course is not eligible for Credit/D/Fail grading.
Corequisite: NURS 511.

NURS 531 (3) Theoretical Foundations of Clinical Education
Theories of learning and their implications for the design of clinical learning experiences. This course is not eligible for Credit/D/Fail grading.

NURS 540 (3) Educational Processes in Nursing
Study of the historical development, theoretical basis, practical knowledge, accountability of, and issues regarding curriculum process and teaching in nursing education or practice. This course is not eligible for Credit/D/Fail grading.
Corequisite: NURS 511.

NURS 541 (3) Clinical Nursing Education
Study of the theory and practice of clinical nursing education. This course is not eligible for Credit/D/Fail grading.
Prerequisite: NURS 540.
Corequisite: NURS 511.

NURS 542 (3) Social Epidemiology: Special Populations
Trends and social and institutional policies and practices that influence the health and illness profiles of particular population groups; trends in the social organization of service delivery for their impact on health. This course is not eligible for Credit/D/Fail grading.
NURS 548 (3) Qualitative Methods and Analysis
This course is not eligible for Credit/D/Fail grading. Corequisite: NURS 511.

NURS 549 (3) Quantitative Research Methods and Analytic Strategies in Nursing and Health Sciences
This course is not eligible for Credit/D/Fail grading. Corequisite: NURS 511.

NURS 552 (3) Methods in Nursing Science
This course is not eligible for Credit/D/Fail grading. Corequisite: NURS 511.

NURS 554 (3) Advanced Research Methods
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of NURS 580, NURS 548, NURS 549.

NURS 560 (3) The Politics of Health Policy
This course is not eligible for Credit/D/Fail grading. Corequisite: NURS 511.

NURS 570 (6) Primary Care I
This course is not eligible for Credit/D/Fail grading.

NURS 571 (6) Primary Care II
This course is not eligible for Credit/D/Fail grading.

NURS 572 (6) PRIMARY CARE III
This course is not eligible for Credit/D/Fail grading.

NURS 576 (3) Topics in Social and Environmental Planning to Foster Health of Populations
Characteristics of social and built environments for their impact on the health of populations. This course is not eligible for Credit/D/Fail grading.

NURS 577 (3-6) d Graduate Practicum in Nursing
This course is not eligible for Credit/D/Fail grading.

NURS 578 (6) d Family Nurse Practitioner Consolidated Practicum
This course is not eligible for Credit/D/Fail grading.

NURS 580 (3) The Philosophy of Evidence
Students not enrolled in the doctoral program require permission of instructor. This course is not eligible for Credit/D/Fail grading. Prerequisite: NURS 511.

NURS 581 (3) Leadership in Knowledge Application and Translation
This course is not eligible for Credit/D/Fail grading. Prerequisite: NURS 580.

NURS 585 (1-6) d Special Topics in Nursing
This course is not eligible for Credit/D/Fail grading.

NURS 586 (3) Specialized Domains of Nursing Practice
This course is not eligible for Credit/D/Fail grading.

NURS 590 (3/6) c Directed Studies in Nursing
This course is not eligible for Credit/D/Fail grading. Prerequisite: NURS 511.

NURS 591 (3) Ethical and Professional Issues in NP Practice
This course is not eligible for Credit/D/Fail grading.

NURS 595 (3) Scholarly Practice Advancement Research Project (SPAR)
This course is not eligible for Credit/D/Fail grading.

NURS 596 (3) Culminating Project
This course is not eligible for Credit/D/Fail grading.

NURS 599 (9) Master's Thesis
This course is not eligible for Credit/D/Fail grading. Corequisite: NURS 511.

NURS 601 (0) Doctoral Seminar

NURS 690 (3/6) c Directed Studies in Nursing
This course is not eligible for Credit/D/Fail grading.

NURS 699 (0) Doctoral Dissertation
Oral Biological Medical Sciences, Faculty of Dentistry

**OBMS: Oral Biological Medical Sciences**

**OBMS 430 (2) Understanding and Evaluating Dental Research**
[1-0-0]

**OBMS 431 (2) Endodontics**
Application of the basic principles of endodontics. [0-1.5-0; 1-1.5-0]

**OBMS 434 (4) Introduction to Oral and Maxillofacial Surgery**
[3-1.5; 0-1.5]

**OBMS 436 (1) Oral Radiology**
Radiographic techniques and radiological interpretation with emphasis on extraoral techniques. [0.5-1.5]

**OBMS 437 (2) Pain and Anxiety Control**
[1-0-2]

**OBMS 439 (3) Oral Medicine and Oral Diagnosis**
Oral diagnosis, including orofacial pain and temporomandibular disorders. [1-3-0; 1-3-0]

**OBMS 440 (1) Advanced Topics in Oral Biology**
[1-0-0]

**OBMS 441 (2) Advanced Endodontics**
[1-3-0; 0-1.5-0]

**OBMS 443 (1) Oral Medicine, Oral Diagnosis and Therapeutics**
Assessment and treatment of advanced periodontal diseases. [1-2-2]

**OBMS 444 (2) Advanced Oral and Maxillofacial Surgery**
[2-1.5]

**OBMS 446 (1) Advanced Oral Radiology and Oral Radiography**

**OBMS 448 (2-6) Directed Research in Oral Biology**
An elective laboratory project taken with the permission of the appropriate supervisor and the department head.

**OBMS 449 (4) Advanced Periodontics**
Assessment and treatment of advanced periodontal diseases. [1-3-0]

Obstetrics and Gynaecology, Faculty of Medicine

**OBST: Obstetrics and Gynaecology**

**OBST 501 (3) Reproductive Endocrinology I**
Neuroendocrine regulation of reproduction, regulation of the ovarian and testicular function. *This course is not eligible for Credit/D/Fail grading.*

**OBST 502 (3) Physiology of the Mother, Fetus and Newborn**
Functional development of the placenta and major organ systems in the fetal and newborn period in man and animals. *This course is not eligible for Credit/D/Fail grading.*

**OBST 503 (3) Fetal and Perinatal Metabolism**
*This course is not eligible for Credit/D/Fail grading.* Prerequisite: Knowledge of fetal growth and development, physiology, pathology of labour.

**OBST 504 (3) Reproductive Endocrinology II**
Lectures and seminars on cellular processes in hormone secretion, steroid biosynthesis, steroid transport and metabolism, mechanism of hormone action, prostaglandins in reproduction. *This course is not eligible for Credit/D/Fail grading.*

**OBST 505 (6) Experimental Techniques in Reproductive Biology**
Laboratory course on: cell and organ cultures, radioimmunoassay of steroid and protein hormones and prostaglandins, in vitro fertilization, neuroendocrine techniques, techniques to study fetuses, techniques for metabolic studies in newborn animals. *This course is not eligible for Credit/D/Fail grading.*

**OBST 506 (3) Seminars in Reproductive Biology**
*This course is not eligible for Credit/D/Fail grading.*

**OBST 507 (3) Perinatal Epidemiology**
Indicators of maternal/newborn well-being across population subgroups, changing trends in obstetrical intervention, perinatal morbidity, and the analysis of perinatal data. *This course is not eligible for Credit/D/Fail grading.*

Corequisite: One of OBST 502, OBST 504.
Equivalency: SPPH 537.

**OBST 549 (18) M.Sc. Thesis**
*This course is not eligible for Credit/D/Fail grading.*

**OBST 649 (0) Doctoral Dissertation**

**Oral Health Sciences, Faculty of Dentistry**

**OHS: Oral Health Sciences**

**OHS 430 (4) Operative Dentistry**
The art and science of diagnosing and treating single tooth defects. [0-4.5-0]

**OHS 431 (3) Orthodontics**
Differential diagnosis, treatment planning, biomechanical principles and clinical treatment. [1-2-0]

**OHS 432 (4) Pediatric Dentistry**
[0-4.5-0; 1-4.5-0]

**OHS 434 (2) Behavioural Sciences in Dentistry**
[1-0-0]

**OHS 435 (8) Prosthodontics I**
The art and science of restoring and replacing teeth and surrounding tissues. *This course is not eligible for Credit/D/Fail grading.*
[2-5-0; 1-9-0]

**OHS 440 (2) Advanced Operative Dentistry**
The art and science of diagnosing and treating single tooth defects. [0-3-0]
Prerequisite: OHS 430.

**OHS 441 (3) Advanced Orthodontics**
[1-2-0; 0-3-0]

**OHS 442 (1) Advanced Pediatric Dentistry**
[0-3-0]

**OHS 444 (4) Practice Management**
Ethics, jurisprudence, practice management, intra- and interprofessional relationships. [2-0-0]

**OHS 445 (8) Prosthodontics II**
The art and science of restoring and replacing teeth and surrounding tissues. *This course is not eligible for Credit/D/Fail grading.*
[1-9-0; 0-12-0]

**Faculty of Medicine**

**ONCO: Oncology**

**ONCO 501 (3) Interdisciplinary Research in Oncology**
*This course is not eligible for Credit/D/Fail grading.*
ONCO 502 (3) Concepts in Oncology
   This course is not eligible for Credit/D/Fail grading.

ONCO 510 (3) Seminars in Oncology
   This course is not eligible for Credit/D/Fail grading.

ONCO 548 (3-9) d Oncology Rotation
   This course is not eligible for Credit/D/Fail grading.

ONCO 549 (12) Master of Science Thesis
   This course is not eligible for Credit/D/Fail grading.

ONCO 649 (0) Doctoral Dissertation

Faculty of Medicine

ORNT: Orientation to Medical School

ORNT 400 (2) Orientation to Medical School and Profession
   A general introduction to the medical school including beliefs and values embedded within the curriculum. The overall curricular
design and expectations regarding evaluation are discussed. This course is not eligible for Credit/D/Fail grading.

Orthopaedics, Faculty of Medicine

ORPA: Orthopaedics

ORPA 508 (2) Advanced Orthopaedics I
   Selected topics in orthopaedic surgery and related basic sciences. Given in alternate years. This course is not eligible for
Credit/D/Fail grading.

ORPA 509 (2) Advanced Orthopaedics II
   The second year of the above program which will be given in alternate years. This course is not eligible for Credit/D/Fail grading.

ORPA 715 (0) Orthopaedic Clinic
   Evaluation of new patients and diagnosis and treatment of appropriate diseases. Basic signs and clinical features are both
stressed in the total management of the patient. Two hours per week in the Outpatient Department under supervision of an
orthopaedics faculty member.

ORPA 716 (0) Orthopaedic Bedside Clinic
   Evaluation of orthopaedic diseases and injuries in patients at bedside. A review of clinical features is correlated with relevant
physiology and pathology.

ORPA 717 (0) Orthopaedic Grand Rounds
   Formal presentations by the orthopaedic residents, fellows, faculty and guests. Subject matter includes the whole spectrum of
orthopaedics.

ORPA 718 (0) Rheumatology Conference
   Patients with a variety of rheumatological disorders are presented for discussion and evaluation in this combined conference,
which rheumatologists and orthopaedic surgeons who have a special interest in reconstructive surgery attend. During each
weekly two hour session, patients with difficult management problems are presented for clinical evaluation and discussion of
medical and orthopaedic treatment.

ORPA 719 (0) Orthopaedic Surgical Anatomy
   A course in clinical anatomy as applied to orthopaedics. A regional approach involving surgical dissections in cadavers. Each
session lasts two hours. Emphasis is on surgical anatomical approach.

ORPA 720 (0) Orthopaedic Basic Science Course
   Weekly lectures by orthopaedic faculty and guest faculty from other departments. Lecture topics include applied physiology,
anatomy, and pathology as they relate to orthopaedic diseases.

ORPA 721 (0) Orthopaedic Seminars
A series of seminars is given weekly, and during each 2-hour session a topic in clinical orthopaedics is reviewed. The subject matter includes the whole spectrum of orthopaedics. One or more faculty members are in attendance at each seminar.

**ORPA 722 (0) Paediatric Orthopaedics**
- Case presentation in paediatric orthopaedics, stressing history, physical findings and total management of the patient, including a review of paediatric fractures with x-rays.

**ORPA 723 (0) Orthopaedic Surgery**
- The practical application of orthopaedics in the operating room with discussion of techniques of surgery, anatomy, pathology, pathophysiology and complications of diseases.

**ORPA 724 (0) Trauma Rounds**
- Orthopaedic traumatology is reviewed, with emphasis being placed on applied basic science, surgical anatomy, diagnosis and definitive management. These sessions are supervised by a faculty member and are held weekly, each session lasting one hour.

**ORPA 725 (0) Bone Tumour Registry**
- A review of musculoskeletal oncology and related problems with presentation of clinical and laboratory information, radiographs and pathological materials. One and one-half hours monthly.

**ORPA 904 (0) Seminar in Orthopaedics**
- A series of 60 seminars in orthopaedics and traumatic surgery given over a two-year period: thirty sessions in each of the two years. One evening per week throughout the Winter Session. For post-graduate students proceeding to Certification and Fellowship of the Royal College of Physicians and Surgeons of Canada.

### Occupational Science and Occupational Therapy, Faculty of Medicine

**OSOT: Occupational Science and Occupational Therapy**

**OSOT 511 (3) Fundamentals of Theory and Practice**
- Credit will be granted for only one of OSOT 511 or RSOT 511. *This course is not eligible for Credit/D/Fail grading.* [1-2-2]

**OSOT 513 (3) Health, Illness & Occupation I**
- Credit will be granted for only one of OSOT 513 or RSOT 513. *This course is not eligible for Credit/D/Fail grading.* [1-0-1.5]

**OSOT 515 (3) Practice Skills and Therapeutic Procedures I**
- Credit will be granted for only one of OSOT 515 or RSOT 515. *This course is not eligible for Credit/D/Fail grading.* [0-3-3]

**OSOT 519 (4) Professional Practice I**
- Credit will be granted for only one of OSOT 519 or RSOT 519. *This course is not eligible for Credit/D/Fail grading.*

**OSOT 525 (5) Theory, Practice Skills and Therapeutic Procedures II**
- Credit will be granted for only one of OSOT 525 or RSOT 525. *This course is not eligible for Credit/D/Fail grading.* [2-3-3]

**OSOT 527 (3) Evidence for Practice I: Research Paradigms and Methods**
- Credit will be granted for only one of OSOT 527 or RSOT 527. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]

**OSOT 528 (3) Fieldwork Education I**
- Credit will be granted for only one of OSOT 528 or RSOT 528. *This course is not eligible for Credit/D/Fail grading.*

**OSOT 538 (7) Fieldwork Education II**
- Credit will be granted for only one of OSOT 538 or RSOT 538. *This course is not eligible for Credit/D/Fail grading.*

**OSOT 545 (5) Theory, Practice Skills, and Therapeutic Procedures: Advanced Applications**
- Credit will be granted for only one of OSOT 545 or RSOT 545. *This course is not eligible for Credit/D/Fail grading.* [0-2-2]

**OSOT 547 (6) Evidence for Practice: Project**
- Credit will be granted for only one of OSOT 547 or RSOT 547. *This course is not eligible for Credit/D/Fail grading.* [2-0-8]

**OSOT 549 (5) Professional Practice II**
- Credit will be granted for only one of OSOT 549 or RSOT 549. *This course is not eligible for Credit/D/Fail grading.*

**OSOT 551 (3) Societal and Environmental Influences**
- Credit will be granted for only one of OSOT 551 or RSOT 551. *This course is not eligible for Credit/D/Fail grading.* [2-0-2]
OSOT 553 (2) Developing Effective Programs
Credit will be granted for only one of OSOT 553 or RSOT 553. This course is not eligible for Credit/D/Fail grading.

OSOT 558 (9) Fieldwork Education III
Credit will be granted for only one of OSOT 558 or RSOT 558. This course is not eligible for Credit/D/Fail grading.

Pathology and Laboratory Medicine, Faculty of Medicine

PATH: Pathology

PATH 300 (6) Background to Medical Laboratory Science
Introductory lectures and laboratory sessions in clinical chemistry, haematology and blood banking, hospital microbiology, preparation and examination of tissue sections. For Medical Laboratory Science students without previous experience in hospital laboratories. [3-4; 0-0]
Prerequisite: All of BIOL 112, BIOL 200, BIOL 201, CHEM 123, CHEM 205, CHEM 233, CHEM 235, MICB 202.

PATH 301 (4) Basic and Physical Biochemistry for Medical Laboratory Scientists
An integrated approach to specific areas of the theoretical and practical aspects of those physical and biological sciences relevant to medical laboratory science. Emphasis will be placed upon the application of basic science to those clinical disciplines practised by the medical laboratory scientist, e.g., histochemistry, clinical chemistry, microbiology, haematology, etc.

PATH 303 (4) Cytogenetics, Molecular Genetics, Tissue Culture & Cytology
Fundamentals of human genetics and molecular biology as they relate to studying and detecting disease in a population; tissue culture techniques to assess cell viabilities; cytomorphology principles in disease detection.

PATH 304 (4) Normal Human Histology
An advanced lecture and laboratory course in the microscopic structure of the human body necessary for a complete understanding of histochemistry and histopathology.

PATH 305 (4) Modern Microscopy
A lecture and laboratory course in the theoretical and practical application of modern biological microscopes - compound, dissecting, comparison, dark ground, fluorescent, phase contrast, interference and electron microscopes.

PATH 306 (2) Laboratory Safety for Medical Laboratory Scientists
Control processes for workplace hazards of radiological, chemical, and biological origin.

PATH 327 (4) Bacteriology, Mycology, Virology and Parasitology
Descriptions of each group of human microbial pathogens according to biological attributes, clinical features, pathogenesis and pathology, epidemiology, immunological reactions, laboratory diagnosis, principles of antimicrobial therapy, preventative measures. For students in the Faculty of Medicine B.M.L.Sc.

PATH 375 (3) Introduction to Human Pathology
A lecture-demonstration course designed to acquaint students in the allied health professions with a basic understanding of the causes, natural history, and pathophysiology of common disease processes.
Prerequisite: 6 credits each first year BIOL and CHEM

PATH 402 (4) Medical Laboratory Science: Haematology
A theoretical and practical examination of those modern concepts of haematology which relate to the practice of medical laboratory science.

PATH 404 (6) Diagnostic Histochemistry
A lecture and laboratory course that encompasses the theory and the practice of currently available histochemical techniques. This course is to supplement the histopathological technique course taken as a requirement for CSLT (RT).
Prerequisite: Certification.

PATH 405 (3) Seminars in Current Topics
Oral and written presentation and critical appraisal of scientific papers.

PATH 406 (6) Clinical Chemistry
This course will review and discuss the methodology of clinical chemistry in order to put these analytical methods into the broad perspective of the pathophysiology of human disease and biochemistry.

PATH 407 (3) Medical Laboratory Toxicology: Analytical, Clinical
A theoretical and practical examination of analytical and pathophysiological aspects of clinical and forensic toxicology.

**PATH 408 (3) Laboratory Administration**
Personnel management, staff management relationships, stock control, record keeping, etc. Medicolegal aspects of medical laboratory science. Theory and practice of quality control. Use of computers in the medical laboratory.

**PATH 415 (2) Immunopathology**
Immunological events causing tissue injury.

**PATH 417 (3/6) c Human Bacterial Infections**
Students acquire content relating to the virulence factors of the bacteria and the pathophysiology of the host while working through case scenarios on their own and in online groups. Students taking this course must be willing to engage in both self-directed and small-group learning.
*Prerequisite*: MICB 202. Or equivalent.

**PATH 427 (3) Basic Principles of Infection Prevention and Control**
This course provides the basic principles to prevent the spread of microorganisms pathogenic to humans. It may be taken towards a Certificate in Infection Control.

**PATH 437 (3) Viral Infections in Humans**
Interactions between viruses and humans; pathogenesis; prompt virological diagnosis; rationale for antiviral chemotherapy and prophylaxis. [3-0-0]
*Equivalency*: MICB 407.

**PATH 438 (2-6) c Medical Laboratory Science: Directed Studies**
Investigation of a specific topic in Medical Laboratory Science. Permission of the department head is required.

**PATH 447 (3) Directed Studies**
An elective in clinical infection control, medical microbiology or molecular biology.
*Prerequisite*: All of PATH 427, PATH 467.

**PATH 448 (2) Introduction to Laboratory Medicine**
An elective course open to first-year medical students who spend at least three consecutive hours each week in one of the affiliated hospitals of the Department of Pathology, Vancouver Hospital, under the joint supervision of a Senior Resident in Pathology and the Professional Staff of the following Divisions: anatomical pathology, clinical biochemistry, haematology, paediatric pathology. Enrolment is limited.

**PATH 450 (0) Systemic Pathology**
A series of Pathology discussions in conjunction with various clinical departments designed to illustrate the role of Pathology in the diagnosis and management of various diseases.

**PATH 451 (3) Clerkship in Laboratory Medicine and Infection Prevention and Control**
May involve attendance at an approved institution and/or a project assigned by the instructor(s). Instructor permission required. Enrolment may be limited.

**PATH 452 (3) Clerkship in Anatomic Pathology**
An elective course open to third-year medical students, designed to familiarize the student with Anatomic Pathology, including Surgical Pathology, Paediatric Pathology, Autopsy Pathology and Cytology. This elective may involve attendance at one or more affiliated hospitals. Registration requires consent of the Department and enrolment may be limited.

**PATH 453 (0) Clinical Laboratory Haematology**
Correlative seminars based on haematology case studies relating clinical features to laboratory investigations.
*Equivalency*: MEDI 452.

**PATH 457 (3) Clinical Laboratory Microbiology**
Selected clinical laboratory exercises plus seminars to illustrate the diagnosis and management of patients with microbial infections. Elective course limited to third- and fourth-year medical students.
*Prerequisite*: Departmental approval required.

**PATH 467 (3) Basic Microbiology for Infection Control**
The identification, clinical significance, and transmission of pathogenic organisms are presented. This course is available by correspondence or webCT. It may be taken towards fulfillment of the Certificate in Infection Control.

**PATH 477 (3) Basic Epidemiology for Infection Control**
Epidemiology, study, design and analysis, and outbreak investigation as it applies to institutional infection control.
Equivalency: HCEP 401.

PATH 501 (2) Foundations of Human Histopathology

This course is not eligible for Credit/D/Fail grading.

PATH 502 (2) Current Topics in Pathology Research
General principles of etiology, pathogenesis, disordered physiology, and anatomic pathology of common disease processes. This course is not eligible for Credit/D/Fail grading.

PATH 518 (2-4) Pulmonary Pathophysiology
A review of current topics in pulmonary pathophysiology at an advanced level suitable for graduate students majoring in pathology, medicine, surgery or anaesthesiology. Topics will include lung anatomy, ventilation, blood flow, gas and fluid exchange.

This course is not eligible for Credit/D/Fail grading.

Prerequisite: One of PHYL 301, PHYL 303, PHYL 400.

PATH 521 (3) Introduction to the Pathogenesis of Human Disease
Current medical research; cardiovascular and pulmonary disease. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Permission of instructor.

PATH 523 (3) Principles of Antimicrobial Chemotherapy
Classification, structure and mode of action of antimicrobial agents. In-depth comparison of factors affecting the activity of antimicrobials in vivo and in vitro. This course is not eligible for Credit/D/Fail grading.

Prerequisite: All of MICB 200, PATH 427.

PATH 527 (2-4) Bacteriology, Mycology, Virology and Parasitology
All groups of microorganisms pathogenic for humans. Clinical features, pathogenesis and pathology, epidemiology, properties of the agents, immunology, laboratory diagnosis, therapy, preventative measures. This course is not eligible for Credit/D/Fail grading.

PATH 530 (3) Nutrition and Metabolic Aspects of Human Disease
Molecular effects of changes in nutrient status and metabolism on health. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Restricted to students registered in the Pathology Graduate Program or instructor approval required.

PATH 531 (3) Molecular and Cell Biology of Cancer
This course focuses on molecular and cell biology of cancer and consists of a series of lectures/reviews combined with discussions and presentations by students on the topics selected by the instructors. Emphasis will be on students' presentations and discussion.

This course is not eligible for Credit/D/Fail grading. [3-0]

Prerequisite: MEDG 421 is recommended. Course coordinator approval is required.

Equivalency: MEDG 521.

PATH 535 (2) Seminar
Attendance required of all M.Sc. candidates in the Department. This course is not eligible for Credit/D/Fail grading.

PATH 547 (3) Techniques in Molecular Biology and Experimental Pathology
Nucleic acid purification and characterization; restriction enzyme digests; northern and southern blotting; cloning; DNA sequencing; polymerase chain reaction technology; electron microscopy; fluorescein-activated cell sorting.

This course is not eligible for Credit/D/Fail grading. [0-6]

PATH 548 (1-12) Directed Studies
This course is not eligible for Credit/D/Fail grading.

PATH 549 (18) M.Sc. Thesis
Honours/Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PATH 570 (3) Cardiovascular Pathophysiology
Pathogenesis, abnormal physiology, and therapeutic approaches in heart disease including cardiac arrhythmia, heart failure, myocardial infarction, hypertension, atherosclerosis. This course is not eligible for Credit/D/Fail grading.

PATH 582 (3) Toxicology III: Environmental Toxicology
Toxicology and risk assessment of air, water and soil pollutants; food additives; animal and plant toxins; pesticides; heavy metals; solvents. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Equivalency: PHAR 582.

PATH 583 (3/4) Toxicology IV: Molecular Mechanisms of Toxicology
Activation versus detoxification by cytochromes P-450; the role of the Ah receptor; reactive oxygen species; heavy metals;
apoptosis. This course is not eligible for Credit/D/Fail grading. [3-0-0]

Equivalency: PHAR 583.

PATH 635 (2) Seminar
Attendance required for all Ph.D. candidates in the department. This course is not eligible for Credit/D/Fail grading.

PATH 649 (0) Doctoral Dissertation

PATH 700 (0) Pathology Conference
Review and analysis of current cases. Diagnostic and pathogenic significance of findings are assessed. One hour weekly.

PATH 701 (0) Surgical Pathology
Five days per week, one hour review of current diagnostic biopsy problems. Diagnostic and therapeutic implications are discussed.

PATH 702 (0) Haematologic Pathology
Lectures and seminars on the pathology of haematological diseases. Two hours weekly.

PATH 703 (0) Histochemical Pathology
A series of lectures and seminars to show current applications of histochemical techniques to contemporary pathological diagnosis. One hour weekly per quarter.

PATH 704 (0) Haematologic Pathology
Analysis of pathology of bone marrow aspirates; taken in one half or whole year. One and one half hours weekly.

PATH 705 (0) Clinical Chemistry
A series of lectures, seminars, tutorials, and laboratory tuition to demonstrate the use of chemical analysis in clinical medicine. Two hours weekly.

PATH 706 (0) Neuropathology
Sectioning of necropsy material with clinicopathological correlation. One hour weekly.

PATH 707 (0) Neuropathology, Clinical Correlation
Pathology of central nervous system disease demonstrated to clinical staff, stressing correlation with clinical diseases. Two hours weekly.

PATH 708 (0) Dermatopathology
Clinicopathological correlation of dermal lesions. Discussion of pathogenesis, clinical course, and prognostic implications. One hour weekly.

PATH 709 (0) Renal Biopsy Rounds
Weekly correlation between clinical status and pathological findings in several patients.
Equivalency: MEDI 711.

PATH 710 (0) Hepatic and Gastrointestinal Pathology
Clinicopathological correlation of hepatic and gastrointestinal biopsy material with discussions of pathogenesis, etiology, and therapeutic implications. Alternate weeks, one hour.

PATH 711 (0) Cytology
Daily review of cytopathology. Analysis of cervical and sputum smears and pleural, gastric, and bronchial aspirates with discussion of significance to patients, taken in one quarter of year.

PATH 712 (0) Perinatal Mortality Conference
Discussion of perinatal mortality cases for the month, with review of clinical and laboratory findings, management, and pathology findings by paediatric, obstetrical, and pathology teaching staff. Methods of possible prevention of foetal or neonatal death are discussed and recommended as hypothetical reasons for preventability, where appropriate. Two hours monthly.

PATH 713 (0) Seminars in Biochemical Paediatrics
A series of discussions on clinical problems which are chosen to illustrate the biochemical basis for the practice of paediatrics.

PATH 714 (0) Paediatric Pathology
Demonstration and dissection of congenital heart lesions; correlation of cardiological and pathological data. One hour weekly.

PATH 720 (0) Microbiological Diagnosis
Conduct of bacterial, fungal, parasitological, and viral laboratory tests relevant to the microbiological examination of patients. For medical residents.
PATH 721 (0) Microbiological Research
Conduct of research on some aspect of clinical or basic microbiology. For medical residents.

PATH 722 (0) Microbial Infections
Review in depth of syndromes caused by common human pathogenic bacteria, fungi and viruses, including principles of current laboratory diagnostic procedures and the rational use of antibiotics and prophylactic agents. For medical residents.

PATH 725 (0) Histopathology of Infectious Diseases
Gross and microscopic changes associated with infections, and the pathophysiology involved in their development. The course includes seminars based on histological specimens. For residents in Medical Microbiology, General and Anatomical Pathology, and Infectious Diseases.

PATH 730 (0) Clinical Nuclear Medicine
See RADI 710.

PATH 731 (0) Progress in Nuclear Medicine
See RADI 711.

PATH 732 (0) Clinical Investigation/Research
See RADI 712.

PATH 733 (0) Quality Correlation in Nuclear Medicine
See RADI 713.

Pharmacology and Therapeutics, Faculty of Medicine

PCTH: Pharmacology and Therapeutics

PCTH 201 (3) Drugs and Society
Introductory principles of drug action. Historical and present day medical and non-medical use of drugs. [3-0]
Prerequisite: One of Biology 12, BIOL 111, BIOL 112, BIOL 153, BIOL 155, or SCIE 001. Second-year standing is required.

PCTH 300 (6) Introduction to Pharmacology
The concepts, language and techniques of scientific pharmacology. Intended primarily for Honours and Major students in Pharmacology. [3-3-0]
Prerequisite: Either (a) all of BIOL 200, BIOL 201, CHEM 233, CHEM 235 or (b) all of BIOL 200, BIOL 201, CHEM 203, CHEM 204; and CHEM 211 and one of CHEM 205, CHEM 201. Permission of the undergraduate adviser is required.

PCTH 302 (3) Introductory Pharmacology Laboratory
A series of experimental demonstrations and individual laboratory experiments illustrating the basic principles of pharmacology. [1-3*]
Corequisite: PCTH 300.

PCTH 305 (6) Basic Human Pharmacology
Lectures and assigned reading on the effects, mechanisms of action, absorption, distribution, fate and excretion of major classes of therapeutic agents. Indications for the use of particular drugs will be discussed in terms of risk versus benefit for the individual and for society. [3-0; 3-0-0]
Prerequisite: One of BIOL 201, BIOC 202, BIOC 203.
Corequisite: CAPS 301.

PCTH 325 (3) Rational Basis of Drug Therapy
The principles and applications underlying the action and disposition of therapeutic agents (including alternative medicines) in the body. Use of drugs as tools in experimental research. [3-0]
Prerequisite: One of BIOL 201, BIOC 202, BIOC 203, BIOC 300.

PCTH 398 (3) Co-operative Work Placement I
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Technical report required. Restricted to students admitted to the Co-operative Education Program in Pharmacology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PCTH 300.

PCTH 399 (3) Co-operative Work Placement II
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Technical report required. Restricted to students admitted to the Co-operative Education Program in Pharmacology. *This course is not eligible for Credit/D/Fail grading.* 
**Prerequisite:** PCTH 398.

**PCTH 400 (6) Systematic Pharmacology**
Lectures and discussions in scientific pharmacology. All aspects of the study of drugs will be covered, but the course will concentrate on the scientific aspects of the pharmacology of neurohumoral transmission, mathematics of pharmacology, cardiovascular and clinical pharmacology, and to a lesser extent on the pharmacology of various organs and tissues. [3-0-1*] 
**Prerequisite:** PCTH 300.

**PCTH 402 (6) Systematic Pharmacology Laboratory**
A series of demonstrated, group, and individual laboratory experiments designed to illustrate the concepts and hypotheses of pharmacology. The course is restricted to Honours students in Pharmacology, but may be taken by others with permission of the department head. [0-9; 0-9] 
**Prerequisite:** PCTH 300.

**PCTH 404 (3) Drug Assay and Pharmacometrics**
The techniques, including methods of statistical analysis, used to detect and measure the actions of endogenous or exogenous chemicals, using chemical assays and bioassays as appropriate. Enrolment limited to students in Pharmacology and others with permission of the department head. [1-0; 2-0] 
**Prerequisite:** All of PCTH 300, BIOL 300.

**PCTH 425 (8) Medical Pharmacology**
A lecture and laboratory course covering the fundamental pharmacological action of drugs. Both terms. *This course is not eligible for Credit/D/Fail grading.*

**PCTH 448 (2-6) Directed Studies in Pharmacology**
Advanced investigation of a specific topic in Pharmacology.

**PCTH 449 (3/6) Honours Thesis**
A research problem directed by a faculty member. Restricted to Honours Pharmacology students.

**PCTH 451 (3) Review of Clinical Pharmacology**
This course has been designed as a basic science elective for third-year medical students. 
**Prerequisite:** Departmental approval required.

**PCTH 453 (3) Advanced Therapeutics**
A lecture, assigned problems, and discussion course dealing with practical aspects of therapeutics. This course is designed to give fourth-year medical students some practical experience in the science of drug prescribing.

**PCTH 498 (3) Co-operative Work Placement III**
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Technical report required. Restricted to students admitted to the Co-operative Education Program in Pharmacology. *This course is not eligible for Credit/D/Fail grading.* 
**Prerequisite:** PCTH 399.

**PCTH 499 (3) Co-operative Work Placement IV**
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer after fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Pharmacology. *This course is not eligible for Credit/D/Fail grading.* 
**Prerequisite:** PCTH 498.

**PCTH 500 (3) Molecular Aspects of Drug Action at the Membrane Level**
Lectures, discussions and assigned reading on actions of drugs on ion channels, receptors and intracellular processes and the methodologies used including electrophysiology, fluorescence measurements, molecular neurobiology and microdialysis. Given in even-numbered and alternate years. *This course is not eligible for Credit/D/Fail grading.*

**PCTH 501 (3) Structure-Activity Relationships in Pharmacology**
Lectures, discussions and assigned reading on physicochemical approaches to drug design - the relationship between molecular structure and pharmacological activity in various representative classes of drugs. Given in odd-numbered and alternate years. *This course is not eligible for Credit/D/Fail grading.*

**PCTH 502 (4) Drugs and Intercellular Communication (including Neuropharmacology)**
Lectures, discussions and assigned reading on the actions of drugs on the production, release and cellular effects of hormones and neurotransmitters. Given in odd-numbered and alternate years. This course is not eligible for Credit/D/Fail grading.

PCTH 512 (3) Experimental Design and Analysis in Pharmacology
A series of lectures, tutorials and exercises designed to improve student skills in the design and statistical analyses of pharmacological experiments. This course is not eligible for Credit/D/Fail grading.

PCTH 513 (4) Pharmacology of Anaesthesia
Pharmacology of drugs used in anaesthesia. Conferences, assigned reading and laboratory exercises demonstrating the actions of drugs as currently applied in the practice of anaesthesia. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the department head is required.

PCTH 514 (1) Seminar in Pharmacology or Therapeutics
To give students experience in the presentation of data and to enhance communication skills in the discussion of scientific topics. All students will present at least one seminar during their graduate work and would be expected to attend all seminars. This course is not eligible for Credit/D/Fail grading.

PCTH 548 (2-6) Directed Studies in Pharmacology
In special cases, with the approval of the department head, advanced courses may be arranged. This course is not eligible for Credit/D/Fail grading.

PCTH 549 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

PCTH 649 (0) Doctoral Dissertation

Asian Studies, Faculty of Arts

PERS: Persian

Heritage speakers with no reading/writing skills: Little to no knowledge of, or training in, reading and writing Persian, but who have developed a level of oral and/or aural proficiency in Persian because they were raised in a home outside Iran where Persian was spoken; OR, students born in Iran and studied in Iran up to (but not beyond) grade 2 before coming to Canada. Heritage speakers with basic reading/writing skills: Some knowledge of, or training in, reading and writing Persian. For example, born in Iran and studied in Iran up to (but not beyond) grade 6/7 before coming to Canada. Heritage speakers with strong reading/writing skills: Lived and studied in Iran up and into High School, but have not studied at the post-secondary level in Iran. If you are unsure which course to register for, please contact Dr. Mozhgan Zolfi (Mozhgan.Zolfi@ubc.ca)

PERS 100 (3) Basic Persian I
Basic vocabulary and the fundamentals of modern Persian grammar, structure, and pronunciation, as well as reading, writing, listening, and speaking.

PERS 101 (3) Basic Persian II
Continuation of PERS 100.
Prerequisite: PERS 100.

PERS 104 (3) Persian Reading and Writing for Persian-Speaking Students
Reading and writing of standard Persian; lexical and syntactic differences between written and spoken Persian. Restricted to Persian heritage speakers with aural/oral knowledge but no reading/writing skills.

PERS 200 (3) Intermediate Persian I
Reading of simple texts with emphasis on reading and writing, conversation skills, grammar, and syntax.
Prerequisite: PERS 101.

PERS 201 (3) Intermediate Persian II
Continuation of PERS 200.
Prerequisite: PERS 200.

PERS 300 (3) Advanced Persian I
Graded reading, writing, exposure to textual history, newspaper reading, and translation. Cultural materials presented as
appropriate.
Prerequisite: One of PERS 104, PERS 201. Or Persian heritage speakers with basic reading/writing skills (less than Grade 8 formal education in Iran).

PERS 301 (3) Advanced Persian II
Continuation of PERS 300.
Prerequisite: PERS 300.

PERS 400 (3) Persian Short Story for Native and Heritage Speakers
Modern short stories from mid-19 century to present.
Prerequisite: One of PERS 104, PERS 300. Or Persian heritage speakers with strong reading/writing skills (High School). NOT eligible to students who have studied at the post-secondary level in Iran.

Faculty of Pharmaceutical Sciences

PHAR: Pharmaceutical Sciences

PHAR 400 (3) Pharmacy Management
Application of management principles to pharmacy operations. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 401 (4) Pharmacy Skills III
Legal, technical and professional aspects of dispensing prescriptions and providing pharmaceutical care, primarily for community pharmacy practice. This course is not eligible for Credit/D/Fail grading. [0-3*-3*;0-3*-3*]
Prerequisite: PHAR 303.

PHAR 402 (3) Living Language: Science and Society
Multidisciplinary course in which students, individually and in groups, examine, integrate and apply subject-specific knowledge through the lens of language and the framework of the language sciences, with a focus on themes of real-world importance. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Fourth-year standing or permission of the instructor.

PHAR 403 (1) Clinical Skills: Administration of Injections
Training for authorization to administer injections. This course is not eligible for Credit/D/Fail grading.

PHAR 404 (3) Peer Teaching in Pharmacy Skills II
Development and delivery of patient counselling role-playing activities in PHAR 303. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHAR 303. Permission of instructor required.

PHAR 405 (2-6) c Directed Studies in Clinical Pharmacy
Individual assignments involving library and clinical investigation of specific problems relating to drug utilization and information topics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the instructor.

PHAR 406 (3) Drug Safety
Pharmacist knowledge and skills in relation to current issues in drug safety. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 408 (3) Clinical Pharmacokinetics
Lectures and discussions of topics on the application of pharmacokinetic principles and the use of therapeutic drug level monitoring in clinical pharmacy practice. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 409 (3) Renal Pharmacotherapeutics
Case-based approach to the pathophysiology, pharmacology, clinical pharmacokinetics, and pharmacotherapy in nephrology with emphasis on the integration and application of fundamental principles to clinical situations in class and during their experiential component. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Successful completion of all required courses in the first three years of the pharmacy curriculum.

PHAR 410 (3) Pharmaceutical Research: From Bench to Bedside and Beyond
Basic, translational, clinical, and community-based research. This course is not eligible for Credit/D/Fail grading.
PHAR 414 (2-6) c Directed Studies in Pharmaceutics and Biopharmaceutics
Individual assignments involving library and laboratory investigation of problems involved in the development of pharmaceutical dosage forms. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the instructor.

PHAR 415 (4) Topics in Pharmaceutics and Biopharmaceutics
A study of selected topics in the field of pharmaceutics and biopharmaceutics. Registration restricted. Permission of instructor required. This course is not eligible for Credit/D/Fail grading. [2-0-0]

PHAR 420 (2-6) c Directed Studies in Pharmacy Education
Individual assignments involving library and scholarly inquiry related to pharmacy education. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the instructor.

PHAR 430 (4) Biomolecular Pharmaceutical Chemistry I
Chemical principles and their application to drugs used to regulate enzyme activity. This course is not eligible for Credit/D/Fail grading. [4-0-0]
Prerequisite: PHAR 330.

PHAR 434 (3) Essential Medicinal Chemistry Concepts for Pharmacists
Applying selected chemical concepts to understand drug structure and properties, using frequently encountered drugs as examples. Examining how drugs are used to inhibit enzyme activity. This course is not eligible for Credit/D/Fail grading.

PHAR 435 (3) Biomolecular Pharmaceutical Chemistry II
Chemical principles and their application to drugs used to regulate receptor activity. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 440 (3) Pain Research and Therapy
A multidisciplinary course dealing with basic mechanisms and the clinical management of acute and chronic pain. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: All of PHAR 442, PHAR 452, PHAR 472.

PHAR 441 (3) Pharmacology III
The pharmacology of selected drug classes. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: PHAR 342.
Corequisite: All of PHAR 451, PHAR 461, PHAR 471.

PHAR 442 (3) Pharmacology IV
The pharmacology of selected drug classes. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: PHAR 441.
Corequisite: All of PHAR 452, PHAR 462, PHAR 472.

PHAR 444 (2-6) c Directed Studies in Pharmacology
Individual assignments involving library and laboratory investigation of certain aspects of drug action. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the instructor.

PHAR 448 (3) Pharmaceutical Toxicology
Basic principles of toxicology; toxicity of pharmaceuticals, and precision medicine approaches to mitigate toxicity. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 450 (2-9) c Selected Topics
This course is not eligible for Credit/D/Fail grading.

PHAR 451 (2) Therapeutics III
Rational drug therapy, management of patient-specific drug-related problems and therapeutic monitoring of selected disease states. This course is not eligible for Credit/D/Fail grading. [2-0-0]
Prerequisite: PHAR 352.
Corequisite: All of PHAR 441, PHAR 461, PHAR 471.

PHAR 452 (2) Therapeutics IV
Rational drug therapy, management of patient-specific drug-related problems and therapeutic monitoring of selected disease states. This course is not eligible for Credit/D/Fail grading. [2-0-0]
Prerequisite: PHAR 451.
Corequisite: All of PHAR 442, PHAR 462, PHAR 472.

**PHAR 453 (2-6)** Directed Studies in Pharmacy Practice
Individual assignments involving library and field work investigations of problems associated with pharmacy practice. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: Permission of the instructor.

**PHAR 454 (3)** Pediatric and Geriatric Drug Therapy
Drug therapy considerations in pediatric and geriatric patients. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]
Prerequisite: PHAR 451.
Corequisite: PHAR 452.

**PHAR 456 (3)** Applied Pharmacoconomics
Principles and methods of economic assessments to determine the value of health technologies, with a focus on pharmaceuticals and services provided by pharmacists. *This course is not eligible for Credit/D/Fail grading.*

**PHAR 457 (3)** Pharmaceutical Care in Aboriginal Health
Aboriginal health in Canada and the role a culturally-competent pharmacist can have in collaborating with other health professionals and Aboriginal communities in providing care and healing. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]

**PHAR 458 (3)** Pharmacotherapy in Oncology
Common oncological diseases and their drug treatment. *This course is not eligible for Credit/D/Fail grading.* [3-0-0]

**PHAR 460 (2)** Natural Health Products in Pharmacy Practice
An evidence-based analysis of the efficacy and safety of natural health products used in pharmacy practice. *This course is not eligible for Credit/D/Fail grading.*

**PHAR 461 (1)** Non-Prescription Drugs and Self-Care of the Patient III
The use of non-prescription drugs for selected conditions. *This course is not eligible for Credit/D/Fail grading.* [1-0-0]
Prerequisite: PHAR 362.
Corequisite: All of PHAR 441, PHAR 451.

**PHAR 462 (1)** Non-Prescription Drugs and Self-Care of the Patient IV
The use of non-prescription drugs for selected conditions. *This course is not eligible for Credit/D/Fail grading.* [1-0-0]
Prerequisite: PHAR 461.
Corequisite: All of PHAR 442, PHAR 452.

**PHAR 469 (3)** Introductory Pharmacy Practice Experience II
A 160-hour pharmacy clerkship focused on delivery of comprehensive patient care and disease management in community practice. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: PHAR 369 and promotion to fourth year.

**PHAR 471 (1)** Pathophysiology II
Pathophysiology of selected disease states. *This course is not eligible for Credit/D/Fail grading.* [1-0-0]
Prerequisite: PHAR 371.
Corequisite: All of PHAR 441, PHAR 451.

**PHAR 472 (1)** Pathophysiology III
Pathophysiology of selected disease states. *This course is not eligible for Credit/D/Fail grading.* [1-0-0]
Prerequisite: PHAR 471.
Corequisite: All of PHAR 442, PHAR 452.

**PHAR 479 (12)** Advanced Pharmacy Practice Experience - Community
A 320-hour pharmacy clerkship emphasizing integration of knowledge and skills in developing and assessing therapeutic plans for patients in community practice. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: PHAR 469.

**PHAR 489 (6)** Advanced Pharmacy Practice Experience - Institutional
A 160-hour pharmacy clerkship emphasizing integration of knowledge and skills in developing and assessing therapeutic plans for patients in institutional practice. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: PHAR 469.

**PHAR 498 (6)** Cases in Pharmaceutical Sciences III
Case studies and other activities integrating scientific and clinical concepts. *This course is not eligible for Credit/D/Fail grading.*
PHAR 499 (5) Cases in Pharmaceutical Sciences IV
Case studies and other activities integrating scientific and clinical concepts. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHAR 399.

PHAR 501 (12) Advanced Pharmacotherapeutics
Pharmacotherapeutic intervention in selected acute and chronic diseases and disorders. Emphasis is on recommendations for and monitoring of drug therapy. This course is not eligible for Credit/D/Fail grading. [3-6]
Prerequisite: PHAR 498.

PHAR 502 (4) Advanced Concepts in Pharmacokinetics
Models of linear and dose-dependent systems in pharmacokinetics including sustained release, volumes of distribution, drug clearance, metabolite kinetics, multiple dosing and computer modelling. This course is not eligible for Credit/D/Fail grading. [4-0]
Prerequisite: PHAR 315.

PHAR 506 (6) Critical Appraisal of Pharmacotherapy Literature
Identification, evaluation, and application of evidence relevant to improving clinical pharmacy practice and patient care. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHAR 508 (4) Advanced Applications in Clinical Pharmacokinetics
Pharmacokinetic applications in therapeutic drug monitoring and patient care; specific drugs and disease states; effects of age and concomitant drug administration. This course is not eligible for Credit/D/Fail grading. [4-0]
Prerequisite: PHAR 502.

PHAR 510 (2-6) Advanced Pharmaceutics I
A study of physical and chemical properties of pharmaceutical systems with emphasis on formulation and preparative aspects. This course is not eligible for Credit/D/Fail grading.

PHAR 511 (2-6) Advanced Pharmaceutics II
A study of problems in pharmaceutics with emphasis on biopharmaceutical aspects. This course is not eligible for Credit/D/Fail grading.

PHAR 515 (3) Nanomedicines
Nanoparticles, drug delivery systems and their interactions with biological systems. This course is not eligible for Credit/D/Fail grading.

PHAR 516 (2) Polymers for Drug and Protein Delivery
Advances in polymer-based drug delivery systems. This course is not eligible for Credit/D/Fail grading. [2-0]

PHAR 517 (2) Lipid-Based Drug Delivery
Advances in lipophilic drug delivery systems. This course is not eligible for Credit/D/Fail grading. [2-0]

PHAR 518 (4) Diagnostic Imaging and Radiopharmaceuticals
Radiation-related, optical, and other imaging methods (SPECT, PET, CT, MRI, microscopy, ultrasound) and their application in research. This course is not eligible for Credit/D/Fail grading. [3-4*-0]

PHAR 525 (4) Pharmaceutical Research Techniques I
Spectroscopic, GC, HPLC, LCMS and NMR analytical techniques for drug analysis, pharmacokinetics and metabolism. This course is not eligible for Credit/D/Fail grading. [2-6]

PHAR 526 (4) Pharmaceutical Research Techniques II
Immunological assays, capillary and gel electrophoresis, radioisotope techniques, PET, peptide analysis and receptor binding studies. This course is not eligible for Credit/D/Fail grading. [2-6-0]

PHAR 533 (12-24) Clinical Clerkships I
Required clinical rotations of four weeks duration in selected specialty areas in medicine and clinical pharmacy. This course is not eligible for Credit/D/Fail grading.

PHAR 534 (2-12) Clinical Clerkships II
Elective clinical rotations of 4 weeks’ duration in hospital, office or clinic locations. This course is not eligible for Credit/D/Fail grading.

PHAR 535 (1/2) Pharm.D. Seminar
This course is not eligible for Credit/D/Fail grading.
PHAR 540 (2-6) d Topics in Pharmacology
Lectures and supervised studies in selected areas of pharmacology. Enrolment restricted. This course is not eligible for Credit/D/Fail grading.

PHAR 541 (3) Drug Metabolism and Toxicology
The biotransformation of drugs, pesticides, carcinogens and other foreign chemicals in animals and humans. The biochemical mechanisms responsible, particularly the cytochrome P-450 mono-oxygenases, will be emphasized. The formation of toxic reactive metabolites and their effects will be discussed. Enrolment restricted. This course is not eligible for Credit/D/Fail grading.

PHAR 542 (3) Central Nervous System Pharmacology
A course comprised of lectures, assigned readings and reports on selected topics dealing with drug actions in the central nervous system. Given in alternate years. Permission of instructor required. This course is not eligible for Credit/D/Fail grading.

PHAR 543 (3) Advanced Laboratory in Pharmacology
A laboratory course giving instruction in the methods and techniques used in pharmacological research. Registration limited. This course is not eligible for Credit/D/Fail grading.

PHAR 545 (3) Cardiovascular Pharmacology
A course composed of lectures, assigned readings and conferences dealing with aspects of drug actions and cardiovascular function. Topics include the role of adenylate cyclase in cardiac function, the role of calcium in myocardial contractility and the effect of drugs on myocardial and vascular function. Enrolment restricted. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

PHAR 548 (2) M.Sc. Seminar
Attendance at regular seminars throughout the session and presentation of one or more papers on selected topics. This course is not eligible for Credit/D/Fail grading.

PHAR 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

PHAR 550 (1-6) c Directed Studies
This course is not eligible for Credit/D/Fail grading.

PHAR 554 (3) Advanced Hospital Pharmacy Management
Institutional, professional and regulatory factors that influence the planning, implementation and control of pharmacy services in hospitals. Permission of instructor required. This course is not eligible for Credit/D/Fail grading. [3-0]

PHAR 560 (3) Advanced Economic Evaluation in Health Care
Economic evaluation of health technologies, considering, in detail, the policy context for the use of economic evaluation. This course is not eligible for Credit/D/Fail grading. Prerequisite: SPPH 541. Or equivalent training. Equivalency: SPPH 549.

PHAR 570 (2) Physical Assessment
Principles of and clinical experience in physical assessment of patients for monitoring of drug efficacy and toxicity; interpretation of objective patient data by the clinical pharmacist. This course is not eligible for Credit/D/Fail grading. [2-0]

PHAR 590 (3) Research in the Pharmaceutical Sciences: Principles and Methods
This course is not eligible for Credit/D/Fail grading.

PHAR 591 (1) Scholarly Integrity and Research Ethics
This course is not eligible for Credit/D/Fail grading.

PHAR 592 (1-3) c Fundamentals of the Pharmaceutical Sciences Disciplines
This course is not eligible for Credit/D/Fail grading.

PHAR 648 (2) Seminar for Ph.D. Students
Attendance at regular seminars throughout the session and presentation of one or more papers on selected topics. This course is not eligible for Credit/D/Fail grading.

PHAR 649 (0) Doctoral Dissertation

Philosophy, Faculty of Arts
Philosophy is an interdisciplinary subject, and students with training in other subjects may be adequately prepared to take on a course even though they lack the formal prerequisites. Students are encouraged to consult with the instructor. Variable credit courses: Most 200-, 300-, and 400-level courses in Philosophy are offered for 3 credits, but may be taken for 4 credits for extra work with the consent of the instructor. Students should consult the instructor if they wish to exercise this option as it may not be available in all sections. For detailed information about courses and topics within courses, see the departmental website (www.philosophy.ubc.ca).

PHIL 100 (6) Introduction to Philosophy
Basic problems and methods of Philosophy. Topics such as the existence of God, the nature and scope of human knowledge, the relationship between mind and body, personal identity, free will, issues and problems in moral philosophy. Credit will be granted for only one of PHIL 100 and either or both PHIL 101 or PHIL 102.

PHIL 101 (3) Introduction to Philosophy
Basic problems and methods of philosophy. Topics such as the nature and scope of human knowledge, the existence of God, and the relationship between mind and body. Credit will be granted for only one of PHIL 100 or PHIL 101.

PHIL 102 (3) Introduction to Philosophy II
Basic problems and methods of philosophy. Topics such as morality, personal identity, free will and determinism, and the meaning of life. Credit will be granted for only one of PHIL 100 or PHIL 102.

PHIL 120 (3) Introduction to Critical Thinking
Tools for dealing with both everyday and more technical arguments and concepts. Analysis and resolution of confusions, ambiguities, and fallacies. This course is restricted to students with fewer than 90 credits.

PHIL 125 (3) Introduction to Scientific Reasoning
Historical and logical analysis of various types of scientific hypotheses and the data that support or undermine them. This course is restricted to students with fewer than 90 credits.

PHIL 211 (3/4) Greek Philosophy I: Socrates and Plato
The Pre-Socratics; Socrates; Sophists; Plato. Recommended as preparation for PHIL 310.
Equivalency: CLST 211.

PHIL 212 (3/4) Greek Philosophy II: Aristotle and After
Aristotle; selections from Hellenistic and Late Antique Philosophy. Recommended as preparation for PHIL 310.
Equivalency: CLST 212.

PHIL 220 (3/4) Symbolic Logic
Sentential and predicate logic. Translation from natural language; truth tables and interpretations; systems of natural deduction up to relational predicate logic with identity; alternative proof methods. Some sections may use computer-based materials and tests.

PHIL 230 (3/4) Introduction to Ethics
Theories of obligation and value; moral reasoning; normative ethics, descriptive ethics and meta-ethics. Readings in classic and contemporary texts.

PHIL 235 (3/4) Contemporary Moral Issues
Moral issues such as life and death decisions, paternalism, markets, animal welfare, technology, and global justice.

PHIL 240 (3/4) Introduction to Epistemology
Topics in epistemology such as skepticism, truth, justification, a priori and a posteriori knowledge. Readings from classic and contemporary texts.

PHIL 250 (3) Minds and Machines
Philosophical and theoretical issues that pertain to how mental phenomena fit into the material world. Examine questions such as whether a sophisticated enough computer should be deemed a conscious intelligent being. Focus on philosophical literature on consciousness, intelligence, animal minds, and the mind-body relation. Credit will be granted for only one of PHIL 250 or PHIL 150.

PHIL 260 (3/4) Science and Society in the Contemporary World
An introduction to the historical development, conceptual foundations, and cultural significance of contemporary science. Themes will vary from year to year.

Equivalency: HIST 260.

PHIL 310 (3/4) d The Philosophy of Plato
A study of Plato's dialogues and his influence on subsequent philosophy.
Prerequisite: PHIL/CLST 211 and PHIL/CLST 212 are recommended.

PHIL 311 (3/4) d The Philosophy of Aristotle
A study of Aristotle's writings and his influence on subsequent philosophy.
Prerequisite: PHIL 310.

PHIL 313 (3) Medieval Philosophy
Survey of Western European thought from Augustine to the 14th century. Possible topics and authors include: Augustine; Abelard; the influence of Islam; the rediscovery of Aristotle; Aquinas; Scotus; Ockham.
Equivalency: RELG 328.

PHIL 314 (3/4) d Philosophy in the 17th Century
Survey of 17th-century philosophy from Bacon to Leibniz, including the writings of Hobbes, Descartes, and Spinoza. The influence of science and religion on philosophy.

PHIL 315 (3/4) d Philosophy in the 18th Century
Survey of 18th-century philosophy from Locke to Kant, including the writings of Berkeley, Rousseau, and Hume. The influence of science and religion on philosophy.
Prerequisite: PHIL 314.

PHIL 316 (3/4) d Philosophy After 1800
Survey of 19th and 20th century philosophy. May include Hegel, Schopenhauer, Nietzsche, Mill, Meinong, Brentano, the British Idealists, Russell, and Moore. Social and political currents in 19th century philosophical thought.

PHIL 320 (3/4) d Logic: Metatheory and Computability
Continuation of PHIL 220. A system of deduction for predicate logic is selected for further study. Completeness of this system and other metatheoretic results are proved. Other topics include computability, recursive function theory, incompleteness and decidability.
Prerequisite: PHIL 220.

PHIL 321 (3/4) d Induction, Decision and Game Theory
Formal methods relevant to probabilistic and inductive reasoning. Decision theory, game theory, axiomatic probability theory and its interpretations, belief dynamics, simulation and modelling.
Prerequisite: One of PHIL 125, PHIL 220 or instructor permission.

PHIL 322 (3/4) d Modal Logic
Logic of the modal operators "It is necessary that" and "It is possible that." Possible-world semantics and a method of derivation for this logic.
Prerequisite: PHIL 220.

PHIL 323 (3/4) d Non-Classical Logics
One or more of conditional logic, deontic logic, epistemic logic, many-valued logic, systems of belief dynamics.
Prerequisite: PHIL 220.

PHIL 324 (3/4) d Philosophy of Logic
Fundamental concepts and methods of logic; the logicist method, syntax and semantics; the conditional; entailment; consequence; modal logic; problems concerning extensionality and intentionality. Frege's distinction between sense and reference; Russell's theory of definite descriptions; Tarski's definition of truth.
Prerequisite: PHIL 220.

PHIL 326 (3/4) d Philosophy of Language I
Philosophical discussion of language, meaning, and communication. Credit will be granted for only one of PHIL 326 or PHIL 425.
Prerequisite: At least one of LING 201/PHIL 220, plus 6 additional credits of PHIL/LING at the 200-level or above.

PHIL 330 (3/4) d Social and Political Philosophy
Theories of political and legal obligation and authority, legal reasoning, society and the state. Readings in classic and contemporary texts.
Prerequisite: PHIL 230 is strongly recommended.

PHIL 331 (3/4) d Business and Professional Ethics
Moral problems in contemporary business and professional practice, general moral theory, the law, and policy formation. Corporate social and environmental responsibility, employee rights, preferential hiring and affirmative action programs, conflicts of interest, advertising, "whistle blowing" and self-regulation. Credit will be granted for only one of PHIL 331 or PHIL 434.

PHIL 332 (3/4) d Environmental Ethics
Moral problems arising in the context of human relationships to nature and to non-human living things, considered in terms of both general moral theory and policy formation. Topics include moral standing, animal rights, obligations to future generations, pollution, hazardous materials, the depletion of natural resources and the treatment of non-human living things. Credit will be granted for only one of PHIL 332 or PHIL 435.

PHIL 333 (3/4) d Bio-Medical Ethics
Moral problems arising in the health sciences, especially in medicine but also in biology, psychology, and social work. Topics include abortion, death and euthanasia, genetic engineering, behaviour modification, compulsory treatment, experimentation with human beings and animals, and the relationship between professionals and their patients, subjects or clients. No philosophical background is required. Credit will be granted for only one of PHIL 333 or PHIL 433.

PHIL 334 (3/4) d Sex, Gender and Philosophy
Relationship between sex, gender, and philosophy. Topics may include ethics, epistemology, science, social relations, law, and personhood.

PHIL 335 (3/4) d Power and Oppression
Philosophical approaches to historical problems of inequality and social harm, with readings drawn from historical and contemporary sources. Topics to be studied may include slavery, colonialism, labour, and the position of women in society.

PHIL 338 (3/4) d Philosophy of Law
Concepts of law, constitution and sovereignty; law and morality; natural law theories and legal positivism; obligation, responsibility, and punishment. 
Prerequisite: Restricted to second- or higher-year standing.

PHIL 339 (3/4) d Philosophy of Art
Topics include art and perception, art and reality, imagination, expression, censorship, and the role of art in human life.

PHIL 340 (3/4) d Introduction to Metaphysics
Topics in metaphysics such as the nature of physical reality, personal identity, the mind/body problem, free will, causation and action theory. Readings from classic and contemporary texts.
Prerequisite: PHIL 240 is recommended.

PHIL 347 (3/4) d Philosophy of Religion
A critical and analytical examination of arguments for and arguments against the existence of God, and other related topics. Credit will be granted for only one of PHIL 347 or PHIL 349.

PHIL 360 (3/4) d Introduction to History and Philosophy of Science
An examination of historical, conceptual and methodological conditions of scientific knowledge through detailed consideration of important episodes in the history of science.
Equivalency: HIST 393.

PHIL 362 (3-6) d History and Philosophy of Economics from Aristotle to Adam Smith
The development of economic thought from Aristotle to Adam Smith, focusing primarily on the conceptual foundations of economics, particularly the problems of value, distribution, and economic growth.
Equivalency: ECON 318.

PHIL 363 (3-6) d History and Philosophy of Economics from Ricardo to Keynes
The development of economic thought from David Ricardo up to the present, including such figures as Mill, Jevons, and Keynes, focusing primarily on the conceptual foundations of economics, particularly the problems of value, distribution and growth.
Equivalency: ECON 319.

PHIL 364 (3) Darwin, Evolution, and Modern History
Darwin and the science of evolution in nineteenth and early twentieth century.
Equivalency: HIST 394.

PHIL 369 (3-6) d Philosophy of Science
Issues common to all sciences. Philosophical questions including the character of scientific laws, theories and revolutions, the nature of scientific confirmation, causality, explanation and prediction, and the use of logic and probability. Difficulties in the interpretation of atomic physics and questions about relationships between biology and psychology. No philosophical background is assumed. Credit will be granted for only one of PHIL 369 or PHIL 460.

PHIL 371 (3) Foundations of Chinese Thought
Chinese thought from the Han dynasty (206 BCE to 220 CE) in its historical and cultural contexts. Includes among others: Confucius; Mo Zi; the Legalists/Authoritarians; Zhuang Zi; the Lao Zi book.
Equivalency: ASIA 371.

PHIL 375 (3/4) d Philosophy and Literature
Philosophical issues in works of literature or arising from theories of literary interpretation. Topics include issues relating to relativism, the nature of morality, free will, personal identity, the nature of the emotions.

PHIL 378 (3) Philosophical Wisdom of Early India
Epistemological and ontological thought from the Vedic Period to the period of the rise of philosophical schools or systems. Philosophy in the Mahabharata, Gita; early Buddhist and Jain views on knowledge and reality; views on language.
Equivalency: ASIA 378.

PHIL 385 (3/4) d Existentialism
Meaning, identity and alienation as explored in the works for example of Kierkegaard, Dostoyevsky, Tolstoy, Sartre, and Camus.

PHIL 388 (3) Buddhist, Brahmanical and Jain Philosophers in Interaction
Debates on issues of epistemology, language and ontology among the philosophical schools or systems of classical India Nagarjuna, Bhartrhari, Uma-svati, Sankara and others.
Equivalency: ASIA 388.

PHIL 390 (6/12) c Honours Tutorial
For students in third-year Honours.

PHIL 400 (3/4) d Morals, Politics and the Individual
Introduction to major themes in moral and political philosophy. Primarily for fourth-year and graduate students who have had no previous course in Philosophy. Credit will be granted for only one of PHIL 400, PHIL 100 or PHIL 101 and 102.

PHIL 401 (3/4) d Knowledge, Explanation, and the Nature of Things
Introduction to major themes in epistemology and metaphysics. Primarily for fourth-year and graduate students who have had no previous course in Philosophy. Credit will be granted for only one of PHIL 401, PHIL 100 or PHIL 101 and 102.

PHIL 410 (3/4) d Topics in Ancient Philosophy
Advanced study of the Presocratics, or of a philosopher such as Plato, or of a school such as the Sceptics or Stoics. Topics vary from year to year.
Prerequisite: PHIL 311.

PHIL 412 (3/4) d Topics in Medieval Philosophy
Advanced study of a medieval philosopher such as Aquinas, or school.
Prerequisite: PHIL 313.

PHIL 414 (3/6) d Topics in the History of Modern Philosophy
Intensive study of a major philosopher or school such as Descartes, Hume, Empiricism, Rationalism, or the British utilitarians.
Prerequisite: One of PHIL 314, PHIL 315, PHIL 316.

PHIL 415 (3/4) d The Philosophy of Immanuel Kant
Study of Kant's critical philosophy.
Prerequisite: One of PHIL 314, PHIL 315, PHIL 340.

PHIL 416 (3/6) d Topics in 19th-Century Philosophy
Study of a major 19th-century philosopher such as Hegel, Mill or Nietzsche, or school, such as German Idealism.
Prerequisite: One of PHIL 314, PHIL 315, PHIL 316, PHIL 340.

PHIL 417 (3/6) d Topics in 20th-Century Philosophy
Intensive study of a major philosopher such as Wittgenstein, Russell, or Heidegger, or school, such as pragmatism or logical empiricism.
Prerequisite: PHIL 340.

PHIL 419 (3/4) d Philosophy of History
Concepts of history and historical explanation, historical progress, purpose, necessity, law and causation. Hegel, Marx, Vico, Spengler, Pareto, Collingwood, Croce, and Toynbee, as well as contemporary figures. Students will be expected to have an adequate knowledge of ancient or modern history.

PHIL 420 (3/4) d Topics in Symbolic Logic
Formal semantics, proof theory, incompleteness and decidability, axiomatic set theory, independence results. Consult the Department as to which topics are offered in a given year.
Prerequisite: PHIL 220.

PHIL 426 (3/4) d Topics in Philosophy of Language
Advanced topics in the philosophy of language.
Prerequisite: PHIL 326. And 6 credits of PHIL/LING at the 200-level or above.

PHIL 427 (3/4) d Philosophy of Mathematics
Logicism, formalism and constructivism, implications of metatheorems such as those of Gödel and Church, mathematical truth, mathematics and mental construction, mathematics and the physical world.
Prerequisite: Philosophy or mathematics courses totaling 9 credits at the 200-level or above.

PHIL 431 (3/4) d Topics in Social and Political Philosophy
Central concepts and problems in political life and thought including obligation, citizenship, representation, justice; equality; civil rights and liberty; disobedience.
Prerequisite: 9 credits of PHIL/POLI at the 200-level or above.

PHIL 432 (3/4) d Topics in Ethical Theory
Classic or contemporary works in ethical theory.
Prerequisite: 9 credits of PHIL at the 200-level or above; PHIL 230 is recommended.

PHIL 440 (3/4) d Topics in Epistemology
Analysis of the concept of knowledge; problems of justifying ordinary and basic empirical beliefs.
Prerequisite: PHIL 240.

PHIL 441 (3/4) d Philosophy of Perception
The contribution of the senses to knowledge of the external world; the nature of perception and its contribution to empirical knowledge.
Prerequisite: PHIL 240 or COGS 200 if accompanied by 3 credits in PHIL at the 200-level or above.

PHIL 448 (3/4) d Topics in Continental Philosophy
A study of European philosophers from amongst Husserl, Heidegger, Habermas, Foucault, Derrida, Lacan, Levinas, and others. Credit will be granted for only one of PHIL 448 or PHIL 449.

PHIL 450 (3/4) d Topics in Metaphysics
Topics including ontology, universals and particulars, substance, determinism and indeterminism, identity over time, and theories of truth.
Prerequisite: 9 credits in PHIL at the 200-level or above. PHIL 340 is recommended.

PHIL 451 (3/4) d Philosophy of Mind
The nature of the mental and physical; the relation between minds and bodies; the character of psychological explanation.
Prerequisite: PHIL 240 or COGS 200 if accompanied by 3 credits of PHIL at the 200-level or above.

PHIL 452 (3/4) d Philosophy of Action
Explanation of human actions; the conditions of responsibility; freedom of the will; the domains of rational and moral appraisal; the category of action and the individuation of actions.
Prerequisite: PHIL 340.

PHIL 455 (3/6) d Topics in the Philosophy of Cognitive Science
Philosophical topics in the cognitive sciences, such as empiricism vs. nativism, consciousness, mental representation, cognitive architecture, language & thought, and situated cognition.
Prerequisite: PHIL 240 or COGS 200 if accompanied by 3 credits in PHIL at the 200-level or above. Recommended: PHIL 441 or PHIL 451.

PHIL 461 (3/4) d Philosophy of Social Science
Topics in the philosophy of science of special concern to the social sciences: the problem of objectivity, the use of models and evidence, causation and causal reasoning, formal methods, the status of social kinds and norms, scientific explanation, laws.
Prerequisite: 9 credits at the 200-level or above from philosophy, anthropology, geography, economics, history, political science,
psychology or sociology.

**PHIL 462 (3-6) d Space and Time**
Such topics as: Are space and time continuous? Is motion always relative to another body? Does time flow? Is time irreversible?
*Prerequisite:* PHIL 340 or 12 credits of mathematics or science.

**PHIL 464 (3) Philosophy of Biology**
Methodological, historical, philosophical and social science questions about biology.
*Prerequisite:* Fourth-year standing in any degree program or 9 credits of philosophy.

**PHIL 469 (3/4) d Topics in Philosophy of Science**
Topics such as probability and induction; foundations of measurement; theory construction.
*Prerequisite:* PHIL 369.

**PHIL 470 (3) Comparative Conceptions of the Self**
Ways in which the 'self' has been portrayed in eastern and western religious traditions. Thinkers to be considered include Aristotle, Mencius, Freud, Xunzi (Hs?n-tzu), Nietzsche, and Zhuangzi (Chuang-tzu).
*Equivalency:* ASIA 470.

**PHIL 485 (3/4) d Directed Reading**
Same as PHIL 486-9.

**PHIL 486 (1-4) d Directed Reading**

**PHIL 487 (3-4) d Directed Reading**

**PHIL 488 (3-4) d Directed Reading**

**PHIL 489 (3-4) d Directed Reading**

**PHIL 490 (6/12) c Honours Tutorial**
For students in fourth-year Honours.

**PHIL 491 (3-6) d Seminar for Majors in Philosophy**
Selected problems in philosophy, with attention to methods of research. Check with the department for specific topics. Primarily for fourth-year Philosophy Major students, but also open to Philosophy Honours.

**PHIL 499 (3-4) c Directed Reading**

**PHIL 510 (3-12) d Ancient Philosophy**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 512 (3-12) d Medieval Philosophy**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 514 (3-12) d Early Modern Philosophy**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 516 (3-12) d Modern Philosophy**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 518 (3-12) d Twentieth-Century Philosophy**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 520 (3-12) d Logic**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 525 (3-12) d Philosophy of Language**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 527 (3-12) d Philosophy of Mathematics**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 528 (3-12) d Philosophical Issues in the Foundations of Mathematics**
*This course is not eligible for Credit/D/Fail grading.*

**PHIL 530 (3-12) d Moral Philosophy**
*This course is not eligible for Credit/D/Fail grading.*
PHIL 531 (3-12) d Political Philosophy  
This course is not eligible for Credit/D/Fail grading.

PHIL 532 (3-12) d Ethical Theory and Practice  
This course is not eligible for Credit/D/Fail grading.

PHIL 533 (3-12) d Issues in Bio-Medical Ethics  
This course is not eligible for Credit/D/Fail grading.

PHIL 534 (3-12) d Issues in Business and Professional Ethics  
This course is not eligible for Credit/D/Fail grading.

PHIL 535 (3-12) d Issues in Environmental Ethics  
This course is not eligible for Credit/D/Fail grading.

PHIL 536 (3-12) d Ethical Issues in Public Policy  
This course is not eligible for Credit/D/Fail grading.

PHIL 539 (3-12) d Aesthetics  
This course is not eligible for Credit/D/Fail grading.

PHIL 540 (3-12) d Epistemology  
This course is not eligible for Credit/D/Fail grading.

PHIL 550 (3-12) d Metaphysics  
This course is not eligible for Credit/D/Fail grading.

PHIL 551 (3-12) d Philosophy of Mind  
This course is not eligible for Credit/D/Fail grading.

PHIL 560 (3-12) d Philosophy of Science  
This course is not eligible for Credit/D/Fail grading.

PHIL 561 (3-12) d Topics in Science and Technology Studies  
Advanced seminar on a theme or topic of interest to both STS and Philosophy. This course is not eligible for Credit/D/Fail grading.

PHIL 581 (3-12) d Problems  
This course is not eligible for Credit/D/Fail grading.

PHIL 585 (3-12) d Directed Reading  
This course is not eligible for Credit/D/Fail grading.

PHIL 586 (3) Philosophy of Action  
This course is not eligible for Credit/D/Fail grading.

PHIL 599 (12) MA Thesis  
This course is not eligible for Credit/D/Fail grading.

PHIL 699 (0) Doctoral Dissertation

Faculty of Pharmaceutical Sciences

PHRM: Pharmacy

PHRM 100 (18) Foundations of Pharmacy  
Scientific concepts and pharmacy practice principles. Role of the pharmacist, patient assessment skills, professional identity, communication skills, and an understanding of legal and ethical responsibilities. This course is not eligible for Credit/D/Fail grading.

PHRM 111 (15) Medication Management I  
Modules and integration activities focusing on: an introduction to infectious diseases; musculoskeletal disorders; dermatology; eyes, ears, nose, and throat disorders; and hematology. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: PHRM 100.  
Corequisite: PHRM 131.
PHRM 131 (2) Study Design and Interpretation I
Principles of clinical study design, focusing on biostatistical foundations, randomized controlled trials, and systematic review of randomized controlled trials. *This course is not eligible for Credit/D/Fail grading.*
Corequisite: PHRM 111.

PHRM 141 (2) Seminar: Pharmacists in Practice I
Current and future roles for pharmacists and controversies in pharmacy practice. *This course is not eligible for Credit/D/Fail grading.*

PHRM 161 (2) Technology in Healthcare
Knowledge and skills related to the role and applications of technology in health care. *This course is not eligible for Credit/D/Fail grading.*

PHRM 170 (1) Community Service Learning I
Service learning activities with external community partner sites and members. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

PHRM 171 (2) Introductory Pharmacy Practice Experience - Outpatient I
Prescription processing, drug distribution systems, and select patient care activities in real world outpatient environments. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

PHRM 211 (15) Medication Management II
Modules and integration activities focusing on respirology and cardiovascular disorders. Corequisite: PHRM 231.

PHRM 212 (15) Medication Management III
Modules and integration activities focusing on nephrology, endocrinology, and neurology. *This course is not eligible for Credit/D/Fail grading.*
Prerequisite: PHRM 211.
Corequisite: PHRM 231.

PHRM 221 (3) Nutrition for Pharmacists
Foundations of nutrition, nutrition for healthy individuals through the lifespan, and selected clinical applications of nutrition in pharmacy practice. *This course is not eligible for Credit/D/Fail grading.*

PHRM 231 (2) Study Design and Interpretation II
Principles of clinical study design, focusing on epidemiologic studies (cohort, case-control), pharmacoeconomic analyses, non-inferiority designs, clinical prediction rules, and guidelines. *This course is not eligible for Credit/D/Fail grading.*
Corequisite: All of PHRM 211, PHRM 212.

PHRM 241 (2) Seminar: Pharmacists in Practice II
Current and future roles for pharmacists and controversies in pharmacy practice, focusing on the roles and training opportunities for pharmacists in specialty areas of outpatient and inpatient practice. *This course is not eligible for Credit/D/Fail grading.*

PHRM 251 (1) Institutional Practice Skills
Preparation for experiential learning in the hospital setting. Focuses on enhancing familiarity with the care environment and developing skills suited for students to apply to patient care during institutional experiential rotations. *This course is not eligible for Credit/D/Fail grading.*

PHRM 270 (1) Community Service Learning II
Service learning activities with external community partner sites and members. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

PHRM 271 (2) Introductory Pharmacy Practice Experience - Outpatient II
Prescription processing, drug distribution systems, and select patient care activities in real world outpatient environments. Focus on direct patient care activities. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

PHRM 272 (1) Introductory Pharmacy Practice Experience - Inpatient
Prescription processing, drug distribution systems, and select patient care activities in real world inpatient environments. Focus on direct patient care activities. Pass/Fail. *This course is not eligible for Credit/D/Fail grading.*

PHRM 311 (12) Medication Management IV
Modules and integration activities focusing on psychiatry; gastroenterology disorders; and oncology and palliative care. *This course is not eligible for Credit/D/Fail grading.*
PHRM 312 (12) Medication Management V

Modules and integration activities focusing on reproductive health, sexual health, and genitourinary disorders; special infectious diseases; and toxicology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 311.

PHRM 341 (2) Seminar: Pharmacists in Practice III

Current and potential roles for pharmacists, and contemporary issues in pharmacy practice. Focus on the role of pharmacists as patient educators, researchers and collaborators in interprofessional teams. This course is not eligible for Credit/D/Fail grading.

PHRM 351 (3) Practice Management and Leadership

Application of management and leadership principles and skills to pharmacy operations. This course is not eligible for Credit/D/Fail grading.

PHRM 361 (1) Clinical Skills: Administration of Injections

Training for authorization to administer injections. This course is not eligible for Credit/D/Fail grading. Equivalency: PHAR 403.

PHRM 371 (4) Introductory Pharmacy Practice Experience - Outpatient III

Direct patient care activities in an outpatient setting. Building on existing pharmaceutical knowledge and problem solving ability. Increased involvement in diverse patient care situations. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 441 (1) Seminar: Advanced Topics in Pharmacy Practice

Roles and skills for pharmacists as preceptors, teachers and mentors; emerging issues in pharmacy practice. This course is not eligible for Credit/D/Fail grading.

PHRM 450 (2) Pharm.D. Seminar

Seminar course about current and potential roles for pharmacists. Students will also deliver an individual and a group seminar. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 451 (4) Critical Appraisal of Pharmacotherapy Literature

Principles of clinical study design, focusing on randomized controlled trials, systematic reviews, epidemiologic studies (cohort, case-control), pharmacoeconomic analyses, clinical prediction rules, and guidelines. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 452 (4) Patient Assessment Skills

Principles and practices of patient assessment, applied to the monitoring of drug efficacy and toxicity. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 453 (3) Applied Pharmacokinetics and Pharmacogenomics

Pharmacokinetic monitoring of drug therapy in common clinical situations with foundations for application to other drugs. Pharmacogenomics and personalized medicine principles and applications to practice. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 454 (2) Practice Management

Values, concepts, issues and responsibilities of individuals exercising leadership and management roles in pharmacy practice and health care settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 461 (2) Pharmacotherapeutics 1

Therapeutic foundations. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 462 (2) Pharmacotherapeutics 2

Respirology, dermatology, and ears, eyes, nose, and throat. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 463 (2) Pharmacotherapeutics 3

Cardiovascular disorders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 464 (2) Pharmacotherapeutics 4

Infectious diseases. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 465 (2) Pharmacotherapeutics 5

Neurology and psychiatry. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.
PHRM 466 (2) Pharmacotherapeutics 6
Gastroenterology and musculoskeletal disorders. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 467 (2) Pharmacotherapeutics 7
GU, OBS/GYN, endocrine, and renal. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 468 (2) Pharmacotherapeutics 8
Oncology, hematology, and toxicology. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 469 (2) Pharmacotherapeutics 9
Acute/critical care, neurology, cardiac, GI, infectious diseases, and respiratory. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 461.

PHRM 471 (12) Outpatient Advanced Pharmacy Practice Experience
Application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in outpatient settings. Patient care will be provided for a wide range of therapeutic areas. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHRM 371.

PHRM 472 (12) Inpatient Advanced Pharmacy Practice Experience
Application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in inpatient settings. Patient care will be provided for a wide range of therapeutic areas. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 473 (6/12) d Selected Advanced Pharmacy Practice Experience
Diverse options available in such domains as patient care (various settings), research, health policy, education, and others. The available placement options will vary from year to year depending on site/preceptor availability. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PHRM 481 (2) Healthcare Quality Improvement
Builds on the foundation of patient care and management learning with knowledge about healthcare system improvement. Focuses on principles of quality measurement and quality improvement in health. This course is not eligible for Credit/D/Fail grading.

PHRM 491 (6) Experiential Rotation I Community
Advanced Pharmacy Practice Experience with application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in a variety of community settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 492 (6) Experiential Rotation II Inpatient
Advanced Pharmacy Practice Experience with application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in a variety of inpatient settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 493 (6) Experiential Rotation III Advanced Practice
Advanced Pharmacy Practice Experience with application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in specialized (advanced practice) settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 494 (6) Experiential Rotation IV Ambulatory/Primary Care
Advanced Pharmacy Practice Experience with application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in a variety of ambulatory or primary care settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 495 (6) Experiential Rotation V Community or Inpatient
Advanced Pharmacy Practice Experience with application of integrated problem-solving skills to resolve increasingly complex drug-therapy problems in community or inpatient settings. Pass/Fail. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 496 (8) Experiential Rotation VI Selected
Advanced Pharmacy Practice Experience with options available in such domains as patient care (various settings), research,
health policy, education, and others. The available placement options will vary from year to year depending on site/practice educator availability. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Prerequisite: All of PHRM 451, PHRM 452, PHRM 453, PHRM 461.

PHRM 499 (1) Comprehensive Examination
Assessment of skills in the clinical problem-solving process. Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Successful completion of all other coursework

Physical Therapy, Faculty of Medicine

PHTH: Physical Therapy

PHTH 301 (3) Physical Therapy Foundations
Builds on prerequisite concepts in anatomy, physiology, and physics taken at undergraduate and high school level to apply basic theories and principles of anatomy, human physiology, pathophysiology, biomechanics, and physics to essential rehabilitation concepts.

PHTH 511 (2) Pathology for Physical Therapy I
This course is not eligible for Credit/D/Fail grading.

PHTH 514 (5) Clinical Practice I
This course is not eligible for Credit/D/Fail grading.

PHTH 516 (2) Clinical Decision-Making I
This course is not eligible for Credit/D/Fail grading.

PHTH 517 (3) Exercise and Movement I
This course is not eligible for Credit/D/Fail grading.

PHTH 521 (2) Pathology for Physical Therapy II
This course is not eligible for Credit/D/Fail grading.

PHTH 524 (6) Clinical Practice II
This course is not eligible for Credit/D/Fail grading.

PHTH 526 (2) Clinical Decision Making II
This course is not eligible for Credit/D/Fail grading.

PHTH 527 (3) Exercise and Movement II
This course is not eligible for Credit/D/Fail grading.

PHTH 528 (1) Case-based Integration
This course is not eligible for Credit/D/Fail grading.

PHTH 531 (2) Pathology for Physical Therapy III
This course is not eligible for Credit/D/Fail grading.

PHTH 534 (4) Clinical Practice III
This course is not eligible for Credit/D/Fail grading.

PHTH 538 (1) Case-based Integration II
This course is not eligible for Credit/D/Fail grading.

PHTH 544 (5) Clinical Practice IVa
This course is not eligible for Credit/D/Fail grading.

PHTH 545 (6) Clinical Practice IVb
This course is not eligible for Credit/D/Fail grading.

PHTH 546 (2) Clinical Decision-Making III
This course is not eligible for Credit/D/Fail grading.

PHTH 548 (1) Case-based Integration III
This course is not eligible for Credit/D/Fail grading.

PHTH 552 (5) Rehabilitation Research
This course is not eligible for Credit/D/Fail grading.

PTHT 554 (4) Clinical Practice V
This course is not eligible for Credit/D/Fail grading.

PTHT 558 (1) Case-Based Integration IV
This course is not eligible for Credit/D/Fail grading.

PTHT 564 (4) Clinical Practice VIa
This course is not eligible for Credit/D/Fail grading.

PTHT 565 (6) Clinical Practice VIb
This course is not eligible for Credit/D/Fail grading.

PTHT 566 (3) Clinical Decision-Making IV
This course is not eligible for Credit/D/Fail grading.

PTHT 574 (4) Clinical Practice VII
This course is not eligible for Credit/D/Fail grading.

PTHT 576 (1) Clinical Decision Making V
Pass/fail. This course is not eligible for Credit/D/Fail grading.

PTHT 580 (9) Orthopaedic Clinical Reasoning and Skills
Restricted to students in the Graduate Certificate in Orthopaedic Manipulative Physical Therapy program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: RHSC 501.
Corequisite: PTHT 581.

PTHT 581 (3) Evidence and Theory in Manipulative Therapy
Restricted to students in the Graduate Certificate in Orthopaedic Manipulative Physical Therapy program. This course is not eligible for Credit/D/Fail grading.
Prerequisite: RHSC 501.
Corequisite: PTHT 580.

Cellular and Physiological Sciences, Faculty of Medicine

PHYL: Cellular and Physiological Sciences

As of Summer Session 2013, all undergraduate PHYL courses have been renamed CAPS with equivalent course numbers.

PHYL 511 (2-6) c Seminar in Mammalian Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 521 (3) Advanced Topics in Renal Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 522 (3) Advanced Topics in Cardiovascular Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 523 (3) Advanced Topics in Gastrointestinal Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 524 (3) Advanced Topics in Endocrinology
This course is not eligible for Credit/D/Fail grading.

PHYL 526 (3) Advanced Topics in Neurophysiology
This course is not eligible for Credit/D/Fail grading.

PHYL 527 (3) Advanced Topics in Respiratory Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 530 (3) Muscle Biophysics
This course is not eligible for Credit/D/Fail grading. Equivalency: ANAT 527.

PHYL 531 (3) Sensory Physiology I: Hearing and Vision
Offered in even numbered years. This course is not eligible for Credit/D/Fail grading.
Equivalency: AUDI 512.

PHYL 532 (3) Sensory Physiology II: Vestibular System, Somatic
Offered in odd numbered years. This course is not eligible for Credit/D/Fail grading.

PHYL 533 (3) Physiology of Thermoregulation
Comprehensive study of thermoregulatory physiology and pathophysiology from molecular to organismal levels in mammal and other vertebrates. This course is not eligible for Credit/D/Fail grading.

PHYL 548 (2-6) c Advanced Topics in Human Physiology
This course is not eligible for Credit/D/Fail grading.

PHYL 549 (12) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

PHYL 649 (0) Doctoral Dissertation

Physics and Astronomy, Faculty of Science

PHYS: Physics

Science students with BC Secondary School Physics 11, but not Physics 12, are required to take PHYS 100. PHYS 100 is intended primarily for students who have completed only Physics 11 or its equivalent. Credit will not be given for PHYS 100 to students with credit for Physics 12 unless they took AP, IB, or A-level Physics and were offered advanced credit for PHYS 100. Most Science degree specializations require at least one or two terms of physics beyond Physics 12 or PHYS 100. Science One is considered to include two terms of physics. Credit will be given for only one of PHYS 117, PHYS 107 and for only one of PHYS 102, PHYS 108, PHYS 118.

PHYS 100 (3) Introductory Physics
An introduction to fundamental concepts such as force, energy, momentum, and the use of graphs and vectors in physics; geometrical optics; electricity; laboratory exercises to familiarize the student with both the phenomena and the basic laboratory instruments commonly used to measure them. Students with credit for Physics 12 may not obtain credit for this course unless they took AP, IB, or A-level Physics and were offered advanced credit for PHYS 100. [3-3*-1*]
Prerequisite: Not open to students with credit for PHYS 12. Principles of Mathematics 12 or Pre-calculus 12 is required; Physics 11 is required for first-year students, strongly recommended for others.

PHYS 101 (3) Energy and Waves
Fluids, harmonic oscillator, travelling waves, standing waves, sound, and interference of light waves, including diffraction. Please consult the Faculty of Science Credit Exclusion List: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 [3-3*-1*]
Prerequisite: One of PHYS 12, PHYS 100.
Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

PHYS 102 (3) Electricity, Light and Radiation
Introduction to optics, electricity and magnetism, electric circuits, radioactivity, including biological applications. Please consult the Faculty of Science credit exclusion list: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 [3-3*-1*]
Prerequisite: One of PHYS 101, PHYS 107.
Corequisite: One of MATH 101, MATH 103, MATH 105, MATH 121.

PHYS 107 (3) Enriched Physics 1
Classical mechanics including conservation laws, angular momentum of rigid bodies and simple harmonic motion, wave phenomena, with an introduction to special relativity, quantum mechanics, nuclear physics, statistical mechanics and solid state physics. Please consult the Faculty of Science credit exclusion lists:
http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414 [3-3*-1*]
Prerequisite: Either (a) a score of 85% or higher in PHYS 12 and a score of 85% or higher in MATH 12; or (b) a score of 85% or higher in PHYS 10 or (c) a score of 85% or higher in PHYS 12 and a score of 85% or higher in MATH 12; or (d) a score of
85% or higher in PHYS 12 and a score of 85% or higher in CALC 12. MATH 12 = Principles of Mathematics 12; PREC 12 = Pre-calculus 12; CALC 12 = Calculus 12, PHYS 12 = Physics 12.

Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 120, MATH 180, MATH 184.

PHYS 108 (3) Enriched Physics II
Electricity and magnetism, electrical circuits, induction, electromagnetic waves, Maxwell's equations and applications. Please consult the Faculty of Science credit exclusion lists: [3-0-1]

Prerequisite: Either (a) PHYS 107 or (b) a score of 85% or higher in PHYS 101 or (c) a score of 85% or higher in PHYS 117.

Corequisite: One of MATH 101, MATH 103, MATH 105, MATH 121.

PHYS 109 (1) Enriched Experimental Physics
A laboratory course accompanying PHYS 108 with emphasis on data collection and analysis and experimental techniques. [0-3-0]

Prerequisite: PHYS 107.

Corequisite: One of PHYS 108, PHYS 118.

PHYS 117 (3) Dynamics and Waves
Kinematics including curvilinear motion. Forces and Newton's laws of motion. Work-energy theorem, conservation of energy. Conservation of momentum, collisions. Torque, rotational dynamics, angular momentum. Oscillations and waves. Please consult the Faculty of Science credit exclusion list: [3-0-2]

Prerequisite: One of MATH 12, PHYS 100.

Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

PHYS 118 (3) Electricity, Light and Radiation
Optics, electricity and magnetism, electric circuits, radioactivity, including biological applications. Please consult the Faculty of Science credit exclusion list: [3-0-1]

Prerequisite: One of PHYS 101, PHYS 107, PHYS 117, PHYS 157 and one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

Corequisite: One of MATH 101, MATH 103, MATH 105, MATH 121.

PHYS 119 (1) Experimental Physics Lab
Introductory laboratory course, with emphasis on data collection, data analysis techniques, and scientific reasoning. Please consult the Faculty of Science credit exclusion list: [0-3-0]

Prerequisite: One of PHYS 12, PHYS 100, PHYS 101, PHYS 117.

Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

PHYS 153 (6) Elements of Physics
Thermometry, thermal properties of matter, heat, oscillations, waves, sound, wave optics; geometrical optics, elementary electricity and magnetism, simple DC and AC circuits. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-1; 3-3-1]

Prerequisite: One of PHYS 12, PHYS 100.

Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

PHYS 157 (3) Introductory Physics for Engineers I
Heat, thermodynamics, oscillations, waves, and sound. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-1]

Prerequisite: One of PHYS 12, PHYS 100.

Corequisite: One of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

PHYS 158 (3) Introductory Physics for Engineers II
Electricity and magnetism, DC and AC circuits, optics. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-1]

Prerequisite: PHYS 157.

Corequisite: One of MATH 101, MATH 103, MATH 105, MATH 121.

PHYS 159 (1) Introductory Physics Laboratory for Engineers
A laboratory course with emphasis on experimental design, measurement and analysis techniques. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414 [0-3-0]

Prerequisite: One of PHYS 12, PHYS 100.

Corequisite: One of PHYS 157, PHYS 158.

PHYS 170 (3) Mechanics I
Statics of particles, equilibrium or rigid bodies, rigid body statics and internal forces, trusses; kinematics: rectilinear motion;
dynamics: Newton's second law, friction, impulse, momentum, work and energy. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-1]

**Prerequisite:** One of PHYS 12, PHYS 100 and one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 120, MATH 180, MATH 184.

**Corequisite:** One of MATH 101, MATH 103, MATH 105, MATH 121.

**PHYS 200 (4) Relativity and Quanta**
Special relativity: Lorentz transformation, dynamics and conservation laws. Quantum physics: the experimental evidence for quantization; a qualitative discussion of the concepts of quantum mechanics and their application to simple systems of atoms and nuclei. [4-0-0]

**Prerequisite:** Either (a) one of PHYS 102, PHYS 108, PHYS 118, PHYS 158, PHYS 153 and one of MATH 101, MATH 103, MATH 105, MATH 121; or (b) SCIE 001.

**PHYS 203 (4) Thermal Physics I**
Fundamentals of thermodynamics and statistical physics; entropy, laws of thermodynamics, heat engines, free energy, phase transitions, Boltzmann statistics, quantum statistics. [4-0-0]

**Prerequisite:** One of PHYS 102, PHYS 108, PHYS 118, PHYS 158, PHYS 153, SCIE 001.

**Corequisite:** One of MATH 217, MATH 200, MATH 226, MATH 253, MATH 263.

**PHYS 209 (4) Intermediate Experimental Physics**
Use of analog electronics and amplifiers, digital electronics and analog-to-digital conversion and the use of computers in data analysis and simulations in thermodynamic, electronic and modern physics experiments. [0-3-1*]

**Prerequisite:** Either (a) all of PHYS 108, PHYS 109 or (b) one of PHYS 102, PHYS 153 or (c) SCIE 001 or (d) all of PHYS 158, PHYS 159 or (e) all of PHYS 118, PHYS 119.

**Corequisite:** One of MATH 215, MATH 255, MATH 256, MATH 265 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

**PHYS 210 (3) Introduction to Computational Physics**
Introduction to UNIX/Linux; software tools for processing, fitting and displaying data; numerical methods and application in the physical sciences. [2-3-0]

**Prerequisite:** One of PHYS 102, PHYS 108, PHYS 118, PHYS 158, PHYS 153, SCIE 001.

**Corequisite:** One of MATH 152, MATH 221, MATH 223.

**PHYS 216 (3) Intermediate Mechanics**
Review of kinematics, Newton's laws, angular momentum and fixed axis rotation. Rigid body motion, central forces, non-inertial frames of reference. Introduction to Lagrangian and Hamiltonian mechanics. [3-0-1]

**Prerequisite:** One of PHYS 107, PHYS 117, PHYS 170, SCIE 001 and one of MATH 152, MATH 221, MATH 223.

**Corequisite:** One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

**PHYS 219 (2) Intermediate Experimental Physics I**
Analog electronics and amplifiers, digital electronics, analog-to-digital converters and an introduction to use of computers in data analysis and simulations. [1-3-0]

**Prerequisite:** Either (a) one of PHYS 108, PHYS 118 and one of PHYS 109, PHYS 119; or (b) PHYS 102 or (c) all of PHYS 158, PHYS 159 or (d) SCIE 001.

**Corequisite:** One of MATH 200, MATH 217, MATH 226, MATH 253.

**PHYS 229 (1) Intermediate Experimental Physics II**
Thermodynamics experiments, modern physics experiments and use of computers in data analysis. [0-3-1*]

**Prerequisite:** PHYS 219.

**Corequisite:** MATH 215.

**PHYS 250 (3) Introduction to Modern Physics**
Wave-particle duality of matter, special relativity, processes in atomic, nuclear and solid state, and introduction to quantum mechanical devices and techniques. [3-0-1]

**Prerequisite:** One of PHYS 102, PHYS 108, PHYS 118, PHYS 158, PHYS 153, SCIE 001.

**PHYS 298 (3) Co-operative Work Placement I**
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the winter term of the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** PHYS 200.
PHYS 299 (3) Co-operative Work Placement II
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PHYS 298.

PHYS 301 (3) Electricity and Magnetism
Maxwell’s equations and their applications, electrical fields and potentials of static charge distributions, current, fields of moving charges, magnetic fields, electromagnetic induction. [3-0-1]
Prerequisite: One of PHYS 102, PHYS 108, PHYS 118, PHYS 153, PHYS 158, SCIE 001 and one of MATH 217, MATH 227, MATH 317 and one of MATH 215, MATH 255.

PHYS 304 (3) Introduction to Quantum Mechanics
Principles and applications of quantum mechanics, wave mechanics, the Schroedinger equation, expectation values, Hermitian operators, commuting observables, one-dimensional systems, harmonic oscillators, angular momentum, three dimensional systems. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of PHYS 200, PHYS 250.
Corequisite: One of MATH 257, MATH 316, PHYS 312.

PHYS 305 (3) Introduction to Biophysics
Physical principles involved in biological systems at the microscopic and molecular scales. Diffusion, low Reynolds number dynamics, the physicist’s view of biomolecular structure, models of molecular motors and membranes. [3-0-0]
Prerequisite: One of PHYS 102, PHYS 108, PHYS 118, PHYS 153, PHYS 158, SCIE 001 and either (a) PHYS 203 or (b) one of ENPH 257, CHEM 201, CHEM 205 and one of MATH 302, MATH 318, STAT 241, STAT 251, STAT 302.

PHYS 306 (3) Advanced Mechanics
Variational calculus, Lagrangian dynamics, rigid body motion including free and forced precession, Hamiltonian mechanics, Poisson brackets, canonical coordinates, Hamilton-Jacobi theory, action angle variables. Introduction to dynamical chaos: determinism, Lyapunov exponents. [3-0-1]
Prerequisite: One of PHYS 216, ENPH 270 and one of MATH 215, MATH 255, MATH 266, MATH 267.

PHYS 309 (3) Electrical Laboratory
Selected experiments in electromagnetism and electronics; computer data acquisition; advanced data analysis and simulation. [1-4-0]
Prerequisite: One of PHYS 209, PHYS 229, ENPH 259.

PHYS 312 (3) Introduction to Mathematical Physics
The application of ordinary and partial differential equations to physical problems; boundary and initial value problems associated with heat, wave and Laplace equations. Fourier analysis; expansions in Bessel and Legendre functions. Credit will be granted for only one of PHYS 312 and MATH 316. [3-0-0]
Prerequisite: MATH 215.

PHYS 314 (3) Fluids
Kinetic theory: Diffusion, viscosity and sound waves. Introduction to hydrodynamics: Laminar flow, capillary and gravity waves, convection and turbulence. Dimensional analysis. [3-0-0]
Prerequisite: MATH 215.
Corequisite: PHYS 203.

PHYS 315 (3) Quantum Physics of Materials
Crystal structure, elasticity and phonons, elementary electronic transport, defects, alloys, liquid crystals and polymers. [3-0-0]
Prerequisite: One of PHYS 203, ENPH 257, CHEM 201, CHEM 205, CHEM 304 and one of MATH 200, PHYS 250, CHEM 312.
Corequisite: MATH 215.

PHYS 318 (3) Experimental Acoustics
Experimental techniques of acoustics: data acquisition hardware and software, microphones, loudspeakers, noise, vibration and modal analysis. [2-3-0]
Prerequisite: One of ENPH 259, PHYS 209, PHYS 229.

PHYS 319 (3) Electronics Laboratory
A project-oriented lab introducing the design and construction of microprocessor-controlled devices. [1-4-0]
Prerequisite: One of PHYS 209, PHYS 219, ENPH 259.
PHYS 330 (3) Modern Physics
Quantum physics, nuclear energy and particle physics at a level suitable for third- and fourth-year Science students not proceeding to a physics degree. Not for credit towards a B.Sc. in Astronomy, Biophysics or Physics. [3-0-0]
Prerequisite: Either (a) one of MATH 100, MATH 102, MATH 104, MATH 110, MATH 180, MATH 184 and one of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157; or (b) SCIE 001.

PHYS 333 (3) Energy and Climate
The fundamental physics behind global issues of energy use and climate change. [3-0-0]
Prerequisite: Either (a) one of MATH 101, MATH 103, MATH 105, MATH 121 and one of PHYS 101, PHYS 102, PHYS 107, PHYS 108, PHYS 117, PHYS 118, PHYS 153, PHYS 157, PHYS 158; or (b) SCIE 001.

PHYS 340 (3) From Atoms to the Universe
Ancient Greek ideas of substance and forms and modern concepts of forces and fields. The twentieth-century quantum revolution. The modern universe, from quarks and atoms to the big bang. Quantum paradoxes. Not for credit in the faculties of Science and Applied Science. No mathematics required. [3-0-0]

PHYS 341 (3) Physics of Music
An introduction to the physical principles important to the production, transmission and perception of musical sounds. The treatment will be non-mathematical; with emphasis on demonstrations. Topics may include the description of sound waves, resonances, scales, physics of hearing, examination of specific musical instruments, etc. Not for credit in the Faculties of Science and Applied Science. [3-0-0]

PHYS 342 (3) Physical Science by Inquiry
A guided sequence of hands-on science modules intended primarily for prospective elementary schoolteachers, to help them to work constructively in a science teaching role. Not for credit in the Faculties of Science and Applied Science. [0-6-0]
Prerequisite: Secondary school algebra.

PHYS 348 (3) Frontiers in Physics and Astronomy
Current research topics in physics and astronomy are investigated and explored. Technical communication and research skills are studied and developed via oral presentations and written scientific reports on these current research topics. [3-0-0]
Prerequisite: Third-year standing in a physics honours program or fourth-year standing in a physics or astronomy major program.

PHYS 349 (3) Directed Research Project in Physics
A research project, undertaken under the direction of a faculty member, culminating in a written report. This course requires approval of the course instructor and program advisor in the Department of Physics and Astronomy. [1*-6-0]

PHYS 350 (3) Applications of Classical Mechanics
Prerequisite: One of ENPH 270, PHYS 270.

PHYS 354 (3) Electric and Magnetic Fields
Applications of electricity and magnetism. Maxwell's equations. [3-0-1]
Prerequisite: One of PHYS 102, PHYS 108, PHYS 153, SCIE 001 and one of MATH 215, MATH 255 and one of MATH 217, MATH 227, MATH 317.

PHYS 399 (3) Co-operative Work Placement III
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in PhysicsThis course is not eligible for Credit/D/Fail grading.
Prerequisite: PHYS 299.

PHYS 400 (3) Introduction to Elementary Particles
Standard model, classification of elementary particles and forces of nature, symmetries, conservation laws, quark model, quantum electrodynamics, quantum chromodynamics, and the theory of weak interactions. [3-0-0]
Prerequisite: One of PHYS 304, PHYS 450.

PHYS 401 (3) Electromagnetic Theory
Applications of Maxwell's theory. Wave propagation in dielectrics, conductors and plasmas, wave guides, radiation, antennae, and special relativity. [3-0-0]
Prerequisite: One of PHYS 301, PHYS 354.
PHYS 402 (3) Applications of Quantum Mechanics
Spin and angular momentum addition, perturbation methods, and applications in the fields of Atomic, Molecular, Nuclear, and Solid State Physics. [3-0-0]
Prerequisite: One of PHYS 304, PHYS 450.

PHYS 403 (3) Statistical Mechanics
Principles and applications of statistical mechanics. Ideal gases, degenerate Fermi gases, Bose-Einstein condensation, black body radiation, fluctuations and phase transitions. Credit will be granted for only one of PHYS 403 or PHYS 455. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of PHYS 203, ENPH 257, PHYS 257, CHEM 201, CHEM 304 and one of PHYS 304, PHYS 450, CHEM 312. One of MATH 302, MATH 318, STAT 241, STAT 251, STAT 302 is recommended.

PHYS 404 (3) Introduction to Medical Physics
Radiotherapy, X-ray imaging, nuclear medicine, magnetic resonance imaging and biomedical optics. [3-0-0]
Prerequisite: Third year standing in Science or Applied Science is required. MATH 200 (or MATH 217 or MATH 226 or MATH 267) is recommended.

PHYS 405 (3) Radiation Biophysics
Physical and chemical interactions of ionizing radiations and their biological effects at the cellular, tissue and whole-animal levels. Credit will be granted for only one of PHYS 405 or PHYS 536. See the Faculty of Science Credit Exclusion Lists: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-0-0]
Prerequisite: One of PHYS 102, PHYS 108, PHYS 118, PHYS 153, PHYS 158, SCIE 001 and third year standing in Science or Applied Science.

PHYS 407 (3) Introduction to General Relativity
Physical consequences of Einstein's equations, including the principle of equivalence, curved space-time, geodesics, the Schwarzschild solution, deflection of light, black holes, and gravitational radiation. [3-0-0]
Prerequisite: One of MATH 217, MATH 227, MATH 317 and one of MATH 215, MATH 255. PHYS 301 and one of PHYS 206, PHYS 306 are recommended.

PHYS 408 (4) Optics
Principles and applications of optical physics. Interference, diffraction, coherence, polarization, Fresnel relations, optical coatings, waves in dielectric media, Gaussian beams, waveguides, optical cavities, lasers, fibre optics, and Fourier optics. [3-3-0]
Prerequisite: One of PHYS 301, PHYS 354 and one of MATH 215, MATH 255.

PHYS 409 (3/6) c Experimental Physics
A laboratory course with a wide choice of experiments for fourth year Honours and Major students. Topics include solid state, nuclear, classical, quantum, electromagnetic and low temperature physics. For six credits, two weekly laboratory periods and completion of a project in second term are required. [0-3-0]
Prerequisite: One of PHYS 309, PHYS 319.

PHYS 410 (3) Computational Physics
Prerequisite: One of PHYS 312, MATH 257, MATH 316 and one of PHYS 210, EOSC 211, CPSC 110, CPSC 111, APSC 160.

PHYS 412 (3) Quantum Physics
Fundamentals of atomic, nuclear, particle, and condensed matter physics. [3-0-0]
Prerequisite: MATH 215 and one of CHEM 312, PHYS 200.

PHYS 420 (2-4) c Physics Demonstrations
The students will prepare, under the supervision of a faculty member, a demonstration or series of demonstrations intended to illustrate physical principles to diverse audiences. Intended for third- or fourth-year Physics Majors and Math/Science Education students.

PHYS 437 (3) Physics of Biocellular Structure and Machinery
Molecular structure and architecture of biological cells, interactions of molecules in aqueous solution and at interfaces, physical properties of polymers and surfactants, mechanisms of cell membranes and cytoplasmic structures, thermodynamics of molecular machines and mechanical enzymes. Credit can not be given for both PHYS 437 and 537. [3-0-0]
Prerequisite: One of PHYS 313, PHYS 403, PHYS 455, CHEM 304.

PHYS 438 (3) Zoological Physics
Animal systems viewed from a physicist's perspective. Topics include sensory systems, energy budgets, locomotion, internal
flows, physical advantages of grouping. [3-0-0]

Prerequisite: One of PHYS 101, PHYS 107, PHYS 117, PHYS 153, PHYS 157, SCIE 001. BIOL 325 is recommended.

Equivalency: BIOL 438.

PHYS 447 (3/6) c Advanced Topics in Physics
Directed studies available to students in Honours Physics with approval from the Head of the Department.

PHYS 449 (6) Honours Thesis
A research project, undertaken under the direction of a faculty member, culminating in a thesis. [1*-6-0]

PHYS 450 (3) Quantum Mechanics
Postulates of quantum mechanics, expectation values, hermitian operators, commuting observables, applications to one-dimensional systems, harmonic oscillators, angular momentum, applications in three dimensions, hydrogen atom, time dependent perturbations. Credit will be granted for only one of PHYS 304, 450 or CHEM 312. [3-0-0]

Prerequisite: One of PHYS 200, PHYS 250.

PHYS 454 (3) Applied Electromagnetic Theory
Wave propagation and related phenomena in dielectrics, conductors and plasmas. Wave guides, radiation, antennae, special relativity. [3-0-0]

Prerequisite: One of PHYS 301, PHYS 354.

PHYS 455 (3) Statistical Mechanics
Introduction to quantum statistical mechanics and its application to systems of varying complexity from the simple ideal gas to the degenerate gas. Quantum fluids, phase transitions and simulation methods will also be introduced. Credit will be granted for only one of PHYS 403 or PHYS 455. [3-0-0]

Prerequisite: One of PHYS 257, PHYS 203, PHYS 313 and one of PHYS 304, PHYS 450.

PHYS 458 (4) Applied Optics
Basic applications of lasers, geometrical optics, fibre optics, diffraction, and Fourier optics. [3-3-0]

Prerequisite: All of PHYS 250, PHYS 354.

PHYS 473 (3) Applied Nuclear Physics
Radioactive decay and radiations, nuclear properties, interactions of neutrons, physical principles of power reactors, nuclear fusion, radiation monitoring, and safety. [3-0-1*]

Prerequisite: One of PHYS 304, PHYS 450.

PHYS 474 (3) Applied Solid State Physics
Symmetry of crystal structures, reciprocal lattice, band theory, conduction in metals and semiconductors, phonons and superconductivity. [3-0-0]

Prerequisite: One of PHYS 450, PHYS 304.

PHYS 490 (3) Student Directed Seminar
Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment, and delivery methods will comply with the "Handbook for Student Directed Seminars". Cannot be used as a specialization requirement in any PHYS and/or ASTR specialization. This course is not eligible for Credit/D/Fail grading. [3-0-0]

PHYS 498 (3) Co-operative Work Placement IV
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the fall term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. This course is not eligible for Credit/D/Fail grading.

Prerequisite: PHYS 399.

PHYS 499 (3) Co-operative Work Placement V
Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. This course is not eligible for Credit/D/Fail grading.

Prerequisite: PHYS 498.

PHYS 500 (3) Quantum Mechanics I
Non-relativistic quantum mechanics with applications to atomic, nuclear and particle physics. Perturbation theory, multielectron atoms, molecular structure, WKB, scattering theory. This course is not eligible for Credit/D/Fail grading.

Prerequisite: PHYS 402.
PHYS 501 (3) Quantum Mechanics II
Time-dependent perturbation theory, density matrix formalism, NMR, emission and absorption of radiation. Elementary field theory techniques for many body systems. Quasiparticles, phonons, magnons, holes. Relativistic Klein-Gordon and Dirac equations. This course is not eligible for Credit/D/Fail grading.

PHYS 502 (3) Condensed Matter Physics I
One-electron theory of solids, energy bands, lattice vibration, transport theory. This course is not eligible for Credit/D/Fail grading. Prerequisite: A background in undergraduate solid state physics such as covered in PHYS 474 is highly recommended.

PHYS 503 (3) Condensed Matter Physics II
Interacting electrons, electron-phonon interaction, Hubbard model, magnetism, superconductivity, use of Green functions. This course is not eligible for Credit/D/Fail grading. Prerequisite: PHYS 502. Corequisite: PHYS 500.

PHYS 504 (3) Special Relativity and Classical Electromagnetism
Boundary-value problems, Green's functions and multipole expansions, magnetostatics, Faraday's law of induction, retarded potentials, Poynting's theorem and conservation laws, gauge invariance. Propagation of electromagnetic waves. Presentation of radiation from moving charges, classical electron theory. This course is not eligible for Credit/D/Fail grading. Prerequisite: A background in electricity and magnetism such as covered PHYS 401 is highly recommended.

PHYS 505 (3) Nuclear Physics
This course is not eligible for Credit/D/Fail grading.

PHYS 506 (3) Elementary Particle Physics
This course is not eligible for Credit/D/Fail grading.

PHYS 508 (3) Quantum Field Theory II
This course is not eligible for Credit/D/Fail grading. Prerequisite: PHYS 526.

PHYS 509 (2-4) d Theory of Measurements
Estimation of parameters from experimental measurements; maximum likelihood; least squares; tests of significance (chi square, etc). Noise properties of common devices. Extracting signals from noise; signal averaging; auto and cross-correlation, etc. This course is not eligible for Credit/D/Fail grading.

PHYS 513 (2-4) d Topics in Advanced Spectroscopy
This course is not eligible for Credit/D/Fail grading.

PHYS 516 (3) Statistical Mechanics
Mean field theory, Landau theory of phase transitions, critical phenomena, renormalization theory. Monte Carlo method, linear response theory, fluctuations. This course is not eligible for Credit/D/Fail grading.

PHYS 518 (2/3) d Superconductivity
Conventional theories: BCS and Landau-Ginsburg, Josephson effect. New theories of high TC superconductivity. This course is not eligible for Credit/D/Fail grading.

PHYS 520 (1-2) d Teaching Techniques in Physics and Astronomy
Foundations of physics and astronomy education research, lesson plans, development of grading, effective questioning, effective presentations, methods in peer evaluation, and peer teaching. This course is not eligible for Credit/D/Fail grading. [1-0-0]

PHYS 521 (2-4) c Group Theory Methods in Quantum Mechanics
Selected topics from atomic, molecular, solid state, nuclear and elementary particle physics treated by group theory methods. This course is not eligible for Credit/D/Fail grading. Prerequisite: PHYS 500.

PHYS 523 (2-3) d Quantum Electronics and Nonlinear Optics
Macroscopic and microscopic treatments of linear and non-linear response to electromagnetic fields. This course is not eligible for Credit/D/Fail grading.

PHYS 525 (2-3) d Advanced Condensed Matter Physics
Current issues in condensed matter theory. This course is not eligible for Credit/D/Fail grading. Prerequisite: All of PHYS 500, PHYS 503.

PHYS 526 (3) Quantum Field Theory I
This course is not eligible for Credit/D/Fail grading.
PHYS 527 (2/3) d Topics in Nuclear Physics
Selected topics from current nuclear theory. This course is not eligible for Credit/D/Fail grading. 
Prerequisite: All of PHYS 501, PHYS 505.

PHYS 528 (2/3) d Elementary Particle Physics
This course is not eligible for Credit/D/Fail grading. Prerequisite: All of PHYS 508, PHYS 505.
Corequisite: PHYS 508.

PHYS 529 (2/3) d Topics in Quantum Theory
This course is not eligible for Credit/D/Fail grading.

PHYS 530 (2-4) d Topics in General Relativity Theory
This course is not eligible for Credit/D/Fail grading. Prerequisite: PHYS 504.

PHYS 531 (3/4) c Particle Detection Techniques
This course is not eligible for Credit/D/Fail grading.

PHYS 533 (3) Laser Physics
Classical and semi-classical treatment of interaction of EM-radiation with atomic systems; semi-classical laser theory; Gaussian beams and optical resonators; specific laser types and systems: femtosecond lasers and amplifiers; Raman lasers; lasing with inversion; topics of current research interest.

PHYS 534 (3) Radiotherapy Physics I
Principles of dosimetry of ionizing radiation with emphasis on applications to radiotherapy and radiobiology. This course is not eligible for Credit/D/Fail grading.

PHYS 535 (3) Radiotherapy Physics II
A continuation of PHYS 534, including an extension of the topics discussed in that course. This course is not eligible for Credit/D/Fail grading.

PHYS 536 (3) Advanced Radiation Biophysics
Credit will be granted for only one of PHYS 536 or PHYS 405. This course is not eligible for Credit/D/Fail grading.

PHYS 539 (3) Radiation Dosimetry
This course is not eligible for Credit/D/Fail grading.

PHYS 540 (3) Radiological Imaging
This course is not eligible for Credit/D/Fail grading.

PHYS 541 (3) Nuclear Medicine
This course is not eligible for Credit/D/Fail grading. Prerequisite: PHYS 473.

PHYS 542 (3) Nuclear Magnetic Resonance Imaging
This course is not eligible for Credit/D/Fail grading.

PHYS 543 (3) Biomedical Optics
This course is not eligible for Credit/D/Fail grading.

PHYS 545 (3) Anatomy, Physiology and Statistics for Medical Physicists
Restricted to graduate students in the M.Sc. (Medical Physics) Specialization. This course is not eligible for Credit/D/Fail grading.

PHYS 546 (2) Clinical Experience in Medical Physics
Clinical treatment planning techniques, quality assurance of treatment equipment and clinical decision making for radiation therapy. Quality assurance and decision making for medical imaging. Pass/fail.

PHYS 549 (12) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

PHYS 555 (1-6) c Directed Studies in Physics
With approval of the department head, advanced studies under the direction of a staff member may be arranged in special cases.

PHYS 560 (3) Physics and Engineering of Particle Accelerators
Injectors, radio frequency acceleration, superconducting acceleration elements, beam dynamics, and applications of electron accelerators. This course is not eligible for Credit/D/Fail grading.

PHYS 565 (3) Applications of Radioisotopes in Science and in Medicine
Use of radioisotopes in nuclear medicine, materials science, environmental science, and nuclear physics in combination with the associated production, processing, and detection technologies. This course is not eligible for Credit/D/Fail grading.

**PHYS 571 (3) Physical Cosmology**
Credit will be granted for only one of ASTR 403 or PHYS 571. This course is not eligible for Credit/D/Fail grading. [3-0]

**PHYS 572 (3) Experimental Methods in Quantum Materials**
This course is not eligible for Credit/D/Fail grading.

**PHYS 573 (3) Modeling and Simulation of Quantum Materials**
This course is not eligible for Credit/D/Fail grading. Prerequisite: A background in undergraduate solid state physics such as covered in PHYS 474 is highly recommended.

**PHYS 599 (12/18) c M.A.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**PHYS 649 (0) Doctoral Dissertation**

**School of Community and Regional Planning, Faculty of Applied Science**

**PLAN: Community and Regional Planning**

Not all courses offered each year.

**PLAN 211 (3) City-Making: A Global Perspective**
Contemporary city development trends, policies, and practices across the globe as explored against the backdrop of culture and technology. Includes hands-on learning.
Prerequisite: Second-year standing or above in any program.

**PLAN 221 (3) City Visuals**
An exploratory journey through the vast world of visualizing the city and ways of representing the built environment, including how to both interpret and use visualizations to read the city.
Prerequisite: Second-year standing or above in any program.

**PLAN 321 (3) Indigeneity and the City**
Place-based exploration of the multiple, complex and contested ways urban Indigeneity is constituted in Canada today, with opportunities for field trips and hands-on learning.
Prerequisite: Third-year standing or above in any program. Second year students may be admitted with permission of instructor.

**PLAN 331 (3) The Just City in a Divided World**
Considers the city as a terrain for the manifestation and mediation of social justice. Explores how the allocation of land, goods, and services in cities (re)produces social stratification, and how institutions and civil society negotiate just and unjust outcomes.
Prerequisite: Third-year standing or above in any program. Second year students may be admitted with permission of instructor.

**PLAN 425 (3) Urban Planning Issues and Concepts**
Evolution, practice and future of urban planning and development, with emphasis on institutional arrangements, housing, transportation, urban design and development control. For third- and fourth-year undergraduate students interested in urban planning. This course is not eligible for Credit/D/Fail grading. [3-0]

**PLAN 500 (3) Fundamentals of Planning Practice**
The design and use of problem-solving procedures. The effective leadership of planning groups, and the development of appropriate community planning processes. Styles of public participation. This course is not eligible for Credit/D/Fail grading.

**PLAN 501 (3) History of Community and Regional Planning**
The origins and evolution of modern urban and regional planning in North America and Europe, emphasizing the changing role of government in the development of Canadian communities during this century. This course is not eligible for Credit/D/Fail grading.

**PLAN 502 (3) Planning Theory**
Historical and contemporary concepts of the planning process and its legitimacy. The role of the state, public interest, and the responsibilities of professional planners. Concepts and codes of professional ethics. This course is not eligible for Credit/D/Fail grading.
PLAN 503 (3) Planning for Community Economic Development
Theories of community economic development planning. Concepts of community wealth, income, growth and development. Models of the formal and informal community economy. This course is not eligible for Credit/D/Fail grading.

PLAN 504 (3) The Ecological Context of Planning
A planning-oriented approach to ecosystems theory emphasizing the structural and functional properties of the biophysical environment. Definition of the urban-centered region in terms of interregional flows and ecological accounts. This course is not eligible for Credit/D/Fail grading.

PLAN 505 (3) Community Development Planning
Evolution of development theory emphasizing the changing relationships among community, state and individuals. Development paradigms and alternative concepts of community. This course is not eligible for Credit/D/Fail grading.

PLAN 506 (3) The Legal Context of Planning
Legal principles affecting planning administration, separation of functions of government, Canadian Constitution and Charter of Rights and Freedoms, Canadian municipal and natural resource laws, nature and control of administrative action, judicial review of discretionary power, and drafting of legislation. This course is not eligible for Credit/D/Fail grading.

PLAN 507 (3) Regional Development Planning
Origins, theory, and practice of planning for regions in Canada and abroad. Types of planning regions, institutional forms for regional planning, regional disparities, and approaches to regional analysis. Resource frontiers, urban, amenity, and rural regions provide the policy context. This course is not eligible for Credit/D/Fail grading.

PLAN 508 (3) Foundations of Planning Theory and History
This course is not eligible for Credit/D/Fail grading.

PLAN 509 (2) Urbanism as a Global Way of Life
This course is not eligible for Credit/D/Fail grading.

PLAN 510 (2) Environment and Sustainability Concepts for Planning Practice
This course is not eligible for Credit/D/Fail grading.

PLAN 511 (3) Quantitative Reasoning and Statistics for Planning
Research design and statistics for the analysis of empirical issues in planning and policy studies. This course is not eligible for Credit/D/Fail grading.

PLAN 513 (3) Economic Impact and Evaluation for Planning
Topics include economic base, income-expenditure, input-output, computer simulation, cost-benefit, goals achievement matrix and the planning balance sheet. This course is not eligible for Credit/D/Fail grading.

PLAN 514 (3) Impact Analysis for Planning
A planning-oriented approach to environmental impact assessment emphasizing institutional, procedural and methodological issues. The conceptual and systemic relationship among biophysical, social and economic impact assessment and the evolving relationship with community development planning. This course is not eligible for Credit/D/Fail grading.

PLAN 515 (3) Data for Planning Practice
Data collection and analysis in relation to professional practice and the scientific method. Questionnaire surveys and alternatives including secondary analysis, unobtrusive measures and client participation techniques. This course is not eligible for Credit/D/Fail grading.

PLAN 517 (3) Theory and Methods of Urban Design
Application of urban design theory to a neighbourhood design. This course is not eligible for Credit/D/Fail grading.

PLAN 519 (3/6) Internships
Guided hands-on experience of day-to-day planning in a workplace environment. This course is not eligible for Credit/D/Fail grading.

PLAN 521 (3) Quantitative Skills for Planners
This course is not eligible for Credit/D/Fail grading.

PLAN 522 (2) Qualitative Data Collection and Analysis
This course is not eligible for Credit/D/Fail grading.

PLAN 523 (2) The Profession of Planning
This course is not eligible for Credit/D/Fail grading.

PLAN 524 (2) Legal Concepts for Professional Planning
This course is not eligible for Credit/D/Fail grading.

PLAN 525 (2) Planning Practice Methods
This course is not eligible for Credit/D/Fail grading.

PLAN 526 (6) Selected Topics in Experimental Learning: The Planning Studio
This course is not eligible for Credit/D/Fail grading.

PLAN 527 (3-6) d Internship
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

PLAN 528 (3/6) d Capstone Professional Report
This course is not eligible for Credit/D/Fail grading.

PLAN 530 (3) Affordable Housing Policy and Planning
The history of housing and homelessness policies as well as current issues and challenges faced by municipalities, regional governments, non-profit housing providers, and others. This course is not eligible for Credit/D/Fail grading.

PLAN 531 (3) Planning for Disaster-Resilient Communities
Natural disasters from the perspective of risk analysis, risk reduction, and planning for disaster-resilient communities. Focus primarily on Canada and the U.S. but includes disaster risk globally. This course is not eligible for Credit/D/Fail grading.

PLAN 532 (3) Strategic Planning: Developing and Implementing Policy Plans
Theory and practice of developing and implementing plans for sustainable regions, cities, and neighbourhoods. Combining land use, transportation, environment, socio-economic, and financial directions, managing plan making including public participation, and writing council reports. This course is not eligible for Credit/D/Fail grading.

PLAN 533 (3) Indigenous Planning: Ways of Being, Knowing and Doing
Indigenous world views; history of colonization in Canada; contemporary resurgence of Indigenous modes of planning. This course is not eligible for Credit/D/Fail grading.

PLAN 534 (1) Introduction to Geographic Information Systems
Theory, history and capabilities behind GIS, with customized laboratory exercises that incorporate urban design and planning themes. This course is not eligible for Credit/D/Fail grading.

PLAN 535 (3) Transportation Planning & Analysis
Foundations of urban travel modelling: data needs; survey and sampling techniques; model calibration and validation; discrete choice modeling; 4-step travel demand forecasting (trip generation, distribution, modal choice, and assignment); activity based models; integrated land use/transport models. Credit will be granted for only one of CIVL 441, CIVL 583, or PLAN 535. This course is not eligible for Credit/D/Fail grading.

PLAN 538 (3) Cross-Cultural Planning
Understanding of the visible landscapes of the multicultural city and less visible inner landscapes applicable to cross-cultural planning. This course is not eligible for Credit/D/Fail grading.

PLAN 539 (6) Social Learning Studio
Community development, gentrification theory, and social learning; engagement with community organizations. This course is not eligible for Credit/D/Fail grading.

PLAN 540 (3-12) d Planning Project
Group preparation and presentation of a professional report. This course is not eligible for Credit/D/Fail grading.

PLAN 542 (3) Practical Practice: City Planning as a Craft
Approach, role, style, and essential skills of practical urban planning: working at the community level; developing overall policy; managing development; undertaking urban design; and engaging in the political process. This course is not eligible for Credit/D/Fail grading.

PLAN 545 (3-12) d Planning Studies Abroad
An extended site visit outside Canada to understand the cultural context for community and regional planning issues and the local institutional response. This course is not eligible for Credit/D/Fail grading.

PLAN 547 (3/6) d Professional Project Report
Research and preparation of a professional project report on a planning topic in public policy or professional practice. This course
is not eligible for Credit/D/Fail grading.

**PLAN 548 (1-12) d Current Issues in Planning**
Each year the school may offer one or more courses on a topical issue covering recent advances in the field. This course is not eligible for Credit/D/Fail grading.

**PLAN 549 (6-12) c Master’s Thesis**
Research and preparation of a thesis on a topic in public policy or professional practice. This course is not eligible for Credit/D/Fail grading.

**PLAN 550 (3-6) c Directed Studies**
With the approval of the Chair of the program. This course is not eligible for Credit/D/Fail grading.

**PLAN 553 (3) Indigenous Law, Governance and Community Planning**
Laws within which Indigenous Peoples in Canada, and particularly in British Columbia, live, and which impact their communities and Nations. How law and governance inform planning with Indigenous communities. This course is not eligible for Credit/D/Fail grading.

**PLAN 558 (3) The Role of Theory in Planning Research**
This course will be taken in the first term of the Master’s program. This course is not eligible for Credit/D/Fail grading.

**PLAN 559 (3) Design of Planning- and Policy-Oriented Research**
Research design for SCARP thesis-based Master's students. Approaches for designing research methodologies and thesis structure. Selection processes for research focus; linking research problems to methodological sources; logics of structuring the thesis. This course is not eligible for Credit/D/Fail grading.

**PLAN 560 (1) Master's Thesis Workshop**
This course is not eligible for Credit/D/Fail grading.

**PLAN 561 (3) Seminar in Real Property Development and Planning**
Topics will vary. This course is not eligible for Credit/D/Fail grading.

**PLAN 565 (1-12) d Current Issues in Real Property Development and Planning**
Topics will vary. This course is not eligible for Credit/D/Fail grading.

**PLAN 571 (3) Housing Policy and Practice in Cities of the Developing World**
Housing development and government policy in cities of developing countries. This course is not eligible for Credit/D/Fail grading.

**PLAN 572 (3) Project and Program Design in Developing Asian Countries**
Development theories, the role of the state, the importance of political and social contexts, and the influence of foreign planning models. This course is not eligible for Credit/D/Fail grading.

**PLAN 573 (3) Shelter and Services in Developing Countries**
Human settlements paradigm in international development, especially in relation to urban poverty and enabling strategies. This course is not eligible for Credit/D/Fail grading.

**PLAN 575 (3) International Development Planning Seminar**
Topics will vary. This course is not eligible for Credit/D/Fail grading.

**PLAN 579 (3) Public Health, Transportation, and the Built Environment**
Health issues associated with transportation and the built environment; design of urban form for non-motorized transportation for the improvement of personal and environmental health; factors that impact transportation choices; applying findings from research to specific transportation planning processes and projects. Credit will be granted for only one of PLAN 579 or SPPH 571. Equivalency: SPPH 571.

**PLAN 580 (3) Urban Transportation Planning**
Topics include the relationship between transportation and urban activity systems; analysis of supply and demand; accessibility and environment; institutional arrangements and public finance. This course is not eligible for Credit/D/Fail grading.

**PLAN 581 (3) Urban Infrastructure Planning and Development**
Policy considerations in the provision of infrastructure including the legal framework, institutional arrangements, and public finance. Planning considerations in drainage, waterworks, sewerage and waste management. This course is not eligible for Credit/D/Fail grading.

**PLAN 582 (3/6) d Residential Site Planning Studio**
Evaluation of neighbourhoods and projects, site analysis, housing types and densities, provision of community facilities and services, and the design of site plans. This course is not eligible for Credit/D/Fail grading.

PLAN 583 (3) Housing and Community Planning
The social, economic, political, and land use dimensions of Canadian housing in the context of demographic trends, housing demand, and affordability. Recent trends in housing policy and the role of the public and private sectors in housing supply. This course is not eligible for Credit/D/Fail grading.

PLAN 585 (3) Housing Seminar
This course is not eligible for Credit/D/Fail grading. Prerequisite: PLAN 583.

PLAN 586 (3) Gender and Planning
Analysis of women's dual roles as users and creators of built environments and the comparative roles of men and women. This course is not eligible for Credit/D/Fail grading.

PLAN 587 (3-12) Urban Design
A studio/seminar on the history of the physical form of cities and theories of city design. Topics include social impacts, heritage and environmental conservation, urban revitalization, and the legal and administrative instruments for the implementation of city designs. This course is not eligible for Credit/D/Fail grading.

PLAN 588 (3) Social Aspects of Urban Form
Exploration of how the urban built environment has been shaped by the actors in the development process. This course is not eligible for Credit/D/Fail grading.

PLAN 589 (3) Influencing the Policy Process
The evolution of policies through the legislative, regulatory and bureaucratic processes with an emphasis on the federal and provincial governments. This course is not eligible for Credit/D/Fail grading.

PLAN 590 (3) Plan Creation, Implementation, and Evaluation
Examines/evaluates issues related to (1) creating plans; (2) implementing plans; and (3) evaluating plans. This is an elective course for SCARP students that build upon foundational material on plan-making that students are exposed to during the completion of required coursework. This course is not eligible for Credit/D/Fail grading.

PLAN 591 (3) Land Use and Environmental Policy
Identify potential impacts of human land use activities on environmental systems; review policies in place at various levels of government in Canada (and elsewhere) that promote sustainable development and reduce negative impacts; assess effectiveness of those policies; design new policies. This course is not eligible for Credit/D/Fail grading.

PLAN 592 (3) Urban Restructuring
The determinants of urban restructuring, including emerging theoretical perspectives and case studies of Canadian and foreign cities. This course is not eligible for Credit/D/Fail grading.

PLAN 593 (3) Resource Analysis for Regional Planning
An ecological approach to land use and resource analysis for regional planning covering inventory, classification, and alternative methods of analysis. This course is not eligible for Credit/D/Fail grading.

PLAN 595 (3) Facilitation, Negotiation and Conflict Resolution for Planners
This course is not eligible for Credit/D/Fail grading.

PLAN 596 (3) Seminar on Environmental-Economic Systems
Relationships between economic activity and the biophysical environment. Topics include the assumptions and determinants underlying economic growth, market failure and traditional approaches to public intervention, the implications of alternatives such as the steady-state economy and sustainable development. This course is not eligible for Credit/D/Fail grading. Prerequisite: PLAN 504.

PLAN 597 (3) Planning for Water Resources Management
The relationships among relevant bio-physical, socio-economic and institutional systems as applied to regional planning for watersheds, lakes, estuaries, coastal zones and international river basins. Water supply, waste disposal, fisheries, aquaculture, recreation, hydropower and flood control. This course is not eligible for Credit/D/Fail grading.

PLAN 599 (3) Environmental Policy Analysis
Determination of risks and values in environmental policy decisions. This course is not eligible for Credit/D/Fail grading.

PLAN 601 (3) Research Methods Seminar
This course is not eligible for Credit/D/Fail grading.
PLAN 602 (3) Planning Theory Advanced Seminar
   This course is not eligible for Credit/D/Fail grading.

PLAN 603 (3) Ph.D. Colloquium
   This course is not eligible for Credit/D/Fail grading.

PLAN 649 (0) Doctoral Dissertation

Surgery, Faculty of Medicine

PLAS: Plastic Surgery

PLAS 514 (3) Advanced Plastic Surgery I
   Seminar and tutorial on selected topics of plastic surgery. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

PLAS 515 (2) Advanced Plastic Surgery II
   The second year course of the above program. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

PLAS 750 (0) Plastic Surgery Conference
   Presentation of clinical cases with discussion of the underlying patho-physiology as related to patient management. One hour weekly.

PLAS 751 (0) Plastic Surgery Seminar Course
   A one-hour weekly seminar course spread over two years for discussion of embryology, anatomy, physiology and pathology relative to the specialty of plastic surgery. These basic science aspects are discussed in relation to patient management.

PLAS 752 (0) Operative Plastic Surgery
   Techniques of surgery and the relative anatomy and pathophysiology are reviewed during the course of operative procedures.

Faculty of Land and Food Systems

PLNT: Plant Science

PLNT 523 (0) Graduate Research Seminar

PLNT 530 (2-6) Directed Studies
   This course is not eligible for Credit/D/Fail grading.

PLNT 540 (3) Plant Molecular Biology Laboratory
   Techniques of purification, cloning, sequencing, restriction-hybridization analysis of plant nucleic acids, in vitro labelling of plant nucleic acids and proteins, and electrophoresis and immunodetection of plant proteins. Offered by the Biotechnology Teaching Laboratory in cooperation with Plant Science. Admissions to the course is limited and requires recommendation from the Program Coordinator. This course is not eligible for Credit/D/Fail grading.
   Prerequisite: BIOL 335 is recommended.
   Equivalency: BOTA 544, FRST 503.

PLNT 542 (3) Grapevine and Berry Crop Biology
   Credit will be granted for only one of PLNT 542 OR APBI 442. This course is not eligible for Credit/D/Fail grading.

PLNT 549 (12/18) Master's Thesis
   This course is not eligible for Credit/D/Fail grading.

PLNT 649 (0) Doctoral Dissertation

Political Science, Faculty of Arts

POLI: Political Science
For details of courses consult the Departmental website at www.politics.ubc.ca.

POLI 100 (3) Introduction to Politics
Political issues and case studies, drawn from Canadian and international contexts, will be used to introduce students to central debates and concepts of politics and political analysis.

POLI 101 (3) The Government of Canada
An examination of the institutions and processes of Canadian government.

POLI 110 (3) Investigating Politics: An Introduction to Scientific Political Analysis
The logic, challenges, and major strategies of empirical political research. Core research tasks including: asking answerable questions, defining concepts, formulating hypotheses, gathering evidence, measuring variables, constructing comparisons, drawing causal inferences, and reporting findings.

POLI 220 (3) Introduction to Comparative Politics
A comparative analysis of foreign governments. Specific countries to be covered will vary according to section; consult the brochure issued by the Department.

POLI 240 (3) Currents of Political Thought
A critical introduction to some major ideologies and traditions of Western political thought that examines their philosophical origins as well as their implications for political life.

POLI 260 (3) Introduction to Global Politics
Applies conceptual tools to topics such as war, conflict management, the global economy, poverty, and civil society. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Recommended for prospective students of POLI 360-373.

POLI 301 (3) Canadian Political Parties
The organization and operation of party politics and the systems of party competition in Canada. The focus is on national-level politics.
Prerequisite: POLI 101.

POLI 302 (3/6) d Public Administration
The structure and organization of the administrative branch of government in theory and practice. Administrative powers and policy-making in the modern state. Examples of the administrative processes are drawn from Canada and other countries.
Prerequisite: POLI 101.

POLI 303 (3) Federalism in Canada
Theory and practice of federalism; cultural duality, social stresses, and problems of flexibility. The constitution and role of the courts.
Prerequisite: POLI 101.

POLI 304 (3) British Columbia Government and Politics
An examination of the party system, and other institutions and processes of the British Columbia political system.
Prerequisite: POLI 101.

POLI 305 (3) Canadian Political Ideas
Political theories and ideologies in Canada.
Prerequisite: POLI 101.

POLI 306 (3) Local Government and Politics in Canada
Local and regional political institutions and processes in Canada, with particular attention to those of Vancouver and other British Columbia localities.
Prerequisite: POLI 101.

POLI 307 (3) Quebec Government and Politics
The nature of politics and the conduct of government in contemporary Quebec. The course is open to students from fields other than political science.
Prerequisite: POLI 101.

POLI 308 (3/6) d Issues in Canadian Politics
An examination of one or more major issues in Canadian politics (e.g., the Charter, electoral reform). Topics will vary from year to year.
Prerequisite: POLI 101.

POLI 309 (3) Canadian Perspectives on Human Rights
Key issues in the theory and practice of human rights in Canada. Topics will vary from year to year.
Prerequisite: POLI 101.

POLI 310 (3) Parliament and Party: The Strategy of Politics
Parliamentary and party politics, showing how politicians in Canada and other countries strike bargains with allies, outmanoeuvre opponents in debates, and manipulate institutional rules.
Prerequisite: POLI 101.

POLI 316 (3/6) d Global Indigenous Politics
The political dynamics of Indigenous peoples' politics on the global level; the legal and practical realities of colonization as a global Indigenous experience; current global Indigenous political issues and avenues of Indigenous resistance.

POLI 320 (3/6) d Government and Politics of the United States of America
The distinctive political system of the U.S. Covers all major institutions and processes, focusing on contemporary issues. Comparisons with the Canadian system. Sources of political failure and possible reform.

POLI 321 (3/6) d Chinese Politics and Development
The course will explore various aspects of Chinese politics and the dynamics of China's development since 1949. Topics include: the Cultural Revolution, political reform and protest, and economic reform policies and their consequences.

POLI 322 (3) Japanese Government and Politics
A general introduction to modern Japanese politics from various theoretical and comparative perspectives.

POLI 323 (3/6) d South Asian Government and Politics
Comparative analysis of politics and government in India, Pakistan, Bangladesh, and Sri Lanka. Imperial legacies and nationalist movements; political institution-building amidst socio-cultural diversity; parties and interest groups; elections and leadership crises; military intervention; ethnic and class conflicts; foreign policy.

POLI 324 (3/6) d Southeast Asian Government and Politics
The political systems of contemporary Southeast Asia.

POLI 325 (3) Communist and Post-Communist Politics
An examination of the origins, development, and demise of Communist political systems, as well as the nature of post-Communist politics, with special emphasis on the Soviet Union and its successor states.

POLI 326 (3) European Politics: Selected Cases
The politics and government of one or more European countries: political development, institutional structure, party politics, and policy-making. The specific country or countries will vary by section.

POLI 327 (3) European Integration
Post-1945 integration of Europe, comparison of national politics and attitudes to integration, and the history and institutions of the European Union.

POLI 328 (3/6) d Topics in Comparative Politics
Topics will vary from year to year. Consult the departmental website.

POLI 329 (3) Gender and Politics
Relations between gender and political processes and institutions, including the impact of globalization and economic development.

POLI 330 (3) Japanese Political Economy
Issues in contemporary Japanese political economy, including industrial policy, the Keiretsu groupings, the main-bank system, trends toward deregulation, and business-labour relations.

POLI 331 (3) Korean Government and Politics
An introduction to the politics of Korea. The evolution of Korean politics from authoritarian rule to democratic transition, focusing on present and future political, economic and social issues.

POLI 332 (3/6) d Politics and Government of Latin America
A comparative examination of democracy and authoritarianism in Latin America: populism, corporatism, bureaucratic authoritarianism, transitions from authoritarianism, and contemporary debates on the quality and diversity of democratic institutions.
POLI 333 (3/6) d Issues in Comparative Politics
An examination of a major issue in comparative politics (e.g., the media, gender, nationalism, ethnic conflict). Topics will vary from year to year.

POLI 334 (3) Comparative Democratization
Literatures and theories on regime democratization around the world; the roles of political, economic, social, and international factors in encouraging or impeding democratization.

POLI 335 (3/6) d Comparative Federalism
An empirical and normative analysis of federalism as a way of structuring political life in industrialized democracies, investigating explanations for the design, persistence and operation of federal systems.

POLI 336 (3) Associations and the State in Comparative Perspective
How organised groups (civil society organizations, NGOs, interest groups) interact with governments in a variety of countries.

POLI 337 (3) The U.S. Presidency in Comparative Perspective
Executive leadership of the U.S. presidency in comparison to the leadership of other Anglo-American systems, including the U.K., Canada, and Australia.

POLI 338 (3/6) d Politics and Development
The relationship between political institutions and economic growth. How governments shape economic policy and development aid.

POLI 340 (3/6) d History of Political Ideas
An introduction to the political ideas of leading political philosophers from Ancient Greece to the 19th century.

POLI 341 (3/6) d Contemporary Political Theory
Topics may include freedom, colonialism, capitalism, Critical Theory and ideology, power and knowledge, social justice, rationalism, gender and identity politics, and the "political."

POLI 342 (3) Modern Political Theory: Analysis of a Selected Theorist
A detailed examination of an acknowledged masterpiece of modern political theory. The text and attendant literature vary from year to year. Consult the departmental website.

POLI 343 (3) Theories of State and Society
Classical origins of contemporary theories of the state, market, and civil society, focused on the relationship between social order, politics, and democracy. Readings from Smith, Toqueville, Weber, and contemporary sources.

POLI 344 (3/6) d Social and Political Thought
An examination of some of the major concepts in political philosophy such as justice, equality, rights, obligation, liberty in the context of both classical and contemporary political thought.

POLI 345 (3/6) d Gender and Politics: Political Thought and Practice
The role of gender in Western political theory and the implications for the practice of politics.

POLI 346 (3) Democratic Theory
An examination of both classical and contemporary theories of democracy. Representative democratic theory, participatory democratic theory, and their relationship to twentieth century concepts of democracy.

POLI 347 (3/6) d Law and Political Theory
An examination of law and political theory that considers topics such as sovereignty, constitutionalism, civil disobedience, rights and the political role of judges.

POLI 348 (3) Political Theory and Public Policy
Application of frameworks to policy questions that factor in debates about citizenship and social inclusion, and an examination of contemporary normative frameworks that fall along, and transcend, the left-right political spectrum.

POLI 350 (3/6) d Public Policy
An introduction to public policy: rationales for government intervention, the influence of interest groups and political institutions on policy outcomes, and the various stages in the policy process.

POLI 351 (3) Environmental Politics and Policy
Domestic and international determinants of environmental policy; alternative approaches to environmental protection. The sustainable development paradigm; public opinion and interest group pressures; risk assessment; mandatory, voluntary and market-based policy instruments.
POLI 352 (3/6) d Comparative Politics of Public Policy
Policy making across industrialized democracies, with a focus on North America and Europe.

POLI 360 (3/6) d Security Studies
The contemporary international security context: reorientation of the study of security, patterns of inter- and intrastate conflict and communal violence, dilemmas of international response and conflict management.

POLI 361 (3/6) d International Violence and Its Control
A study of the nature of international violence from guerrilla to nuclear war; a survey of theories of the causes of interstate war; recent research findings on the causes of war and conditions for peace; a comparative analysis of strategies for controlling violence through disarmament and the promotion of alternative means of conflict resolution.

POLI 362 (3) The Great Powers and International Politics
An examination of the changing nature of Great Power relations, including procedures and institutions for managing their conflicts, in the pre-Cold War, Cold War, and post-Cold War international systems.

POLI 363 (3/6) d Canadian Foreign Policy
An analysis of Canadian foreign policy on important international issues since the 1960s and of the policy-making process. Issues may include defence commitments, economic relations, activities of international organizations, and relations with the US, Europe, USSR, Asia and the Third World.

POLI 364 (3/6) d International Organizations
Analysis of the activities and influence of modern international organizations in international security, economic, and social issue areas. The course will focus on organizations associated with the United Nations, but other world and regional bodies will be analysed as well.

POLI 365 (3/6) d Asian International Relations
Analysis of the foreign policies of one or more of the states of East, Southeast, and South Asia; their relations with other states in the region as well as with major outside powers.

POLI 366 (3) International Political Economy
An analysis of governmental policies and international political bargaining in regard to such issues as international investment, trade, and monetary relations. Pre-requisite: ECON 100 or 309 are recommended.

POLI 367 (3/6) d International Relations Theory and the International System
The evolution of the international system and empirical and normative theories of international relations such as realism, liberalism, and Marxism.

POLI 368 (3) Japan's Foreign Relations
Japan's security policy, aid policy, relations with the United States and with neighbouring Asian nations, role in the United Nations and other international institutions.

POLI 369 (3/6) d Issues in International Security
An examination of issues such as interstate conflicts, terrorism, environmental change, international crime. Topics will vary from year to year.

POLI 370 (3-6) d Issues in International Conflict Management
Problems of managing conflict in the international system (e.g., intervention, mediation, sanctions). Topics will vary from year to year.

POLI 372 (3/6) d Multinational Corporations and Globalization
Multinational corporations and the state in the contemporary international system, including the impact of multinationals and foreign direct investment on governments, societies, and industry. 
*Prerequisite:* Third year standing. Previous completion of an introductory course in international relations (e.g. POLI 260 or its equivalent) is very strongly recommended.

POLI 373 (3) Ethics in World Politics
When is it right to wage war? Who should pay for global warming? Should the wealthy provide foreign aid- how much? Analysis of traditions of moral thought to reach reasoned judgments about such dilemmas in global politics.

POLI 374 (3/6) d International Peacekeeping
The development of peacekeeping within and outside the United Nations system and as an instrument of conflict management.

POLI 375 (3/6) d Global Environmental Politics
Ecological consequences of the global political economy.
POLI 376 (3) International Law
The nature, sources, and sanctions of international law; the notion of nationhood with particular reference to the status of the British Dominions; territorial and extra-territorial jurisdiction; diplomatic and sovereign immunities; international delinquency; treaties; settlement of disputes; international organizations. This course may not be taken for credit in both Arts and Law. 
Equivalency: LAW 316.

POLI 377 (3) Nuclear Weapons and Arms Control
Evolution and contemporary significance of nuclear weapons and arms control policy and technology from the perspective of the physical and life sciences and the social sciences and humanities.
Prerequisite: Third-year standing in B.A. or B.Sc. prog. or second-year standing in B.A.Sc. program
Equivalency: APSC 377.

POLI 378 (3/6) d The Politics of Terrorism
Exploration of contemporary terrorism as a contested area of understanding and as a social construct. Includes origins and motives, evolution of terrorist groups, strategies and tactics, and anti-terrorism and counter-terrorism responses.

POLI 379 (3/6) d China in World Politics
Impact and implications of the rise of China in historical and contemporary perspective.
Prerequisite: Third year standing. Previous coursework on international relations or POLI 321 are recommended.

POLI 380 (3) Quantitative Methods in Political Science
An introduction to quantitative methods as utilized in the study of Political Science. Not available for credit in the Faculty of Commerce and Business Administration.
This course is not eligible for Credit/D/Fail grading.

POLI 381 (3) Topics in Quantitative Analysis
Application of quantitative techniques to selected topics in Political Science. Topics vary from year to year. Consult the departmental website.
Prerequisite: POLI 380.

POLI 385 (3/6) d Public Opinion and Elections
Psychological and social foundations of public opinion; quality of democratic decision-making; how voters make up their minds; impact of electoral systems; social bases of party systems; campaigns and the mass media. The Canadian experience in comparative context.

POLI 390 (6) Honours Seminar
An examination of the dimensions of Political Science and the major debates within the discipline.

POLI 401 (3/6) d Canadian Provincial and Regional Politics
Seminar examines political parties, processes, and institutions in the provincial political systems and regional arrangements between provinces.
Prerequisite: POLI 101 and one of POLI 301, POLI 302, POLI 303, POLI 304, POLI 305, POLI 306, POLI 307, POLI 308.

POLI 402 (3/6) d Law and Politics of the Canadian Constitution
Seminar on the origins and development of the Canadian Constitution: the political aspects of federalism and the legal consequences of the Charter of Rights.
Prerequisite: POLI 101 and one of POLI 301, POLI 302, POLI 303, POLI 304, POLI 305, POLI 306, POLI 307, POLI 308.

POLI 403 (3/6) d The Political Economy of Canada
A seminar devoted to the analysis of the interplay of economic and social factors in the shaping of Canadian politics: the major issues and strains in the functioning of the Canadian polity.
Prerequisite: POLI 101 and one of POLI 301, POLI 302, POLI 303, POLI 304, POLI 305, POLI 306, POLI 307, POLI 308.

POLI 404 (3/6) d Public Policy and Its Administration
Political and administrative aspects of public policy, particularly in Canada.
Prerequisite: POLI 101 and one of POLI 301, POLI 302, POLI 303, POLI 304, POLI 305, POLI 306, POLI 307, POLI 308, POLI 350, POLI 351, POLI 352.

POLI 405 (3/6) d Topics in Canadian Politics
This seminar examines in depth some of the important issues in Canadian politics.
Prerequisite: POLI 101 and one of POLI 301, POLI 302, POLI 303, POLI 304, POLI 305, POLI 306, POLI 307, POLI 308.

POLI 406 (3) Aboriginal Peoples and Canadian Politics
Seminar in political structures, activities, and demands of aboriginal peoples; policies of federal, provincial, and territorial governments; relations between these governments and aboriginal peoples; role of the courts and the Constitution.
Prerequisite: POLI 101 and at least 3 credits from POLI 301-308.

POLI 420 (3/6) d Advanced Topics in Comparative Politics
Seminar in comparative analysis of politics in democratic systems. For specific content in a given year, consult the departmental website.
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 350, POLI 351.

POLI 421 (3/6) d Advanced Topics in Comparative Politics: Non-Western
A seminar devoted to comparative analysis of politics in non-western states. For specific content in a given year, consult the departmental website.
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 350, POLI 351.

POLI 422 (3/6) d Selected Problems in Comparative Politics
A seminar devoted to intensive analysis of a contemporary political problem from a comparative perspective, e.g., ethnic politics, class politics, the politics of post-industrial society. For specific content in a given year, consult the departmental website.
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 350, POLI 351.

POLI 423 (3/6) d Issues in Comparative Politics
Seminar in comparative analysis of constitutionalism, authoritarianism, democracy, etc. For specific content in a given year, consult the departmental website.
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 350, POLI 351.

POLI 424 (3/6) d Ethics in Democratic Politics
Ethics in politics, including citizenship and public service, and practices demanded by the institutions of democracy.
Prerequisite: Third year standing.

POLI 426 (3/6) d Seminar on Comparative Parties and Party Systems
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 350, POLI 351.

POLI 427 (3) Issues in Chinese Politics and Development
Seminar examines one issue in Chinese politics (e.g., environmental politics, local government, state-society relations) from a broadly comparative perspective.
Prerequisite: POLI 220 and one of POLI 320-337.

POLI 428 (3/6) d Comparative Public Management
Major changes in the structures and processes of government in advanced democracies, including the welfare state, citizenship, ethics, accountability, and institutional reform. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Restricted to Major/Honour POLI or Combined Major with POLI.

POLI 429 (3) Seminar in Issues in Gender and Politics
Prerequisite: Two of POLI 220, POLI 320, POLI 321, POLI 322, POLI 323, POLI 324, POLI 325, POLI 326, POLI 327, POLI 328, POLI 329, POLI 330, POLI 331, POLI 332, POLI 333, POLI 345, POLI 350, POLI 351.

POLI 439 (3/6) d Politics and Economic Growth
The relationship between politics, economics, and development. The role of the state, political institutions, economic policy, and foreign aid in development strategies. This course is not eligible for Credit/D/Fail grading.

POLI 440 (3/6) d Contemporary Political Theory
This seminar examines the political ideas of leading political philosophers of the twentieth century. Consult the departmental website.
Prerequisite: Any 6 credits from POLI 240, POLI 340-349.

POLI 441 (3-6) d Interpretation and Criticism in Political Theory
Approaches to political criticism: Critical Theory, Foucauldian genealogy, critical realism, and feminism, including forms of domination, which shape people's beliefs and self-conceptions.
Prerequisite: Any 6 credits from POLI 240, 340-349.

POLI 442 (3) Contemporary Political Theorists: Analysis of a Selected Theorist
This seminar examines in detail the political ideas of an important political philosopher of the twentieth century. The theorist
studied varies from year to year. Consult the departmental website.

**POLI 443 (3/6) d MODERN WESTERN POLITICAL THOUGHT**
Seminar: Texts in the history of modern Western political thought, such as works by Thomas Hobbes, John Locke, Jean-Jacques Rousseau, Karl Marx, Alexis de Tocqueville, John Stuart Mill, Friedrich Nietzsche, Max Weber, and Sigmund Freud.

*Prerequisite:* Any 6 credits from POLI 240, 340-349.

**POLI 445 (3/6) d Critical Theory: Political Theory and the Problems of Race**
Traditions of critical social theory, broadly construed, to examine the modern politics of 'race,' racism, and racialized identities.

*Prerequisite:* Any 6 credits from POLI 240, 340-349.

**POLI 446 (3/6) d Multiculturalism and Identity Politics**
Seminar will examine how “identity” is theorized in contemporary political thought, beginning with the role that identity plays in the "western" canon and proceeding to examine feminist, multicultural, queer, and post-colonial theories of citizenship along with their critics.

*Prerequisite:* Any 6 credits from POLI 240, 340-349.

**POLI 448 (3/6) d Democratic Theory**
Overview of traditional democratic theory with close readings of several contemporary theories, such as those of Habermas, Rawls, and Arendt. Readings are drawn from complete original texts, and assessment is based on a research essay.

*Prerequisite:* Any 6 credits from POLI 240, 340-349.

**POLI 449 (3/6) d Topics in Political Theory**

**POLI 450 (3) Policy Analysis**
Practical skills for generating written and oral analysis for a client or supervisor.

*Prerequisite:* Either (a) POLI 101 and one of POLI 302, POLI 306, POLI 350; or (b) all of POLI 350, POLI 352.

**POLI 460 (3/6) d Foreign Policy Analysis**
A seminar devoted to the analysis of the foreign policies of one or more states, as well as to the study of literature pertaining to foreign policy analysis. For specific content in a given year, consult the departmental website.

*Prerequisite:* Two of POLI 260, POLI 360, POLI 361, POLI 362, POLI 363, POLI 364, POLI 365, POLI 366, POLI 367, POLI 368, POLI 369, POLI 370.

**POLI 461 (3) Peace and Conflict Studies**
A seminar on a selected topic concerning the causes of war and strategies for the promotion of peace. For specific content in a given year, consult the departmental website.

*Prerequisite:* Two of POLI 260, POLI 360, POLI 361, POLI 362, POLI 363, POLI 364, POLI 365, POLI 366, POLI 367, POLI 368, POLI 369, POLI 370.

**POLI 462 (3) International Relations Theory**
This seminar examines some of the major theoretical approaches to the study of international relations. For specific content in a given year, consult the departmental website.

*Prerequisite:* Two of POLI 260, POLI 360, POLI 361, POLI 362, POLI 363, POLI 364, POLI 365, POLI 366, POLI 367, POLI 368, POLI 369, POLI 370.

**POLI 463 (3) International Interdependence**
This seminar analyses issues relating to the politics of international economic relations. For specific content in a given year, consult the brochure issued by the Department.

*Prerequisite:* Two of POLI 260, POLI 360, POLI 361, POLI 362, POLI 363, POLI 364, POLI 365, POLI 366, POLI 367, POLI 368, POLI 369, POLI 370. 6 credits of ECON are recommended.

**POLI 464 (3/6) d Problems in International Relations**
Content varies from year to year. Consult the departmental website. One section (of 3 credits) is reserved for fourth-year students in the Major program in International Relations.

**POLI 466 (3) The Politics of International Law**
Seminar on the origins and politics of international law, and its impact on international affairs; the laws of war, human rights, environment, law of the sea, and international criminal law.

**POLI 492 (12) Honours Thesis**
In consultation with faculty, students develop a research project, report on their project during seminars, give feedback on their fellow students’ projects, and write a thesis. *This course is not eligible for Credit/D/Fail grading.*
POLI 501 (3/6) d Core Seminar in Canadian Government and Politics
This course is not eligible for Credit/D/Fail grading.

POLI 502 (3/6) d Canadian Political Institutions and Processes
This course is not eligible for Credit/D/Fail grading.

POLI 503 (3/6) d Canadian Political Parties and Participation
This course is not eligible for Credit/D/Fail grading.

POLI 504 (3/6) d Topics in Canadian Politics
This course is not eligible for Credit/D/Fail grading.

POLI 511 (3/6) d Core Seminar in Comparative Government and Politics
This course is not eligible for Credit/D/Fail grading.

POLI 512 (3/6) d Theories in Comparative Politics: Political Development
This course is not eligible for Credit/D/Fail grading.

POLI 513 (3/6) d Current Debates in Comparative Political Economy: Globalization and Democracy
This course is not eligible for Credit/D/Fail grading.

POLI 514 (3/6) d Comparative Western Governments
This course is not eligible for Credit/D/Fail grading.

POLI 515 (3/6) d State and Society in the Developing World
This course is not eligible for Credit/D/Fail grading.

POLI 516 (3/6) d Issues in Comparative Politics
This course is not eligible for Credit/D/Fail grading.

POLI 517 (3/6) d The State in Comparative Perspective
This course is not eligible for Credit/D/Fail grading.

POLI 521 (3/6) d Political Theory
This course is not eligible for Credit/D/Fail grading.

POLI 523 (3/6) d Political Thought
This course is not eligible for Credit/D/Fail grading.

POLI 531 (3/6) d Public Administration
This course is not eligible for Credit/D/Fail grading.

POLI 532 (3/6) d Topics in Public Administration
This course is not eligible for Credit/D/Fail grading.

POLI 533 (3/6) d Topics in Public Policy
This course is not eligible for Credit/D/Fail grading.

POLI 540 (3/6) d Core Seminar in Political Theory
This course is not eligible for Credit/D/Fail grading.

POLI 547 (3/6) d Topics in Political Theory
This course is not eligible for Credit/D/Fail grading.

POLI 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

POLI 551 (3/6) d Elections: Parties and Voters
This course is not eligible for Credit/D/Fail grading.

POLI 552 (3/6) d Political Psychology and Public Opinion
This course is not eligible for Credit/D/Fail grading.

POLI 553 (3/6) d Topics in Empirical Theory
This course is not eligible for Credit/D/Fail grading.

POLI 561 (3/6) d Core Seminar in International Relations Theory
This course is not eligible for Credit/D/Fail grading.
POLI 562 (3/6) d Topics in International Relations  
This course is not eligible for Credit/D/Fail grading.

POLI 563 (3/6) d International Organization  
This course is not eligible for Credit/D/Fail grading.

POLI 564 (3/6) d Research Seminar in International Relations  
This course is not eligible for Credit/D/Fail grading.

POLI 565 (3/6) d International Security  
This course is not eligible for Credit/D/Fail grading.

POLI 567 (3/6) d Norms and Ethics in World Politics  
This course is not eligible for Credit/D/Fail grading.

POLI 571 (3/6) d Qualitative Methods of Political Analysis  
This course is not eligible for Credit/D/Fail grading.

POLI 572 (3/6) d Quantitative Techniques of Political Analysis  
This course is not eligible for Credit/D/Fail grading.

POLI 573 (3/6) d Formal Models in Political Science  
This course is not eligible for Credit/D/Fail grading.

POLI 574 (3/6) d Advanced Statistical Methods for Political Science  
This course is not eligible for Credit/D/Fail grading.

POLI 580 (3/6) c Directed Studies  
This course is not eligible for Credit/D/Fail grading.

POLI 649 (0) Doctoral Dissertation

Central, Eastern and Northern European Studies, Faculty of Arts

POLS: Polish

POLS 200 (6) Beginner's Polish  
Introduction to contemporary Polish. Oral practice, grammar, reading, writing.

POLS 300 (6) Intermediate Polish  
Intermediate oral practice, grammar, reading, composition.  
Prerequisite: POLS 200.

POLS 345 (3/6) d Introduction to Twentieth-Century Polish Literature  
Readings and discussion of selected works of representative writers.  
Prerequisite: POLS 210.

POLS 424 (3) Polish Literature and Film in Translation  
Selected films and translated literature by Polish writers and filmmakers, with emphasis on the interaction between politics and literature.

POLS 426 (3) The German Nazi Holocaust in Polish Literature and Film (in English)  
The German Nazi Holocaust in Polish Literature and film.

French, Hispanic and Italian Studies, Faculty of Arts

PORT: Portuguese

PORT 101 (3) First-Year Portuguese I  
Grammar, composition, translation, oral practice. Credit will be granted for only one of PORT 101 or PORT 110.

PORT 102 (3) First-Year Portuguese II  
Grammar, composition, translation, oral practice. Credit will be granted for only one of PORT 102 or PORT 110.
Prerequisite: PORT 101 or equivalent.

PORT 110 (3) Elementary Portuguese for Romance Language Speakers
A single-term alternative to PORT 101 and 102 for students with heritage Portuguese or another Romance language. Credit will be granted for only one of PORT 110, PORT 101, or PORT 102.

PORT 201 (3) Second-Year Portuguese I
Grammar, composition, translation, oral practice, readings. Credit will be granted for only one of PORT 201 or PORT 210
Prerequisite: One of PORT 102, PORT 110.

PORT 202 (3) Second-Year Portuguese II
Grammar, composition, translation, oral practice, readings. Credit may be granted for only one of PORT 202 or PORT 210.
Prerequisite: PORT 201.

PORT 210 (3) Intermediate Portuguese for Romance Language Speakers
A single-term alternative to PORT 201 and 202 for students with heritage Portuguese or another Romance language. Credit will be granted for only one of PORT 210, PORT 201, or PORT 202.
Prerequisite: PORT 110. Heritage speakers who feel ready to enter PORT 210 directly should consult the undergraduate adviser in Portuguese.

PORT 222 (3) Introduction to the Analysis of Portuguese and Brazilian Cultures
Critical analysis of different cultural genres, including music, film and visual art through the study of selected Portuguese and Brazilian texts. This course is taught in English.

PORT 301 (3) Advanced Portuguese
Advanced work in composition for students who have reached the Language-Requirement level of Portuguese. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of PORT 202, PORT 210.

PORT 308 (3) Portuguese for Business (in Portuguese)
Communicative Portuguese for students studying Commerce or otherwise preparing for a career in business.
Prerequisite: One of PORT 202, PORT 210.

PORT 392 (3/6) d Studies in Portuguese and Brazilian Literature
PORT 405 (3-6) d Studies in Portuguese and Brazilian Culture
Selected topics on Portuguese and Brazilian Culture. Please refer to section details for up to date course offering information. This course is taught in English.

Psychology, Faculty of Arts

PSYC: Psychology

Unless otherwise specified, the prerequisite for 300-level Psychology courses is 6 credits of 100-level or 200-level PSYC courses (PSYC 216 or PSYC 217 strongly recommended), or permission of the instructor. For students registered in the B.Sc. Behavioural Neuroscience program, a maximum of 6 credits of Psychology courses can be used towards the Faculty of Science Arts requirement (http://www.calendar.ubc.ca/vancouver/proof/edit/index.cfm?tree=12,215,410,1464). In addition to Psychology 348 and 448, all Psychology courses numbered 60 to 89 in the last two digits have Science credit. Listed below are courses in which there is sufficient overlap that credit may be obtained for only one course in each list. However, it does not necessarily follow that the listed courses are equivalent: (1) PSYC 304, 360, 370; (2) PSYC 304, 360, 371; (3) PSYC 217, 277, 366; (4) PSYC 218, 278, 366. Students with fewer than 36 previous credits may not take 300-level courses. Not every course is offered every year. For current listings, consult the departmental website at www.psych.ubc.ca.

PSYC 100 (6) Introductory Psychology
Introduction to methods and statistics, biopsychology, learning, perception, memory, cognition, motivation, assessment, developmental, personality, clinical, and social psychology. Credit will be granted for only one of PSYC 100 or PSYC 101 and 102.

PSYC 101 (3) Introduction to Biological and Cognitive Psychology
Introduction to Methods and Statistics, Biopsychology, Learning, Perception, Memory, and Cognition. Credit will be granted for
only one of PSYC 100 and PSYC 101.

**PSYC 102 (3) Introduction to Developmental, Social, Personality, and Clinical Psychology**
Introduction to methods and statistics, motivation, assessment, developmental, personality, clinical, and social psychology. Credit will be granted for only one of PSYC 100 and PSYC 102.

**PSYC 205 (3/6) Contemporary Issues in Psychology**
Topics include addiction, culture and evolution in social behaviour, personal relationships, pro- and anti-social behaviour, judgment and decision-making, prejudice and discrimination. Consult the Psychology Department for topics offered each term. May be repeated on a different topic once for credit.

**PSYC 207 (3) Contemporary Topics in Biological and Cognitive Psychology**
A focus on the interpretation of contemporary research in neuroscience, cognition, perception, memory, and learning.

**PSYC 208 (3) Contemporary Topics in Social, Developmental, Personality, and Clinical Psychology**
A focus on the interpretation of contemporary research in social, developmental, personality, and clinical psychology.

**PSYC 216 (3) Questioning Psychological Science in the Media**
Use basic principles of quantitative psychological research methods to critique psychological claims presented in the media and to translate psychological science to everyday life.

**PSYC 217 (3) Research Methods**
Focus on various research methods used in psychology, with an emphasis on critical thinking and experimental design. Restricted to students in the Faculty of Arts who have declared their major in one of Psychology, Cognitive Systems, or Speech Sciences (Linguistics Department). This course is not eligible for Credit/D/Fail grading.
Corequisite: Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102.

**PSYC 218 (3) Analysis of Behavioural Data**
Use of inferential statistics in psychology and conceptual interpretation of data; experimental design (laboratory, field research methods); presentation of data analyses in reports. PSYC 218 excludes credit for a number of other statistics courses in various departments. Please consult the Science Exclusion List (www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414) before registering. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PSYC 217. And a major in Psychology, Cognitive Systems, or Speech Sciences.
Corequisite: Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102.

**PSYC 260 (8) Experimental Psychology and Laboratory**
Detailed introduction to experimental and theoretical aspects of motivation, sensation, perception and learning. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Completion of first-year Science program and permission of the department head is also required.
Corequisite: Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102.

**PSYC 263 (3/6) Contemporary Issues in Behavioural Neuroscience**
Contemporary issues in behavioural neuroscience. Consult the Psychology Department for topics offered each term. May be repeated on a different topic once for credit. [3-0-0]

**PSYC 270 (3) Introduction to Behavioural Neuroscience**
Foundational topics in behavioural neuroscience. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: Either (a) SCIE 001 and BIOL 140; or (b) one of CHEM 111, CHEM 121, CHEM 123 and all of BIOL 121, BIOL 140. And second-year standing in a Behavioural Neuroscience specialization.

**PSYC 277 (4) Behavioural and Neuroscientific Research Methods**
Research methods used in behavioural neuroscience. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: Either (a) SCIE 001 and BIOL 140; or (b) one of CHEM 111, CHEM 121, CHEM 123 and all of BIOL 121, BIOL 140. And second-year standing in a Behavioural Neuroscience specialization.

**PSYC 278 (4) Analysis of Behavioural and Neuroscientific Data**
Statistical methods for use in behavioural neuroscience. This course is not eligible for Credit/D/Fail grading. [3-3-0]
Prerequisite: One of PSYC 217, PSYC 277.

**PSYC 300 (3/6) Abnormal Psychology**
The definition, history, and scope of abnormal behaviour; emphasis on the psychological factors that control its origins, maintenance, and modification.
Prerequisite: Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101, 102, and PSYC 216 or 217.
PSYC 301 (3) Brain Dysfunction and Recovery
Cognitive and behavioral impairments resulting from brain dysfunction. Focus on the efficacy of various intervention approaches. 
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101, 102, and PSYC 216 or 217.

PSYC 302 (3) Infancy
Human cognition, perception, motor, social, emotional needs, brain development and their interactions from birth until the emergence of language.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101, 102, and PSYC 216 or 217.

PSYC 303 (3) Tests and Measurements
Theory and practice of psychological measurement, statistical models for items and tests, assessment of test reliability and validity, factor analysis, scoring.
**Prerequisite:** One of PSYC 218, PSYC 278, PSYC 366.

PSYC 304 (3/6) d Brain and Behaviour
The neurobiological bases of behaviour; brain processes involved in perception, motivation, emotion, psychopathology, learning and memory. Open to all Arts and Science majors except those in the B.Sc. Psychology program. Credit will be granted for only one of PSYC 304 or PSYC 360.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

PSYC 305 (3/6) d Personality Psychology
Theory and research on individual differences in motivation, emotion, and social behaviour.
**Prerequisite:** Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102 or (c) 6 credits of 200-level Psychology (but not 205 or 263).

PSYC 306 (3/6) d Principles of Animal Behaviour
Behavioural neuroscience; behavioural genetics; social systems; mating and parental strategies; instinct and learning; evolution of human behaviour. Credit will be given for only one of BIOL 310 or PSYC 306.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and one of PSYC 216 or 217.

PSYC 307 (3) Cultural Psychology
Cultural influences on human thought and behaviour; interactions of culture and self; multicultural experiences; intercultural relations; methodological issues.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

PSYC 308 (3/6) d Social Psychology
Theory and research of individual social behaviour; social motivation; attitudes; group interaction; socialization; prejudice.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

PSYC 309 (3/6) d Cognitive Processes
Contribution of cognitive processes to perception, attention, and memory; cognitive development, language, thinking, and creativity.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

PSYC 311 (3) Psychology of Sport
Psychological theory, research, and skills training related to sport performance, exercise motivation, and adherence. Credit will be granted for only one of PSYC 311 and HKin 231 and 364.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 216 or 217.

PSYC 312 (3/6) History of Psychology
The principal trends of psychological explanation and events in the history of psychology from the earliest times to the present. Open only to Major or Honours students or by permission of the instructor.
**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

PSYC 314 (3) Health Psychology
Health-related behaviours such as smoking and drug use; effects of stressful events on health; methods for coping with stress; impact of chronic illness on the family; social support systems.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

**PSYC 315 (3) Childhood and Adolescence**

Human development from the preschool period through adolescence.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

**PSYC 319 (3) Applied Developmental Psychology**

Applications of theories and research in developmental psychology to contemporary social issues; topics may include daycare, child abuse, divorce and remarriage, substance abuse, sexuality.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

**PSYC 320 (3/6) Psychology of Sex Differences**

Theory and research on gender development and the influence of sex and/or gender on cognition, emotion, motivation, social behaviour, and health.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 216 or 217.

**PSYC 321 (3) Environmental Psychology**

Psychological theory and research on the interaction between organisms and the physical environment; emphasis on applications to the design and management of constructed and natural environments.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

**PSYC 322 (3) Adulthood and Aging**

Issues, theories, and psychological research regarding adulthood and the aging process.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

**PSYC 325 (3) Socialization: Media Content and Effects**

Examines human development in the context of the socializing role of media.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

**PSYC 331 (3) Forensic Psychology**

The application of psychological theory and research to legal issues and the criminal justice system.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

**PSYC 333 (3) Memory: Historical, Clinical and Cognitive Perspectives**

Classical and contemporary metaphors for memory and their impact on theory development.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217. Non-PSYC students may substitute LING 420 or LING 200 and 201 for the above prerequisite.

**PSYC 334 (3) Memory II**

Organic amnesia; remembering childhood events; the self and memory; and the problem of distinguishing genuine from simulated forgetting.

**Prerequisite:** PSYC 333.

**PSYC 335 (3) Gambling and Decision Making**

The psychology of gambling behaviour, with emphasis on relevant work from judgment and decision-making, the cognitive neuroscience of choice, and clinical perspectives on disordered gambling.

**Prerequisite:** Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

**PSYC 336 (3) The Psychology of Language I**

Psychological abilities underlying human language; language processing, lexical representation, and principles of online conversation; animal versus human communication.
Prerequisite: Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217. Non-PSYC students may substitute ENGL 329, or LING 420, or LING 200 and 201 for the above prerequisite.

PSYC 337 (3) The Psychology of Language II
Language and thought; deriving psychological principles from language universals; the psychology of literacy, dyslexia, multilingualism, and natural language processing.
Prerequisite: PSYC 336 or permission of the instructor.

PSYC 340 (2-6) Directed Studies in Psychology
Directed investigation of a problem, requiring a written report of the findings.
Prerequisite: At least 72% average in the preceding 30 credits and permission of a faculty member who is prepared to supervise the investigation.

PSYC 348 (2-6) Directed Studies in Behavioural Neuroscience
Directed investigation of an experimental problem requiring a written report of the findings.
Prerequisite: At least 72% average in the preceding 30 credits and permission of a faculty member who is prepared to supervise the investigation.

PSYC 349 (6) Honours Seminar
Orientation to psychological research, with special emphasis on ongoing research within the department; effective presentation of research findings, oral and written; critical evaluation of research. Requires a research project.
Prerequisite: Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102; and all of PSYC 217, 218.

PSYC 350 (3/6) Psychological Aspects of Human Sexuality
Human sexuality from a biopsychological, behavioural, and psychosocial perspective.
Prerequisite: Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 216 or 217.

PSYC 358 (3) Evolutionary Psychology
Theory and research on the evolution of the human mind, with emphasis on implications for cognition and behaviour in contemporary environments.
Prerequisite: Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 102 and PSYC 216 or 217.

PSYC 359 (3) Advanced Research Methods in Behavioural Sciences
Prepares students for graduate studies or other advanced behavioural research; experimental design and analytic techniques; laboratory with computer applications.
Prerequisite: Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 366.

PSYC 360 (6) Biopsychology
The relationship between the nervous system and behaviour; the physiological basis of perception, motivation, learning, and memory. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414.
Prerequisite: PSYC 260.

PSYC 361 (3) Neuroscience of Motivation
Experimental analysis of hunger, thirst, exploratory and curiosity behaviour, maternal and reproductive behaviour, fixed action patterns, and complex processes involved in social motivation with emphasis on the biological basis of motivation. [3-0-0]
Prerequisite: One of PSYC 260, PSYC 270, PSYC 304, PSYC 360, PSYC 370.

PSYC 363 (3) Neuroscience of Simple Learning
Introduction to basic theories of non-associative learning, classical and operant conditioning. Experimental findings from behavioural and biological analyses with animals and humans. [3-0-0]
Prerequisite: One of BIOL 260, BIOL 361, BIOL 455, BIOL 458, CAPS 301, PSYC 260, PSYC 263, PSYC 270, PSYC 304.

PSYC 364 (3) Animal Cognition
Investigations of animal cognitive abilities, including spatial learning, timing, counting, concept formation and language use. Experimental findings presented from behavioural and biological approaches with animals and humans.
Prerequisite: PSYC 363.

PSYC 365 (3) Cognitive Neuroscience
Brain mechanisms underlying cognitive processes such as perception, attention, consciousness, and memory.
Prerequisite: One of PSYC 260, COGS 200.

PSYC 366 (8) Methods in Research
Detailed coverage of basic research methods; the design of experiments and statistical analysis; methods will be applied in laboratory and project work. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. This course is not eligible for Credit/D/Fail grading.
Prerequisite: PSYC 260 or in Honours program.

PSYC 367 (3) Sensory Systems
Anatomy and physiology of the sensory pathways and their relation to perception.
Prerequisite: Either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102 or (c) 6 credits of 200-level Psychology (but not 205 or 263).

PSYC 368 (3) Perceptual Processing
Perceptual phenomena and their underlying brain mechanisms.
Prerequisite: PSYC 367.

PSYC 370 (3) Behavioural Neuroscience I
Advanced methods and topics in behavioural neuroscience. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of PSYC 260, PSYC 270 and one of PSYC 217, PSYC 277 and one of PSYC 218, PSYC 278.

PSYC 371 (3) Behavioural Neuroscience II
Neurodevelopment and neuroplasticity, the physiological bases of several motivated behaviours (sleep, sexual behaviour, hunger and eating, drugs and addiction), cognition, the stress response, and brain dysfunction and recovery. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: PSYC 370.

PSYC 388 (3/6) Directed Studies in Behavioural Neuroscience
Directed investigation of an experimental problem in Behavioural Neuroscience requiring a written report of the findings. This course is not eligible for Credit/D/Fail grading.
Prerequisite: At least 72% average in the preceding 30 credits, permission of the supervisor, and permission of the department.

PSYC 398 (3) Cooperative Work Placement I
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks, full-time. Normally taken in Summer Session after third year. Work term report required. Restricted to students admitted to the Co-op Program in Psychology (B.Sc.). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Co-op Workshops, PSYC 360.

PSYC 399 (3) Cooperative Work Placement II
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks, full-time. Normally taken in fourth year Winter Session, Term 1. Work term report required. Restricted to students admitted to the Co-op Program in Psychology (B.Sc.). This course is not eligible for Credit/D/Fail grading.
Prerequisite: PSYC 398.

PSYC 400 (6) Clinical Psychology: A Health Profession
Theory, research, practice, and professional issues in clinical psychology, including a practicum placement. Credit will be granted for only one of PSYC 400 and 401.
Prerequisite: PSYC 300.

PSYC 401 (3) Clinical Psychology
Theoretical and research foundations of the processes of assessment and behaviour modification in clinical psychology. Credit will be granted for only one of PSYC 400 or PSYC 401.
Prerequisite: PSYC 300.

PSYC 402 (3) Research in Psychological Disorders
Focus on the cognitive, biological, and motivational underpinnings of psychological disorders. Topics include current research methods, controversies in the research literature, and directions for future research.
Prerequisite: Either (a) all of PSYC 217, PSYC 218 or (b) all of PSYC 300, PSYC 366.

PSYC 403 (3) Human Emotion
Developmental, cognitive, and social psychological theories and research on human emotion.
Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 305, PSYC 307, PSYC 308, PSYC 358.

PSYC 404 (3) Psychology of Religion
Cognitive, emotional, and motivational underpinnings of religious behaviour; supernatural beliefs, magical thinking, ritual,
sacrifice; religion's role in morality, prosociality, health, violence, and intergroup relations.

Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 305, PSYC 307, PSYC 308, PSYC 358.

PSYC 407 (3) Cognition and Culture
Cultural learning; cultural variation and universality in cognition and emotion; cognitive and emotional bases of cultural phenomena.

Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 307, PSYC 308, PSYC 358.

PSYC 408 (3) Research in Social Psychology
Representative studies on social psychological topics; emphasis on the formulation of significant questions and the design and execution of relevant research.

Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 305, PSYC 307, PSYC 308, PSYC 358.

PSYC 409 (3) Cognitive Neuropsychology
The structure of the mind as revealed by brain injury, neurological illness, and surgical intervention. Topics include attention, memory, language, sense of self, topographic awareness, moral reasoning, emotion, theory of mind, and social awareness.

Prerequisite: Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 366 and one of PSYC 309, PSYC 365.

PSYC 412 (3) Cognitive Development
The development of fundamental cognitive abilities from infancy through adulthood, including traditional approaches to cognitive development as well as new areas of current investigation.

Prerequisite: One of PSYC 302, PSYC 315, PSYC 319, PSYC 322, PSYC 325.

PSYC 413 (3) Social and Personality Development
Comprehensive overview of the psychological processes in the social and personality development of infants, children, and adolescents.

Prerequisite: One of PSYC 302, PSYC 315, PSYC 319, PSYC 322, PSYC 325.

PSYC 414 (3) Research in Developmental Psychology
Advanced study of current research in a specific area of developmental psychology.

Prerequisite: Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 366; and one of PSYC 302, PSYC 315, PSYC 319, PSYC 322, PSYC 325.

PSYC 415 (3/6) Directed Studies in Applied Social Psychology
The application of social psychological research and theory to the solution of social problems.

Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 305, PSYC 307, PSYC 308, PSYC 358.

PSYC 417 (3/6) Directed Studies in Special Topics in Psychology
Intensive examination of selected topics and issues in psychology.

Prerequisite: Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 366.

PSYC 418 (3) The Self-Concept
Theory and research on the self: development, knowledge, motivation, emotions, presentation.

Prerequisite: One of PSYC 217, PSYC 366 and one of PSYC 305, PSYC 307, PSYC 308, PSYC 358.

PSYC 420 (3) Community Psychology
The relationships between social contexts and wellbeing with a focus on disadvantaged populations. Students engage in a community service placement to complement academic learning.

Prerequisite: Either (a) PSYC 300 or (b) PSYC 308 or (c) PSYC 314 or (d) PSYC 319.

PSYC 421 (3) Environmental Psychology
Psychological theory and research on the interaction between organisms and the physical environment; emphasis on applications to the design and management of constructed and natural environments. Credit will be granted for only one of PSYC 421 or PSYC 321.

Prerequisite: Either (a) PSYC 100 or (b) two of PSYC 101, PSYC 102, PSYC 205, PSYC 207, PSYC 208, PSYC 216, PSYC 217. Strongly recommended: PSYC 101 and PSYC 216 or 217.

PSYC 440 (2-6) Directed Studies in Psychology
Directed investigation of an experimental problem, requiring a written report of the findings.

Prerequisite: At least 72% average in the preceding 30 credits and permission of a faculty member who is prepared to supervise the investigation.

PSYC 448 (2-6) Directed Studies in Behavioural Neuroscience
Directed investigation of an experimental problem requiring a written report of the findings.
**Prerequisite:** At least a 72% average in the preceding 30 credits and permission of a faculty member who is prepared to supervise the investigation.

**PSYC 449 (6) Honours Seminar and Essay**
Students carry out a research project and report on its development during seminars. Students also discuss research by Departmental staff, with emphasis on choice of problems, research design and data analysis.

**PSYC 460 (3) Behavioural Neuroendocrinology**
Detailed examination of the interaction between hormones and neural control of reproductive and non-reproductive behaviours; emphasis on gonadal and adrenal hormone effects on learning and memory in the brain.

**Prerequisite:** One of PSYC 304, PSYC 360.

**PSYC 461 (3) Neuroplasticity and Behaviour**
Experimental findings and theory documenting the plasticity of the brain and its relationship to behaviour: emphasis on gene regulation, neurogenesis and cell morphology changes in relation to learning and experience.

**Prerequisite:** One of PSYC 304, PSYC 360, PSYC 460.

**PSYC 462 (3) Drugs and Behavioural Neuroscience**
Introduction to neurochemical systems and functional neuroanatomy; animal models of human cognitive processes and mental disorders; neurochemical foundations and treatments for mental disorders.

**Prerequisite:** One of PSYC 304, PSYC 360. BIOL 205 and/or PCTH 325 recommended.

**PSYC 463 (3/6) d Research in Sensation and Perception**
Vision and audition; physical properties and subjective experience of stimuli.

**Prerequisite:** Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 260.

**PSYC 466 (3) Research in Animal Learning and Cognition**
Examination and evaluation of studies of animal learning and cognition; includes one or more research projects based on material covered.

**Prerequisite:** Either (a) all of PSYC 217, PSYC 218 or (b) PSYC 366 and one of PSYC 304, PSYC 360, PSYC 363, PSYC 365; or (c) one of BIOL 355, BIOL 455 or (d) one of PHYL 301, PHYL 426.

**PSYC 469 (3) Psychoneuroimmunology**
Research linking psychological characteristics with the immune system, including implications regarding the onset and course of disease.

**Prerequisite:** Either (a) one of PSYC 314, PSYC 360 or (b) MICB 302 and either (a) PSYC 100 or (b) all of PSYC 101, PSYC 102.

**PSYC 472 (3) Advanced Neuroscience of Motivation**
Neurobiological pathways mediating five core aspects of motivated behaviour: (1) affective decision making; (2) motivated drive; (3) goal-directed vs. habit-based behaviour; (4) learning from negative reinforcers; and (5) disorders of motivation.

**Prerequisite:** PSYC 361.

**PSYC 488 (3/6) c Directed Studies in Behavioural Neuroscience**
Directed investigation of an experimental problem in Behavioural Neuroscience requiring a written report of the findings. This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** At least 72% average in the preceding 30 credits, permission of the supervisor, and permission of the department.

**PSYC 498 (3) Cooperative Work Placement III**
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks, full-time. Normally taken in fourth year Winter Session, Term 2. Work term report required. Restricted to students admitted to the Co-op Program in Psychology (B.Sc.). This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** PSYC 399.

**PSYC 499 (3) Cooperative Work Placement IV**
Approved and supervised relevant work experience in an industrial, academic, or government setting for a minimum of 13 weeks, full time. Normally taken in Summer Session after fourth year. Work term report required. Restricted to students admitted to the Co-op Program in Psychology (B.Sc.). This course is not eligible for Credit/D/Fail grading.

**Prerequisite:** PSYC 498.

**PSYC 500 (3/6) d History of Psychology**
This course is not eligible for Credit/D/Fail grading.

**PSYC 501 (3) Health Psychology**
This course is not eligible for Credit/D/Fail grading.

PSYC 502 (3) Research Methods in Health Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 503 (3) Biological Basis of Health Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 504 (3/6) d Special Topics in Health Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 507 (3) Cultural Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 508 (3-12) d Teaching of Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 510 (3) Descriptive Psychopathology  
This course is not eligible for Credit/D/Fail grading.

PSYC 512 (3) Psychology of Emotion  
This course is not eligible for Credit/D/Fail grading.

PSYC 513 (3-12) d Special Topics in Developmental Psychology  
This course is not eligible for Credit/D/Fail grading.

PSYC 514 (3) Advanced Topics in Biopsychology  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 516 (3) Animal Learning, Memory, and Cognition  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 517 (3) Biopsychology of Motivation  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 520 (3) Developmental Biopsychology  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 521 (3/6) d Psycholinguistics  
This course is not eligible for Credit/D/Fail grading.

PSYC 522 (3) Drugs and Behaviour  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 523 (3) Experimental Neuropsychology and Animal Models  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 524 (3/6) d Neural Models of Learning and Memory  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 525 (3) Attitudes and Social Cognition  
To be offered in alternate years only. This course is not eligible for Credit/D/Fail grading.

PSYC 527 (3) Interpersonal Processes  
To be offered in alternate years only. This course is not eligible for Credit/D/Fail grading.

PSYC 528 (3) Advanced Methods in Social Psychology and Personality  
To be offered in alternate years only. This course is not eligible for Credit/D/Fail grading.

PSYC 529 (3-12) d Special Topics in Social Psychology  
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 530 (3) Assessment: A Critical Survey  
This course is not eligible for Credit/D/Fail grading.

PSYC 531 (3) Assessment: Clinical Applications  
This course is not eligible for Credit/D/Fail grading.

PSYC 532 (3) Child Assessment
This course is not eligible for Credit/D/Fail grading.

PSYC 533 (3/6) d Current Issues in Clinical Psychology
This course is not eligible for Credit/D/Fail grading.

PSYC 534 (3-12) c Clinical Psychology Practicum
This course is not eligible for Credit/D/Fail grading.

PSYC 535 (3) Psychopathology of the Adult
This course is not eligible for Credit/D/Fail grading.

PSYC 536 (3) Psychopathology of the Child
This course is not eligible for Credit/D/Fail grading.

PSYC 537 (3) Ethical and Professional Issues in Clinical Psychology
This course is not eligible for Credit/D/Fail grading.

PSYC 538 (3) Clinical Neuropsychological Assessment
This course is not eligible for Credit/D/Fail grading.

PSYC 540 (3/6) d Strategies of Psychological Intervention
This course is not eligible for Credit/D/Fail grading.

PSYC 541 (2) Introduction to Psychotherapy
This course is not eligible for Credit/D/Fail grading.

PSYC 542 (3) Cognitive/Behavioural Interventions
This course is not eligible for Credit/D/Fail grading.

PSYC 545 (3/6) d Advanced Statistics I
This course is not eligible for Credit/D/Fail grading.

PSYC 546 (3/6) d Seminar in Psychological Problems
This course is not eligible for Credit/D/Fail grading.

PSYC 547 (2-6) c Reading and Conference
This course is not eligible for Credit/D/Fail grading.

PSYC 549 (18) Master’s Thesis
This course is not eligible for Credit/D/Fail grading.

PSYC 556 (3) Psychological Treatment of Childhood Disorders
This course is not eligible for Credit/D/Fail grading.

PSYC 559 (6) Clinical Psychological Internship
This course is not eligible for Credit/D/Fail grading.

PSYC 560 (3) Clinical Research Design
This course is not eligible for Credit/D/Fail grading.

PSYC 567 (3) Personality Dimensions and Structure
To be offered in alternate years only. This course is not eligible for Credit/D/Fail grading.

PSYC 569 (3) Contemporary Conceptual Issues in Personality
To be offered in alternate years only. This course is not eligible for Credit/D/Fail grading.

PSYC 570 (3) Cognitive Neuroscience
This course is not eligible for Credit/D/Fail grading.

PSYC 571 (3-12) d Special Topics in Cognitive Neuroscience
This course is not eligible for Credit/D/Fail grading.

PSYC 574 (3) Biopsychology I
This course is not eligible for Credit/D/Fail grading.

PSYC 578 (3/6) d Perception
This course is not eligible for Credit/D/Fail grading.

PSYC 579 (3/6) d Special Topics in Perception
This course is not eligible for Credit/D/Fail grading.

PSYC 582 (3/6) d Cognition
This course is not eligible for Credit/D/Fail grading.

PSYC 583 (3/6) d Special Topics in Cognition
This course is not eligible for Credit/D/Fail grading.

PSYC 584 (3/6) d Language Development in Infancy and Childhood
This course is not eligible for Credit/D/Fail grading.

PSYC 585 (3/6) d Special Topics in Developmental Cognitive Neuroscience
This course is not eligible for Credit/D/Fail grading.

PSYC 586 (3/6) d Developmental Psychology
This course is not eligible for Credit/D/Fail grading.

PSYC 587 (3/6) d Cognitive Development
This course is not eligible for Credit/D/Fail grading.

PSYC 588 (3/6) d Special Topics in Social and Personality Development
This course is not eligible for Credit/D/Fail grading.

PSYC 589 (3/6) d Moral Development
This course is not eligible for Credit/D/Fail grading.

PSYC 590 (3) Survey of Social Psychology I
This course is not eligible for Credit/D/Fail grading.

PSYC 591 (3) Survey of Social Psychology II
This course is not eligible for Credit/D/Fail grading.

PSYC 592 (3) Neuroethology
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 593 (3) Neurophysiology and Cortical Plasticity
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 594 (3) Psychoneuroendocrinology
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 595 (3) Psychophysiology
Not offered each year; consult Department of Psychology. This course is not eligible for Credit/D/Fail grading.

PSYC 649 (0) Doctoral Dissertation

Psychiatry, Faculty of Medicine

PSYT: Psychiatry

PSYT 550 (3/6) d Directed Studies
Reading and study in particular fields of study and research in psychiatry. This course is not eligible for Credit/D/Fail grading.

Asian Studies, Faculty of Arts

PUNJ: Punjabi

PUNJ 100 (3) Introductory Punjabi I
Spoken and written Punjabi. Credit will be granted for only one of PUNJ 100 or PUNJ 102. Students who have taken Punjabi 11 in high school cannot take PUNJ 100 for credit.

PUNJ 101 (3) Introductory Punjabi II
Continuation of PUNJ 100. Credit will be granted for only one of PUNJ 101 or PUNJ 102. Students who have taken Punjabi 11 in high school cannot take PUNJ 101 for credit.
Prerequisite: PUNJ 100.

PUNJ 102 (6) Introductory Punjabi
Spoken and written Punjabi. As of 2011W, credit will be granted for only one of PUNJ 100/101 or PUNJ 102. Students who have taken Punjabi 11 in high school cannot take PUNJ 102 for credit.

PUNJ 200 (6) Intermediate Punjabi
Study of the grammar and introduction to Punjabi literature. As of 2011W, credit will be granted for only one of PUNJ 201/202 or PUNJ 200.
Prerequisite: One of PUNJ 101, PUNJ 102.

PUNJ 201 (3) Intermediate Punjabi I
Study of the grammar and introduction to Punjabi literature. Credit will be granted for only one of PUNJ 201 or PUNJ 200.
Prerequisite: PUNJ 101.

PUNJ 202 (3) Intermediate Punjabi II
Continuation of PUNJ 201. Credit will be granted for only one of PUNJ 202 or PUNJ 200.
Prerequisite: PUNJ 201.

PUNJ 205 (1) Introduction to the Gurmukhi Script
The writing system of Punjabi for those with some background in the spoken language. May be taken at the same time as PUNJ 200.

PUNJ 300 (6) Advanced Punjabi
Advanced grammar and conversation. Major genres of Punjabi literature. As of 2011W, credit will be granted for only one of PUNJ 301/302 or PUNJ 300.
Prerequisite: One of PUNJ 200, PUNJ 202.

PUNJ 401 (3) Devotional Literature in Punjabi
Emphasis is on reading and written expression. Analytical writing in English and Punjabi required.
Prerequisite: PUNJ 300.

PUNJ 402 (3) Early Modern Punjabi Literature
Emphasis is on reading and written expression. Analytical writing in English and Punjabi required.
Prerequisite: PUNJ 300.

PUNJ 403 (3) Modern Punjabi Literature
Popular and literary works in modern Punjabi, with a focus on short stories and poetry. Emphasis on reading, writing, and vocabulary development.
Prerequisite: PUNJ 300.

PUNJ 404 (3) The Punjabi Novel (Advanced Punjabi)
Study of the modern Punjabi novel to deepen understanding and use of Punjabi, and strengthen analysis in English and Punjabi.
Prerequisite: PUNJ 300.

PUNJ 457 (3) Punjabi Theatre
Punjabi-language theatre, with emphasis on Canadian forms. Reading, writing, and performance of plays; examination of history of Punjabi theatre.
Prerequisite: PUNJ 300.

PUNJ 475 (3) Oral Histories in Punjabi
Develops students' oral expression and listening comprehension in Punjabi through Community Based Learning. Students engage in oral history collection in the Punjabi-speaking community and develop short video or sound projects. Analytical reading and writing required.
Prerequisite: PUNJ 300.

Radiology, Faculty of Medicine

RADI: Radiology

RADI 700 (0) Physics and Technology for Radiology
During the first month of residency training, didactic instruction is given at the British Columbia Institute of Technology in the
physics of radiology and the fundamentals of radiographic technology (radiography). During this one-month residency period, the resident is trained in radiographic technology by working as a technologist at one of the affiliated hospitals. Eight hours daily.

**RADI 701 (0)Continuing Instruction in Basic Sciences**
During the four years of training in Radiology and/or Nuclear Medicine, scheduled and unscheduled instruction is given in physics (one hour per week).
*Prerequisite:* Pathology correlated with radiology (one hour per week).

**RADI 702 (0)Clinical Investigation or Research**
Each resident is encouraged to complete an investigative project in each of the four years in Radiology, under the supervision of a faculty member, for possible presentation at an annual department meeting. Average 80 hours each year.

**RADI 703 (0)Current Topics in Radiology**
Approximately six internationally recognized authorities in radiology and two or three in nuclear medicine are invited to visit this department each year for one to five day periods, during which lectures, consultations and small group seminars are given.

**RADI 705 (0)Elective Periods**
During the third and fourth years of Radiology for eight hours daily, elective periods of one to twelve months, as acceptable to the resident and the Program Director, are available for two or more of the radiologic subspecialties including computed tomography, ultrasound, neuroradiology, paediatric radiology, nuclear medicine, angiography, interventional radiology and magnetic resonance imaging.

**RADI 710 (0)Clinical Nuclear Medicine**
Daily discussions of the clinical applications of nuclear medicine. See PATH 730.

**RADI 711 (0)Progress in Nuclear Medicine**
Weekly reviews of current literature topics in nuclear medicine. See PATH 731.

**RADI 712 (0)Clinical Investigation/Research**
Participation in ongoing research projects within the division. See PATH 732.

**RADI 713 (0)Audit in Nuclear Medicine**
Review of diagnostic nuclear medicine procedure, correlation with other diagnostic tests, and final patient diagnosis. Also offered as PATH 733.

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**Classical, Near Eastern and Religious Studies, Faculty of Arts**

**RELG: Religious Studies**

Not all courses are offered every year. For current listings, consult the departmental website at: www.cnrs.ubc.ca.

**RELG 101 (3)Introduction to the Western (Abrahamic) Religions: Judaism, Christianity, and Islam**
An overview of the three main western monotheistic (Abrahamic) religions, together with the concepts used in studying religion. The focus will be on the origins and representative texts along with some historical development and current experience of each religion.

**RELG 102 (3)Introduction to the Major Eastern Religions**
An introduction to the major Asian religious traditions (Hinduism, Sikhism, Jainism, Buddhism, Confucianism, Daoism, Shintoism, and Shamanism; including religious life in South Asia û devotionalism in Islam, Hinduism, Sikhism) which employs theoretical models drawn from religious studies.
*Equivalency:* ASIA 110.

**RELG 201 (3)Near Eastern and Biblical Mythology**
An introduction to the world of Near Eastern mythology, from the Gilgamesh Epic to the Book of Genesis and beyond.

**RELG 203 (3)Scriptures of the Near East**
An introduction to the scriptures of Judaism, Christianity, and Islam.

**RELG 204 (6)Introduction to Asian Religions**
The religions of India, China, and Japan in their interactions and cultural contexts, including Hinduism, Buddhism, Jainism, Sikhism, Taoism, Confucianism, and Shinto.
Equivalency: ASIA 204.

**RELG 206 (3) Introduction to Judaism and its Texts**
What is Judaism? An overview of the key texts that have defined the Jewish religion, from the Hebrew Bible through works of contemporary thinkers. Recommended as a basis for upper-level courses in religious studies.

**RELG 207 (3) Classical Islam**
The history and culture, values, and achievements of Islamic societies from 700-1500; the interconnections between power, politics, gender, and the arts in Islamic societies. This course is highly recommended as a basis for all 300- and 400-level Islamic Studies courses.

**RELG 208 (3) Modern Islam**
The history and culture, values, and socio-political movements of the Islamic world from 1500 to the modern day; the interconnections between power, politics, gender, and the arts in modern Islamic societies. This course is highly recommended as a basis for all 300- and 400-level Islamic Studies courses.

**RELG 209 (3) Eden to Exile: Introduction to the Hebrew Bible**
An overview of the Hebrew Bible ("Old Testament"), with emphasis on its ancient Near Eastern context; its competing religious perspectives; and its limits as a historical source.

**RELG 210 (3) History of Christianity I (1st C. C.E. - 14th C. C.E.)**
An introduction to the history of Christianity from the post-Biblical period to the colonial expansion of Christianity under Spain and Portugal.

**RELG 211 (3) History of Christianity II (15th C. C.E. - present)**
The history of Christianity from the Reformation to the present day. Provides an historical overview of Christian thought and its institutions and significant people during the rise of the Reformation in various locales of Europe and beyond (Germany, France, Great Britain, Switzerland, and Scandinavia).

**RELG 302 (3) Death and Afterlife in Western Religious Tradition**
A survey of traditional attitudes toward death and beliefs regarding human existence after death in Western religions.

**RELG 305 (3) The Prophetic Personality in Ancient Israel**
An exploration of the unique phenomenon of the biblical prophet in its wider Near Eastern context.

**RELG 306 (3) Archaeology and the Bible**
The impact of archaeological research on understanding the history and religion of ancient Israel.

**RELG 307 (3) Sex, Lies, and Violence in the Hebrew Bible**
An exploration of the Bible's "dark side," with emphasis on texts that center on sex, deceit, and murder.

**RELG 308 (3) Talmud, Midrash and the Rabbinic Imagination**
The Talmud, Midrash, and other late-antique (3rd - 7th centuries) rabbinic writings, focusing on biblical interpretation and narratives.

**RELG 309 (3) Jews and Christians**
Aspects of Jewish-Christian relations from the beginnings of Christianity to the present day. Emphasis on the study of Christian and Jewish texts in translation.

**RELG 310 (3) Jewish Responses to Catastrophe**
Topics include the destruction of the Second Temple, the Crusades, the expulsions from Spain and Portugal, and the Holocaust. A study of texts in translation.

**RELG 311 (3) Jewish Literature in Translation**
A survey of Jewish literature in medieval and modern times.

**RELG 312 (3) Jews and Judaism in Canada**
The history of the Jewish community in Canada, from New France to the present. Emphasis on the relationship between immigration and religious transformation, Jewish-Christian relations, the development of community structures.

**RELG 313 (3) Modern Jewish Ethics in Historical Perspective**
Readings from key texts in English translation, tracing how Jewish approaches to ethical issues evolved from biblical times to the present.

**RELG 315 (6) History of Christian Thought**
Selected topics with special emphasis on doctrinal change and development, orthodoxy and heresy, tradition and authority, and
Church and State in the Patristic, Medieval, Reformation, and Modern periods.

RELG 316 (3) The Origins of Christianity: Literary Contexts
The origins of Christianity as reflected in the New Testament and contemporaneous literature.

RELG 317 (3) The Origins of Christianity: Social, Religious, and Political Milieux
The origins of Christianity as reflected in early Christian literature of the first and early second centuries (including the New Testament).

RELG 321 (3/6) d Prophetic Figures in the Christian Tradition
Examined in their historical context and in terms of their continuing significance. Selection will vary from year to year, but may include Augustine, Thomas Aquinas, Martin Luther, and Teresa of Avila.

RELG 323 (6) Christianity in the Modern World
The interaction between Christianity and the major intellectual, social, and cultural developments since 1648 with special attention to the expansion of Christianity and its encounter with urban industrial society.

RELG 328 (3) Medieval Philosophy
Survey of Western European thought from Augustine to the fourteenth century. Possible topics and authors include: Augustine; Abelard; the influence of Islam; the rediscovery of Aristotle; Aquinas; Scotus; Ockham.
Equivalency: PHIL 313.

RELG 330 (3) The Origins of Judaism
Survey the history of Jewish Judaism in the Second Temple era, from the destruction of the First Jerusalem Temple (586 B.C.E.) to the beginnings of the rabbinc movement (200 C.E.).

RELG 331 (3) Medieval Jewish History
The political, social, economic, and cultural history of the Jews from the time of the Christianization of the Roman Empire to the expulsion of professing Jews from Spain and Portugal at the end of the fifteenth century.

RELG 332 (3) Modern Jewish History
The political, social, economic, and cultural history of Jews from the beginning of the sixteenth century to the present, with special emphasis on changing attitudes to Jews and Judaism, and social and cultural transformations.

RELG 335 (3) Jewish Law
History, sources, theoretical issues and current state of research about early Jewish legal traditions, focusing on close readings of classic primary texts in English translations.

RELG 341 (3/6) d Art and Architecture in the Islamic World
A thematic study of visual arts, architecture, and objects from the Islamic world.
Equivalency: ARTH 351.

RELG 365 (3) Daoist (Taoist) Religion and Its Philosophical Background
A study of the Daoist religious traditions from their beginnings in the second century C.E. in cultural, intellectual and social contexts.
Equivalency: ASIA 381.

RELG 366 (3) Buddhism in China
History, thought and practices of Chinese Buddhism from its beginnings until the twentieth century.
Equivalency: ASIA 382.

RELG 370 (6) Concepts and Methods in the Study of Religion
Required of Major and Honours students in their third year. Open to others by permission of the instructor.

RELG 385 (3) Mystical Traditions: Jewish and Christian
Methodology, textual study and scholarly analysis of selected texts from these traditions.

RELG 407 (3) Topics in Early Judaism
Judaism and Hellenism, the rise of the synagogue, Jewish sects, the development of Mishnah and Talmud.

RELG 408 (3) Topics in Medieval Judaism
The work of Maimonides and other Jewish philosophers, early developments in Jewish mysticism, the Jews as a minority culture in Islamic and Christian lands.

RELG 409 (3) Topics in Modern Judaism
The Jews in the ghetto culture, Hasidism, the Emancipation, Reform, Orthodox, and Conservative Movements.
RELG 414 (3) The Gospels and the Historical Jesus
The canonical and apocryphal gospels and the life and teachings of the historical Jesus.

RELG 415 (3) The Life and Thought of Paul of Tarsus
The life and literature of Paul in the Roman imperial world: letter writing, patronage and power; Roman imperial iconography; Paul and community formation.

RELG 420 (6) Religion in Canada
An examination of Canadian religious development with special reference to the separation of church and state, the rise of denominationalism and religious pluralism, secularization and ecumenicity, and the emergence of new religious movements.

RELG 448 (3) Seminar in the History of the Religion of Islam
A topic relevant to the study of Islam as a religion: e.g., the text and doctrines of the Qur’an; the Hadith (or Traditions) of the Prophet; Islamic Law; mysticism in Islam; the Shi’ah and the Isma’ils. Not offered every year. Consult the departmental brochure for the topic to be offered.

RELG 452 (6) Readings in Hindu Religious Texts
Representative texts, in translation, of the Vedic, Epic, Puranic, Classical, Medieval, and Modern periods. Emphasis in the second term on texts of particular periods, movements, or sects, depending on the students’ needs and interests. Those with the necessary preparation may read some texts in the original language. This course is not eligible for Credit/D/Fail grading.

RELG 475 (3/6) d Topics in Religion
Consult the course registration information each year for offered topics. This course is not eligible for Credit/D/Fail grading.

RELG 479 (3/6) c Directed Studies
Reading and, where appropriate, other research on a topic arising in the discipline, arranged by agreement between the student and the instructor. This course is not eligible for Credit/D/Fail grading.

RELG 480 (3/6) d Women and Religion
A study of the roles of women in the literature of one or more religious traditions.

RELG 485 (3) Images of Eve
The story of Adam and Eve, and its influence on the role and image of women in Judaism, Christianity, and Islam.

RELG 500 (3-12) d Topics in Biblical Studies
Studies in the history, literature, canon and text, and the religious thought of the Old and New Testaments. This includes the study of the cultural and religious milieu out of which these documents arose. Such studies require a competence in the canonical languages (Biblical Hebrew and/or Koine Greek), usually achieved by not less than two years of study. This course is not eligible for Credit/D/Fail grading.

RELG 502 (3-12) d Topics in Judaism
Studies in the texts (in translation), history, and religious thought of Judaism after the close of the Biblical Period. This course is not eligible for Credit/D/Fail grading.

RELG 503 (3-12) d Topics in the Post-Biblical Christian Tradition
Studies in post-Biblical history, documents, and religious ideas of the Christian tradition. Depending on the area of concentration, language requirements include either Latin or Greek and a reading knowledge of French or German. This course is not eligible for Credit/D/Fail grading.

RELG 514 (3-12) d Topics in Islam
Studies in the literature (in translation), history, and religious thought of Islam in Western Asia and North Africa from its inception to the rise of the Ottoman Empire. This course is not eligible for Credit/D/Fail grading.

RELG 531 (3) Graduate Seminar
This course is not eligible for Credit/D/Fail grading.

RELG 631 (6/12) d Buddhist Studies
This course is not eligible for Credit/D/Fail grading.

RELG 649 (0) Doctoral Dissertation

Faculty of Science
RES 500 (3-12) Resource and Environmental Workshop
Faculty and students from different disciplines act as an interdisciplinary team studying specific resource problems with ecological, economic, demographic and social dimensions. Techniques and methods are emphasized to show their value in integrating knowledge, defining policy and facilitating communication. Several sections with different emphasis offered each year. This course is not eligible for Credit/D/Fail grading. Prerequisite: Permission of the instructor is required.

RES 501 (3) Development of Environmental Thought
History and philosophy of Western environmental thought; changes in concepts of human nature and external nature over time; critiques of modern industrial society. This course is not eligible for Credit/D/Fail grading.

RES 502 (3) Master's Seminar on Resources and Environment
Environment and resource management goals and issues. This course is not eligible for Credit/D/Fail grading.

RES 505 (3) Qualitative Methods in Interdisciplinary Contexts
Research design, data quality, analysis, representation, ethics review, structured and unstructured interviews, field observations, survey design. This course is not eligible for Credit/D/Fail grading.

RES 506 (3) Human Dimensions of Conservation
History of wilderness and protected areas; ecological dynamics underpinning biodiversity; evaluating the success of protected areas and ecological dynamics. This course is not eligible for Credit/D/Fail grading.

RES 507 (3) Human Technological Systems
Critical analysis of harms and benefits, and anticipation of global technological innovations, as they interact with social behaviour. This course is not eligible for Credit/D/Fail grading.

RES 508 (3) Ecosystem Services
Fostering sustainable management of ecosystem-based activities, for the competing and complementary ends of sustaining and enhancing human well-being and protecting biodiversity. This course is not eligible for Credit/D/Fail grading.

RES 510 (3) Social Ecological Systems
Dynamics of environmental issues across temporal and spatial scales using disciplinary and interdisciplinary approaches to integrating sociological, cultural, and ecological perspectives. This course is not eligible for Credit/D/Fail grading.

RES 515 (3) Integrated Watershed Management
Methods of watershed evaluation, land-water interactions, key aspects of hydrology, water quality and aquatic biota, land use impacts on water resources, community involvement, and integration of multiple land use activities and their cumulative impacts. Credit will be granted for only one of SOIL 515 or RES 515. This course is not eligible for Credit/D/Fail grading.

RES 516 (3) Urban Watershed Management
Urban land use impacts on water resources with a focus on impervious surfaces, storm-water management, non-point sources of pollution, cumulative effects, water quality, rehabilitation of urban streams and application of best management practices. Prior completion of RES 515 strongly recommended. Credit will be granted for only one of RES 516 or SOIL 516. This course is not eligible for Credit/D/Fail grading.

RES 517 (3) Agricultural Watershed Management
Intensive and extensive agriculture with a focus on water needs, water use and impacts on water resources. Non-point sources of pollution, nutrient modeling, soil and land degradation, protection and rehabilitation of watersheds including buffer zones, wetlands, and best management practices. Credit will be granted for only one of SOIL 520 or RES 517. This course is not eligible for Credit/D/Fail grading. Equivalency: SOIL 520.

RES 518 (3) Water in International Development
Key water issues associated with international development: global water demand, scarcity, efficiency of use, water as a commodity, biophysical and policy aspects of water management, water and health, land use impact, water harvesting, improved irrigation, and pollution prevention. Credit will be granted for only one of SOIL 518 or RES 518. This course is not eligible for Credit/D/Fail grading.

RES 520 (3) Climate Change: Science, Technology and Sustainable Development
Interdisciplinary science of climate change and its impacts; options for mitigation and adaptation. This course is not eligible for Credit/D/Fail grading.
RES 530 (3) Knowledge, Policy and Values in Risk and Resource Management
The course focuses on the role of values, science and validity of alternate knowledge systems. Included in the dialogue are the democratization of science, uncertainty, adaptive scientific practices and the values that govern management programs. This course is not eligible for Credit/D/Fail grading.

RES 542 (3) Integrated Assessment
Basic skills for quantitative analysis including probability, validity of quantitative statements and experimental design to test hypothesis validity. This course is not eligible for Credit/D/Fail grading.

RES 550 (3) Environmental Policy Analysis
Determination of risks and values in environmental policy decisions. This course is not eligible for Credit/D/Fail grading. Equivalency: PLAN 599.

RES 586 (3) Fish Conservation and Management
Offered concurrently with CONS 486. This course is not eligible for Credit/D/Fail grading. Equivalency: CONS 486.

RES 599 (12) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

RES 602 (3) Doctoral Seminar on Resources and Environment
Environment and resource management goals and issues. This course is not eligible for Credit/D/Fail grading.

RES 699 (0) Doctoral Dissertation

Religion, Literature and The Arts, Faculty of Arts

RGLA: Religion, Literature and The Arts

Not all courses are offered every year. For current listings, consult the departmental website at: rglarts.arts.ubc.ca.

RGLA 371 (3) Seminar in Religion and Literature

RGLA 372 (3/6) d Topics in Religion, Literature, and the Arts
The topic is selected and announced annually by the RGLA Committee.

RGLA 471 (3) Advanced Seminar in Religion and Literature
Application of critical methods to one or more major authors.

Faculty of Medicine

RHSC: Rehabilitation Sciences

RHSC 420 (4) Elements of Neuroanatomy and Neurophysiology
An introduction to the structure and function of the human nervous system. [2-3-0]

RHSC 500 (2) Advanced Concepts for Rehabilitation Research
Issues relevant to clinical investigations in rehabilitation. Emphasis on research design, measurement issues, selection of analytical approaches, and relevant epidemiological concepts. This course is not eligible for Credit/D/Fail grading.

RHSC 501 (3) Evidence for Practice
This course is not eligible for Credit/D/Fail grading.

RHSC 502 (3) Rehabilitation Theory
The history, evolution and analysis of conceptual systems underlying practice in occupational therapy and physical therapy. This course is not eligible for Credit/D/Fail grading.

RHSC 503 (3) Reasoning and Decision-Making
This course is not eligible for Credit/D/Fail grading.
RHSC 504 (3/6) c Directed Studies in Rehabilitation
This course is not eligible for Credit/D/Fail grading.

RHSC 505 (3) Measurement for Assessment, Planning, and Evaluation
This course is not eligible for Credit/D/Fail grading.

RHSC 506 (3/6) c Current Topics in Rehabilitation
This course is not eligible for Credit/D/Fail grading.

RHSC 507 (3) Developing Effective Rehabilitation Programs
This course is not eligible for Credit/D/Fail grading.

RHSC 508 (3) Cross-Cultural Issues in Rehabilitation
This course is not eligible for Credit/D/Fail grading.

RHSC 509 (3) Facilitating Learning in Rehabilitation Contexts
This course is not eligible for Credit/D/Fail grading.

RHSC 510 (3) Disability: Social, Economic and Political Influence
Interrelationships between disability and the social, economic and political environment, with emphasis on factors shaping experiences of health and illness. The social consequences of disability in the context of family, community and workplace. This course is not eligible for Credit/D/Fail grading.

RHSC 512 (2) Directed Studies in Pathology in Rehabilitation
This course is not eligible for Credit/D/Fail grading.

RHSC 514 (3) Neuroimaging: Basic Concepts and Applications to Research and Practice
This course is not eligible for Credit/D/Fail grading.

RHSC 515 (3) Physical Activity in Health and Chronic Conditions
Epidemiology, measurement, physiology, and adoption of physical activity in the prevention and treatment of chronic conditions. This course is not eligible for Credit/D/Fail grading.

RHSC 516 (3) Biomechanics in Musculoskeletal Rehabilitation
Biomechanical analysis of human movement as it pertains to musculoskeletal disorders. Hands-on human movement assessment. This course is not eligible for Credit/D/Fail grading.

RHSC 520 (3) Neurorehabilitation
Therapeutic approaches and strategies in physical and occupational therapy for persons with motor control problems resulting from central nervous system dysfunction. This course is not eligible for Credit/D/Fail grading.

RHSC 530 (1) Research Proposal
Development, appraisal and formatting of a research proposal. Emphasis on research writing and critical analysis of a variety of research proposal formats. This course is not eligible for Credit/D/Fail grading.

RHSC 549 (18) M.Sc. Thesis
This course is not eligible for Credit/D/Fail grading.

RHSC 581 (1.5-3) c Writing to Enhance Practice
This course is not eligible for Credit/D/Fail grading.

RHSC 583 (1.5-6) c Applying Research to Practice
This course is not eligible for Credit/D/Fail grading. Prerequisite: RHSC 501.

RHSC 585 (3) Directed Studies
This course is not eligible for Credit/D/Fail grading. Prerequisite: RHSC 501.

RHSC 587 (3) Major Project, Part I
This course is not eligible for Credit/D/Fail grading. Prerequisite: Permission of the project coordinator is required.

RHSC 589 (3/6) c Major Project, Part II
This course is not eligible for Credit/D/Fail grading. Prerequisite: RHSC 587. Permission of the project coordinator is also required.

RHSC 699 (0) Doctoral Dissertation
RMST: Romance Studies

RMST 221 (3) Literatures and Cultures of the Romance World I: Medieval to Early Modern
An introduction to the main themes that shaped the Western part of Europe as its different national identities emerged in the Mediterranean sphere.

RMST 222 (3) Literatures and Cultures of the Romance World II: Modern to Post-Modern
An introduction to the main themes that shaped the Western part of Europe in the age of the nation state, imperialism, colonization, and decolonization.

RMST 234 (3) Introduction to Romance Language Cinema

RMST 420 (3/6) d Studies in Romance Languages and Literature

RMST 468 (6) Romance Linguistics
The Indo-European background; Classical and Vulgar Latin; the origin, development and spread of the Romance languages; their vocabulary, phonology, morphology, syntax; vernacular Latin texts and Romance texts.
Prerequisite: Two years study of each of two Romance languages or two years of one Romance language and one year of Latin.

RMST 495 (3) Research Intensive Seminar in Romance Studies

RMST 520 (3) Studies in Romance Languages and Cultures
This course is not eligible for Credit/D/Fail grading.

RMST 548 (0) Major Essay

Faculty of Medicine

RSOT: Occupational Therapy

RSOT 538 (7) Fieldwork Education II
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Central, Eastern and Northern European Studies, Faculty of Arts

RUSS: Russian

RUSS 100 (6) First-Year Russian
Introduction to contemporary Russian Oral practice, grammar, reading, writing.

RUSS 101 (3) Basic Russian I
Introduction to contemporary Russian with emphasis on specialized vocabulary for science, commerce, law, etc. Oral practice, grammar, reading and writing. Note: Students who intend to use RUSS 101, 102 and 200 to satisfy the Faculty of Arts language requirement must register for both RUSS 101 and 102 in the same year.

RUSS 102 (3) Basic Russian II
Continuation of RUSS 101.

RUSS 112 (3) Russian for Singers
Study of Russian language and culture for opera students.

RUSS 200 (6) Second-Year Russian
Intermediate oral practice, grammar, reading, composition. A special section may be provided for Science students. Credit will be granted for only one of RUSS 200 or both of RUSS 201 and RUSS 202.
Prerequisite: One of RUSS 100, RUSS 102.

RUSS 201 (3) Second-Year Russian I
Intermediate oral practice, grammar, reading, composition. A special section may be provided for Science students. Credit will be granted for only one of RUSS 201 or RUSS 200.
Prerequisite: One of RUSS 100, RUSS 102.
RUSS 202 (3) Second-Year Russian II
A continuation of RUSS 201. Intermediate oral practice, grammar, reading, composition. A special section may be provided for Science students. Credit will be granted for only one of RUSS 202 or RUSS 200.
Prerequisite: RUSS 201.

RUSS 206 (3) Nineteenth-Century Russian Writers in Translation
The writings, lives, and thought of selected authors.

RUSS 207 (3) Twentieth-Century Russian Writers in Translation
The writings, lives, and thought of major Russian authors.

RUSS 215 (3) Russian Practice
Emphasis on oral practice and reading. It is recommended that this course be taken concurrently with RUSS 200.
Prerequisite: RUSS 100.

RUSS 300 (6) Third-Year Russian
Intermediate oral practice, syntax and composition.
Prerequisite: RUSS 200.

RUSS 305 (3) Readings in Russian Literary Texts
Texts are selected from 19th-, 20th-, and 21st-century sources.
Prerequisite: RUSS 200.

RUSS 306 (3/6) Russian Literature in Translation
A comprehensive historical and critical presentation with emphasis on the nineteenth and twentieth centuries.

RUSS 315 (3) Advanced Russian Practice
Continuation of RUSS 215. May be taken concurrently with RUSS 300.
Prerequisite: RUSS 215.

RUSS 316 (3) Russian through Film (in Russian)
Conversation and composition using Russian film.
Prerequisite: RUSS 200.

RUSS 321 (3) Imagining Location in Russian Literature (in English)

RUSS 323 (3/6) Fantastic Worlds in Russian Fiction (in English)
Russian genre fiction and film (science fiction, fantasy and gothic).
Prerequisite: Third year standing.

RUSS 400 (3/6) Fourth-Year Russian
Advanced oral practice, reading and composition.
Prerequisite: RUSS 300.

RUSS 401 (6) Russian for Reading Knowledge
Russian for Reading Knowledge This course provides a reading knowledge of Russian, sufficient to enable students to understand scientific and scholarly material. Basic grammar and practice in the translation into English of texts in the natural sciences, social sciences, and humanities. Intended primarily for upper-year and graduate students.

RUSS 407 (3/6) Studies in Russian Poetry
For further details see Department.
Prerequisite: RUSS 300.

RUSS 408 (3/6) Studies in Russian Prose Before 1917
See Department for further details.
Prerequisite: RUSS 300.

RUSS 409 (3/6) Contemporary Russian Literature after 1917
See Department for further details.
Prerequisite: RUSS 300.

RUSS 410 (3/6) Women in Russian Literature and Culture
Analysis of translated texts by and concerning women from folklore to contemporary society.

RUSS 411 (3) Tolstoy in Translation
RUSS 412 (3) Dostoevsky in Translation

Asian Studies, Faculty of Arts

SANS: Sanskrit

SANS 300 (6) Introductory Sanskrit
Basic vocabulary and most important grammatical features of classical Sanskrit. Useful to students of South Asian history, culture, languages, philosophies, and religions, and of linguistics and classics. Credit will be granted for only one of SANS 300 or SANS 102 or both SANS 100, SANS 101 or both SANS 301, SANS 302. This course is not eligible for Credit/D/Fail grading.

SANS 301 (3) Introductory Sanskrit I
Basic vocabulary and most important grammatical features of classical Sanskrit. Useful to students of South Asian history, culture, languages, philosophies, and religions, and of linguistics and classics. No prior proficiency in Sanskrit required. Credit will be granted for only one of SANS 301 or SANS 100 or SANS 302. This course is not eligible for Credit/D/Fail grading.

SANS 302 (3) Introductory Sanskrit II
Continuation of SANS 301. Credit will be granted for only one of SANS 302 or SANS 101 or SANS 300. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SANS 301.

SANS 400 (6) Intermediate Sanskrit
Advanced grammar and selected readings. Credit will be granted for only one of SANS 400 or SANS 200 or both SANS 201, SANS 202 or both SANS 401, SANS 402. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of SANS 300, SANS 302.

SANS 401 (3) Intermediate Sanskrit I
Advanced grammar and selected readings. Credit will be granted for only one of SANS 401 or SANS 201 or SANS 400. This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of SANS 300, SANS 302.

SANS 402 (3) Intermediate Sanskrit II
Continuation of SANS 401. Credit will be granted for only one of SANS 402 or SANS 202 or SANS 400. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SANS 401.

SANS 450 (6-18) Further Readings in Sanskrit
Study of selected texts belonging to a particular period (e.g., Vedic) or representing a specific branch of kavya (poetic literature) or sastra (technical-philosophical literature). This course is not eligible for Credit/D/Fail grading.
Prerequisite: One of SANS 200, SANS 202, SANS 400, SANS 402.

Central, Eastern and Northern European Studies, Faculty of Arts

SCAN: Scandinavian

SCAN 332 (3/6) Topics in Scandinavian Studies (in English)
Selected issues and topics in Scandinavian cultural studies.

SCAN 333 (3) Major Works of Scandinavian Literature (in English)
Selected Danish, Swedish, Norwegian, and Icelandic texts ranging from Old Norse sagas to contemporary literary works against the background of literary, social, and political developments in Scandinavia.

SCAN 334 (3) Contemporary Scandinavian Fiction (in English)
Study of texts, topics, or genres against the background of current Scandinavian literary, social, and political developments.

SCAN 335 (3) Vikings and Norse Mythology (in English)
History, literature, and mythology of early Scandinavian societies.

SCAN 336 (3) Scandinavian Crime Fiction (in English)
Crime fictions and films as a mirror of Scandinavian society.
SCAN 337 (3) Scandinavian Cinema (in English)
An introduction to the cinemas of the Scandinavian region.

SCAN 411 (3/6) Scandinavian Drama and Film in Translation
Traces the explosive development of a provincial theatre into one of the seminal forces of twentieth-century drama and film. Emphasis on Ibsen, Strindberg, and Bergman.

SCAN 412 (3) The Northern European Epic in Translation
Major prose works of the Scandinavian literatures with emphasis on the stylistic qualities of the Old Icelandic sagas and their transformation in the novels of modern Icelandic, Danish, Swedish, and Norwegian writers. Possible authors: Laxness, Blixen, Hamsun, Lindgren.

SCAN 413 (3/6) The Literatures of the Baltic in English Translation
An examination through literature of the historical, cultural, and ethnic elements that have made the Baltic area the crossroads of northeastern Europe. The emphasis is on literature from the Germanic and Finno-Ugric languages. Authors to be studied include Strindberg, Tikkanen, Transtomer, Kaplinski, Grass, Bobrowski, Lenz.

SCAN 414 (3) Topics in Danish and Northern European Cultural Studies (in English)
Selected topics, such as ethnicity, migration, identity, women's issues, Danish and Northern European film.

SCAN 415 (3) The World of the Sagas (in English)
Scandinavian contributions to medieval and early modern world literature, culture and history.

SCAN 501 (3/6) Old Icelandic
Though 501 is usually taught as a 6-credit course, students may elect to take the first term only, "Introduction to Old Icelandic," for 3 credits. This course is not eligible for Credit/D/Fail grading.

Faculty of Science

SCIE: Science

SCIE 001 (27) Science One
An innovative first-year multidisciplinary course incorporating biology, chemistry, mathematics, and physics with a strong focus on the connections between these traditional disciplines. See the Science One website (www.scienceone.ubc.ca) for further information and the application process for admission to SCIE 001. This course is not eligible for Credit/D/Fail grading. [12-6-4]
Prerequisite: Either (a) BIOL 11 or (b) BIOL 12; and all of CHEM 12, CALC 12, PHYS 12, ENGL 12 and Principles of Mathematics 12 or Pre-calculus 12.
Corequisite: BIOL 140.

SCIE 113 (3) First-Year Seminar in Science
Small-group experience where students study science in society, scientific process, and how to communicate scientific concepts. Enrollment limited to students with first-year standing in the B. Sc. program in Science. This course is not eligible for Credit/D/Fail grading. [3-0-0]

SCIE 120 (1) Topics in Sustainability Science
Topics in sustainability, based on concepts introduced in first-year Science courses. [1-0-0]
Corequisite: One of BIOL 111, BIOL 121 and one of CHEM 111, CHEM 121. Restricted to students with first-year standing in Science.

SCIE 300 (3) Communicating Science
Effective communication and presentation skills in science. [1-0-3]
Corequisite: One of BIOL 300, STAT 200, STAT 241 and 3rd or 4th year standing in Combined Major in Science.

SCIE 420 (3) Sustainability for Community and the World
Explores systems thinking in the context of sustainability and also re-examines the familiar three pillar model of sustainability - society, ecology, and economics - highlighting its uses and limitations. [3-0-0]
Prerequisite: One of ASIC 200, ASIC 220, APBI 260, APBI 265, ARCL 309, BIOL 230, CHEM 301, CHEM 302, CHEM 341, CIVL 200, CONS 330, ECON 210, ENDS 221, ENVR 200, ENVR 300, EOSC 270, EOSC 340, FRST 100, GEOG 211, GEOG 310, HIST 106, ISCI 360, ISCI 361, LAW 386, LFS 250, PHYS 333, POLI 351, PSYC 321, SCIE 120. Fourth-year standing or permission of the instructor.
Asian Studies, Faculty of Arts

SEAL: Southeast Asian Languages

SEAL 440 (3-18) c Supervised Study in Southeast Asian Languages

Smart Grid Energy Systems, Faculty of Applied Science

SGES: Smart Grid Energy Systems

SGES 501 (6) Integration Project
Design, analysis, and implementation of technology to create a bench-scale smart grid energy system. Assessment of technology based on sustainability, market, policy and regulatory considerations. This course is not eligible for Credit/D/Fail grading.

SGES 502 (3) Renewable and Efficient Electric Power Systems
Electricity infrastructure, fundamentals of electric power, solar photovoltaic systems, wind electric conversion systems, other renewable energy systems, grid integration of renewables, smart grid, distributed energy resources, electricity storage. This course is not eligible for Credit/D/Fail grading.

SGES 503 (2) Topics in Power and Energy
Current topics in smart grid systems and technologies in the context of sustainability, market, policy and regulation. This course is not eligible for Credit/D/Fail grading.

SGES 531 (3) Smart Grid Communication Systems
Review of probability theory, signals and noise, spectral analysis; information theory and applications; detection and estimation of signals in the presence of noise; performance calculations of modulation systems; digital communication techniques. Credit will be granted for only one of SGES 531 or ELEC 431. This course is not eligible for Credit/D/Fail grading.

SGES 550 (2) Power Electronic Devices
New devices and applications in power electronics with applications to smart grid systems. Credit will be granted for only one of SGES 550 or EECE 550. This course is not eligible for Credit/D/Fail grading.

SGES 592 (2) Architecture for Learning Systems
Learning in neural networks, error backpropagation, simulated annealing, content addressable memories. Data representation topics. Implementation challenges in real world scale problems. Architectures for function approximation in Reinforcement Learning. Comparison with conventional artificial intelligence: history and emerging trends. Credit will be granted for only one of SGES 592 or EECE 592. This course is not eligible for Credit/D/Fail grading.

Central, Eastern and Northern European Studies, Faculty of Arts

SLAV: Slavic Studies

SLAV 105 (6) Introduction to Russian and Slavic Culture
Cultural developments from the medieval period to the present.

SLAV 307 (3/6) d Literature and Film in Eastern Europe
Films and translated literature by Slavic writers with emphasis on the interaction between politics and literature.

Asian Studies, Faculty of Arts

SOAL: South Asian Languages

SOAL 100 (6) Khichri: The South Asian Languages of Vancouver
A systematic introduction to the grammars and scripts of Hindi, Urdu, Punjabi and Sanskrit, primarily through the media of Indo-Canadian popular culture (film, radio, bhangra, etc.)
SOAL 440 (3-18) c Supervised Study in South Asian Languages

Sociology, Faculty of Arts

SOCl: Sociology

One of SOCI 100, SOCI 101, SOCI 102 is prerequisite for most 300- and 400-level SOCI courses.

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**SOCI 100 (6) Introduction to Sociology**
Introduction to problems in the analysis of social structures and processes. Basic sociological concepts will be introduced and their application demonstrated in various areas of sociology. Credit will be granted for only one of SOCI 100 or both SOCI 101, SOCI 102.

**SOCI 101 (3) Social Interaction and Culture**
Culture, identity, social interaction, relationships and socialization. Credit will be granted for only one of SOCI 101 or SOCI 100.

**SOCI 102 (3) Inequality and Social Change**
Inequality, institutions, social structure and social change. Credit will be granted for only one of SOCI 102 or SOCI 100.

**SOCI 200 (3) Sociology of Family**
An introduction to contemporary family forms and relations.

**SOCI 201 (3) Ethnic Relations**
An introduction to the study of the relations between ethnic groups and of the interplay between ethnicity and other social factors.
Equivalency: ANTH 201.

**SOCI 210 (3) Canadian Social Structure**
Descriptive and analytic survey of such features as demographic characteristics, class structure, ethnicity, and regional variation in Canadian society as a basis for understanding current social issues.

**SOCI 217 (3) Research Methods**
Introduction to research designs and methodologies.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

**SOCI 220 (3) Sociology of Indigenous Peoples**
Sociological perspective of Indigenous peoples and issues both internationally and within Canada.

**SOCI 240 (3) Introduction to Social Interaction**
A general introduction to research on social interaction, with an emphasis on group (as opposed to individual) processes and behaviour. Topics include: status, power and prestige, distributive justice, marginality and social control, authority relations, and group structure and membership, all to be studied in the context of a variety of groups (such as families, formal organizations, communities and friendship groups) and cultures.

**SOCI 250 (3) Crime and Society**
Crime as a social phenomenon, with emphasis on the changing definitions of crime in relation to social and political change in Canadian and other societies. The scope and nature of the crime problem, the growth of criminology as a science and profession, and relationships between components of state criminal justice systems.

**SOCI 260 (3) Technology, Work and Society**
The social forces responsible for changing patterns of technological innovation and work organization in modern industrial societies. Emphasis on the organization of work and the labour force.

**SOCI 285 (3) Citizenship and Identity**
The concepts of citizenship, identity, and human rights as social processes shaping individuals and communities (both local and global).

**SOCI 301 (3) Sociology of Development and Underdevelopment**
Processes of social change in the Third World and other developing countries. Major themes stress the relationship between urbanization and industrialization; modernization and ethnic conflict; imperialism, neo-colonialism, and foreign aid; and intra-national modernization problems such as regional underdevelopment in industrial societies.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 302 (3) Ethnic and Racial Inequality
A critical examination of classical and contemporary theories and research evidence concerning ethnic and racial inequality at the societal and interpersonal levels.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 303 (3) Sociology of Migration
Sociological approaches to the movement of peoples and its impact over time.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 310 (3) Canadian Society
Social organization of Canadian society: relationships between social institutions and social processes (e.g., economics, education, family, law, media, and politics); including issues of ancestry, ethnicity, gender, region, and social class.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 312 (3) Gender Relations
The nature of gender relations, their social and cultural expression, and theories of gender inequality.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 320 (3) Diversity in Family Forms
An examination of diversity within and between families and of diverse family forms.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 324 (3) Sociology of the Life Course
Individuals and families through the life course.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 328 (3) Social Statistics I
The testing of sociological theories using quantitative data analysis techniques on numerical data from social surveys, experiments and official statistics. SOCI 328 excludes credit for a number of other statistics courses in various departments. Please consult the Science Credit Exclusion List (www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414) before registering.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 342 (3) Consumers and Consumption
The structure and culture of consuming and consumption.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 344 (3) Sociology of Aging
Demographic, economic, and social trends associated with aging, ageism, and aging populations. Credit will be granted for only one of SOCI 344 and SOCI 444.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 352 (3) Organization of Work
The meaning of work and leisure. Properties of work organization: division of labour and specialization; technology and working knowledge; means of coordinating work, such as cooperation, authority, and exchange. Research problems concerning work in households, offices, and industry, division of labour by gender, industrial democracy and the relation of work and social inequality.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 354 (3) Community Studies
Study of the organization of human communities; a focus upon collective activities including family, work, neighbourhood, and formal and informal networks.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 360 (3) Sociology and Natural Resources
Sociological perspectives on property, resource industries (such as agriculture, fishing, forestry and mining), resource development, and resource communities. May also include examination of social aspects of resource development in the Third World.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 361 (3) Social Inequality
Tendencies toward equality and inequality; manifestations of inequality (occupation, education, gender, ethnicity, income, power)
and their consequences; caste and class features of major stratification systems; theories of social class; stratification profile of contemporary industrial societies.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SOCI 364 (3) Built Environments**
Physical, social, and economic aspects of built environments, including housing and community planning.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SOCI 369 (3) Sociology of Sexualities**
Historical and social construction of sexual identities, desires, communities, and politics in the twentieth century.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

**SOCI 370 (6) Sociological Theories: Classical and Contemporary Approaches**
An examination of selected traditions, conceptual problems, and current topics in the field of sociological theory. Credit will be granted for only one of SOCI 370 or both SOCI 371, SOCI 372.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SOCI 371 (3) Classical Traditions in Theory**
An examination of selected traditions, conceptual problems and topics in the foundational theories of sociology. Credit will be granted for only one of SOCI 371 or SOCI 370.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SOCI 372 (3) Contemporary Directions in Theory**
A survey of theories in contemporary sociology. Credit will be granted for only one of SOCI 372 or SOCI 370.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SOCI 380 (3) Sociological Methods: Survey Research**
Questionnaire design, interviewing, sampling, and analysis of survey data.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102 and SOCI 217 and SOCI 328.

**SOCI 381 (3) Sociological Methods: Experimental and Mixed Methods**
Experimental methods in sociology integrating quantitative and qualitative approaches. Emphasis is on research design to inform policy and decision making.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102 and SOCI 217.

**SO CI 382 (3) Sociological Methods: Qualitative Research**
Examination of the different traditions of qualitative sociological inquiry and the associated methodological features used to study the interpretive practices and meanings in the everyday lives of individuals.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102 and SOCI 217.

**SOCI 383 (3) Sociological Methods: Historical Research**
Methodological problems and research strategies associated with the interpretation of socio-historical data; contributions of classical and contemporary approaches to historical sociology and social history.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102 and SOCI 217.

**SOCI 384 (3) Sociology of Health and Illness**
Classic and contemporary sociological perspectives on health, illness, and health care. Credit will be granted for only one of SOCI 384 and SOCI 484.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SO CI 387 (3) Drugs and Society**
Social dimensions of the causes, consequences, regulation, and treatment of substance use from Canadian and international perspectives.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SO CI 410 (3-12) d Selected Topics in Canadian Society**
Selected areas of study relating to Canadian society such as BC Studies; French Canada's demographic problems; rural communities; social welfare and community programs in Canada. Consult the Department for this year's offerings.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.

**SO CI 414 (3) Feminist Theory**
The emergence of feminist theory, its relationship to sociology, and the major theoretical schools of thought. The social basis and development of feminist thought from critiques of scholarship and research to contemporary debates will be addressed.

**Prerequisite:** One of SOCI 100, SOCI 101, SOCI 102.
SOCI 415 (3/6) d Theories of Family and Kinship
Theoretical approaches to the study of the family and family forms.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 416 (3-12) d Selected Topics in Sociological Theory
An in-depth examination of selected sociological theories. Consult the department for this year's offerings.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 418 (3) Social Statistics II
Primary emphasis on applications of statistical techniques to data in Sociology.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 420 (3) Sociology of the Environment
Sociological approaches to the study of environmental conflicts, issues, movements, impact of changing technology, economic development on the environment.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 423 (3) Sociology of Food
Cultural, economic, and political aspects of food production and consumption, including connections to class, ethnicity, and gender. Food-related social movements will be included.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 425 (3) Urban Sociology
Demographic, behavioural, and organizational aspects of urban structures and of urbanization in different societies and periods.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 430 (3) Global Citizenship
Sociology approaches to global citizenship, including its contested nature and intellectual lineage.

SOCI 433 (3/6) d Directed Studies
General reading and/or a research undertaking, with the agreement, and under the supervision, of a Department faculty member selected by the student.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102. And permission of the Department.

SOCI 435 (3/6) d International Service Learning
International field placement normally for eight to ten weeks; pre-departure seminars (eight to twelve seminars or equivalent) with student presentation seminars upon return from the field.
Prerequisite: SOCI 430. Or equivalent.

SOCI 440 (3) Economic Sociology
Analysis of economic actions and institutions using the concepts and methods of sociology.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 441 (3) Society, Economy and Family
The study of family in social and economic contexts. Credit will be granted for only one of SOCI 441 and FMST 440.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 442 (3) Families and Work
The effect of combining family and work roles. Credit will be granted for only one of SOCI 442 and FMST 442.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102, SOCI 200.

SOCI 449 (6) Honours Tutorial
Requires the presentation of at least one research paper. Restricted to students in the Sociology Honours program.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 461 (3) Political Sociology
The social and economic bases of political power. May include studies of the state and interstate relations, ideology and control, alienation and anomie, political movements and social revolutions, political violence and terrorism, and the political economy of world conflict.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 464 (3) Social Movements
A study of the sources, stages, and effects of social movements in developing and modernized societies.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.
SOCI 465 (3) Sociology of the Arts
An examination of the arts as social practices from the standpoint of the relationships among artists, critics, patrons, and public; and the social institutions through which these relationships are structured.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 466 (3) Sociology of Education
Examines the role of schooling in modern society including links with inequality, knowledge production, socialization and the economy.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 469 (3) Queer Theory and Politics
Empirical expressions and political possibilities of queer theory.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102 and SOCI 369.

SOCI 470 (3) Sociology of Crime and Justice
Critical examination of specific forms of crime and delinquency in relation to the criminal justice system including law, enforcement, and corrections. Issues selected for study will be further scrutinized within the cultural framework of ethics, morality, and social justice.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 473 (3) Sociology of Mental Illness
A sociological approach to the meaning of mental illness; the organization of psychiatric treatment; problems in the explanation of the distribution of mental illness in a population.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 479 (3) Social Determinants of Health
Relationships between social phenomena (e.g., personal beliefs, lifestyle practices, social support, socio-economic status, social class, gender, and ethnicity) and the health of human populations.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 480 (3/6) c Urban Ethnographic Field School (UEFS)
Approximately 50 hours of volunteering and fieldwork based in community organizations with theoretical approaches to urban spaces. Students will engage in collaborative research while considering a range of theoretical and methodological approaches.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102. Or permission of the instructor(s)
Equivalency: ANTH 480.

SOCI 490 (3) Contemporary Chinese Society
Current social topics in Chinese society; perspectives on gender, inequality, culture, and social relations.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 495 (3/6) d Advanced Studies in Sociology
An intensive examination of selected topics in Sociology. Consult the department for this year's offerings.
Prerequisite: One of SOCI 100, SOCI 101, SOCI 102.

SOCI 500 (3) Foundations of Sociological Thought
This course is not eligible for Credit/D/Fail grading.

SOCI 501 (3) Contemporary Sociological Theory
This course is not eligible for Credit/D/Fail grading.

SOCI 502 (3) Research Design and Techniques (Quantitative)
This course is not eligible for Credit/D/Fail grading.

SOCI 503 (3) Research Design and Techniques (Qualitative)
This course is not eligible for Credit/D/Fail grading.

SOCI 504 (3) Methodology of Social Inquiry
This course is not eligible for Credit/D/Fail grading.

SOCI 505 (3/6) c Tutorial in Sociological Theory
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of SOCI 500, SOCI 501.

SOCI 506 (3/6) d Tutorial in Research Methods
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of SOCI 502, SOCI 503.
SOCI 507 (3/6) d Advanced Theory Seminar  
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of SOCI 500, SOCI 501.

SOCI 508 (3/6) d Advanced Methods Seminar  
This course is not eligible for Credit/D/Fail grading. Prerequisite: One of SOCI 502, SOCI 503.

SOCI 509 (3/6) d Sociology of the Environment  
This course is not eligible for Credit/D/Fail grading.

SOCI 510 (3/6) d Population, Community and Demography  
This course is not eligible for Credit/D/Fail grading.

SOCI 511 (3) Cross-National Comparisons in the Social Sciences  
This course is not eligible for Credit/D/Fail grading. Equivalency: IAR 511.

SOCI 512 (3/6) d Gender and Feminist Issues  
This course is not eligible for Credit/D/Fail grading.

SOCI 513 (3) Theories About the Family  
This course is not eligible for Credit/D/Fail grading.

SOCI 514 (3) Analyzing Quantitative Data in Sociology  
This course is not eligible for Credit/D/Fail grading. Prerequisite: SOCI 502 is a prerequisite for Sociology graduate students. A background in material such as that covered in SOCI 502 is highly recommended for all others.

SOCI 515 (3) Qualitative Data Analysis in Sociology  
This course is not eligible for Credit/D/Fail grading. Prerequisite: SOCI 503.

SOCI 520 (3/6) d Law and Crime  
This course is not eligible for Credit/D/Fail grading.

SOCI 530 (3/6) d Social Change and Development  
This course is not eligible for Credit/D/Fail grading.

SOCI 540 (3/6) d Social Inequality  
This course is not eligible for Credit/D/Fail grading.

SOCI 549 (6/12) c Master's Thesis  
This course is not eligible for Credit/D/Fail grading.

SOCI 550 (3/6) d Social Interaction  
This course is not eligible for Credit/D/Fail grading.

SOCI 560 (3/6) d Culture and Knowledge  
This course is not eligible for Credit/D/Fail grading.

SOCI 562 (3/6) d Mass Media and Communications  
This course is not eligible for Credit/D/Fail grading.

SOCI 570 (3/6) d Seminar in Work, Industry and Technology  
This course is not eligible for Credit/D/Fail grading.

SOCI 580 (3/6) d Canadian Society  
This course is not eligible for Credit/D/Fail grading.

SOCI 584 (3/6) d Health, Illness and Society  
This course is not eligible for Credit/D/Fail grading.

SOCI 590 (3/6) d Seminar in an Ethnographic Area  
This course is not eligible for Credit/D/Fail grading.

SOCI 596 (3/6) d Political Sociology and Social Movements  
This course is not eligible for Credit/D/Fail grading.

SOCI 598 (3/6) c Directed Studies  
This course is not eligible for Credit/D/Fail grading.

SOCI 599 (3/6) d Special Topics Seminar  
This course is not eligible for Credit/D/Fail grading.
Faculty of Land and Food Systems

SOIL: Soil Science

SOIL 500 (3) Graduate Seminar
This course is not eligible for Credit/D/Fail grading.

SOIL 501 (3) Advanced Soil Processes
Integration of soil physics, chemistry, and biology in understanding essential soil processes. This course is not eligible for Credit/D/Fail grading.
Equivalency: LWS 501.

SOIL 502 (3) Advanced Sustainable Soil Management
This course is not eligible for Credit/D/Fail grading.

SOIL 503 (3) Advanced Soil Sampling, Analyses and Data Interpretation
Field and laboratory analytical techniques in the chemical, biological and physical assessment of soils. Credit will be granted for only one of SOIL 503 or APBI 403. This course is not eligible for Credit/D/Fail grading.

SOIL 510 (3) Land and Water Seminar
This course is not eligible for Credit/D/Fail grading.

SOIL 512 (3/6) c Advanced Soil Biology
Current research in root-soil interfaces. Offered in alternate years. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SOIL 321. Permission of the instructor is also acceptable.

SOIL 513 (3/6) c Advanced Soil Physics
Infiltration and evaporation of water, flow and storage of heat and chemicals in soil, and interactions with the atmosphere. Emphasis on mathematical formulation of problems and solutions using analytical and numerical methods. This course is not eligible for Credit/D/Fail grading.
Prerequisite: All of SOIL 313, SOIL 314.

SOIL 514 (3/6) c Biometeorology
Energy and mass exchange in the biosphere with emphasis on the interfaces between the atmosphere and soils, plants and animals. Offered in alternate years. This course is not eligible for Credit/D/Fail grading.

SOIL 515 (3) Watershed Science
Watershed evaluation, key aspects of hydrology, water quality, land use impacts on water resources and integration of multiple land use activities and their cumulative impacts. This course is not eligible for Credit/D/Fail grading.
Equivalency: LWS 515.

SOIL 516 (3) Urban Watershed Management
Urban land use impacts on water resources with a focus on impervious surfaces, rainwater management, non-point sources of pollution, cumulative effects, water quality, rehabilitation of urban streams, and application of best management practices. This course is not eligible for Credit/D/Fail grading.

SOIL 517 (3) Land and Water Resource Evaluation
Topics in land and water system evaluations and assessing resource development options; monitoring and modelling environmental systems. This course is not eligible for Credit/D/Fail grading.
Equivalency: LWS 517.

SOIL 518 (3) Water in International Development
Key water issues associated with international development: global water demand, scarcity, efficiency of use, water as a commodity, biophysical and policy aspects of water management, water and health, land use impact, water harvesting, improved irrigation, and pollution prevention. This course is not eligible for Credit/D/Fail grading.

SOIL 520 (3) Agricultural Watershed Management
Intensive and extensive agriculture with a focus on water needs, water use, and impacts on water resources. Non-point sources of pollution, nutrient modeling, soil and land degradation, protection, and rehabilitation of watersheds including buffer zones, wetlands, and best management practices. This course is not eligible for Credit/D/Fail grading.
SOIL 524 (2) Instrumentation for Biometeorology
The theory, design and evaluation of instrumentation for biometeorological research. Consent of instructor. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the instructor is required.

SOIL 530 (2-6) Directed Studies
This course is not eligible for Credit/D/Fail grading.

SOIL 548 (6) Major Project
Professional paper on topics focusing on emerging issues in water and land resources. This course is not eligible for Credit/D/Fail grading.

SOIL 549 (12) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

SOIL 550 (3) Professional Communications Strategies
This course is not eligible for Credit/D/Fail grading.

SOIL 649 (0) Doctoral Dissertation

School of Social Work, Faculty of Arts

SOWK: Social Work

As of July 1, 2015, the IHHS courses have been distributed among the following units: School of Social Work, School of Population and Public Health, and Faculty of Land and Food Systems.

SOWK 200 (3) Introduction to Social Welfare
An introduction to the perspectives, concepts and theoretical foundations of social welfare, including an analysis of the institutional structures of social welfare in the modern state.

SOWK 201 (3) Introduction to Social Work Practice
An introduction to the knowledge, skills and values of social work practice in its many forms, emphasizing different ways of understanding the context of social and personal problems.
Prerequisite: SOWK 200.

SOWK 305 (6) Social Work Practice I
An examination of the foundation, knowledge and competencies underlying generalist social work practice. Enrolment is limited to students in the B.S.W. program.

SOWK 310 (3/6) d Interviewing Skills
Communication theory and interviewing skills and their application to the Social Work interview.

SOWK 315 (6) Practicum I
A supervised practicum in an assigned social service, two days a week throughout the program year. Limited to students in the B.S.W. program. This course will be graded Pass/Fail.
This course is not eligible for Credit/D/Fail grading.
Prerequisite: SOWK 310.

SOWK 316 (3) Integrative Seminar in Social Work Theory, Policy and Practice
Integrates students' learning from field, practice, policy and theory courses for the purposes of professional development.

SOWK 320 (3) Introduction to Social Work Research
Introduction to theory and conduct of social research as applied to social welfare and social work practice. The focus is on development of social work research questions and design of studies. Enrolment is limited to students in the B.S.W. program, except by permission of the school.

SOWK 335 (6) Social Analysis for Social Work Practice
Theoretical considerations of relevance to social work practice.

SOWK 337 (3) Culture and Race in Social Work Practice
Issues and problems inherent in practising social work in diverse cultural settings.
SOWK 400 (3) Canadian Social Policy
Analysis of race, gender, class and culture as factors in the distribution and delivery of Canadian social benefits and social services.

SOWK 405 (3) Social Work Practice II
This course examines the principles of optimal social work process with individuals, small groups, families and larger collectivities.

SOWK 415 (6) Practicum II
A supervised practicum in an assigned social service, two days a week throughout the program year. Enrollment is limited to students in the B.S.W. program. This course will be graded Pass/Fail.

This course is not eligible for Credit/D/Fail grading.

SOWK 416 (3) Advanced Integrative Seminar in Social Work Theory, Policy and Practice
Development of professional judgement, evaluation, and self-evaluation in practice.

SOWK 425 (3) First Nations Social Issues
Contemporary social issues facing First Nations peoples and communities examined in the context of the history of Euro-Canadian/First Nations relations; the impact of Euro-Canadian institutions upon First Nations peoples; implications for social policy and social work practice.

SOWK 430 (3-6) d Special Studies in Social Work
Lectures, seminars and/or individual tutorials to develop knowledge and skills in relation to a defined theory, policy or practice problem or client population. Enrollment is limited to students in the B.S.W. program, except by permission of the School.

SOWK 440 (3-12) d Integrative Seminars in Social Work
A series of seminars offered during the final term of studies which address salient issues in social policy and social work practice and draw upon combined knowledge from social work and related disciplines.

SOWK 441 (3) Social Context of Child Development
The ways in which the familial, physical, and social environment affects the life structures, opportunities and outcomes of epigenetic developmental processes.
Equivalency: FMST 441.

SOWK 442 (3) Policy and Practice in Child Welfare
Covers the statutory bases and practices associated with the continuum of child welfare services from prevention through permanency planning.
Prerequisite: SOWK 441 or another course in child development.

SOWK 450 (3) Social Work Practice in Community Mental Health
Online course providing overview of social work services to persons with a mental illness. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Fourth-year standing in SOWK.

SOWK 451 (3) Health Care Team Development
This Interprofessional Health and Human Service (IHHS) course covers the skills, knowledge, roles, and issues involved with working successfully in interprofessional health and human service teams. Intended for upper division students in any health and human service program. Offered as IHHS 400 prior to September 2015. Credit will be granted for only one of SOWK 451 or IHHS 400.

SOWK 452 (6) HIV Prevention and Care
This Interprofessional Health and Human Service (IHHS) course prepares senior students to respond effectively to the HIV epidemic and its consequences. The knowledge and skills required for interprofessional and discipline-specific work are explored. Intended for students in health and human service programs. Offered as IHHS 402 prior to September 2015. Credit will be granted for only one of SOWK 452 or IHHS 402.

This course is not eligible for Credit/D/Fail grading.

SOWK 453 (3) Disability and Justice
This Interprofessional Health and Human Service (IHHS) course considers how health and human service professionals can effectively practice with people with disabilities from a social justice perspective. Social and personal context and practice responses are examined. Offered as IHHS 407 prior to September 2015. Credit will be granted for only one of SOWK 453 or IHHS 407.

SOWK 454 (3) Interdisciplinary Practice with Children and Families
This Interprofessional Health and Human Service (IHHS) course covers interprofessional perspectives, challenges, and strategies. Clinical experience and some knowledge of child protection issues required. Offered as IHHS 403 prior to September
2015. Credit will be granted for only one of SOWK 454 or IHHS 403.

**SOWK 455 (6) Palliative Care**
This Interprofessional Health and Human Service (IHHS) course covers attitudes, knowledge, skills, and abilities necessary for interprofessional and discipline-specific work in palliative care. For students registered in health and human service programs only. Offered as IHHS 405 prior to September 2015. Credit will be granted for only one of SOWK 455 or IHHS 405.

**SOWK 456 (1-6) d Special Topics in Collaborative Healthcare**
This Interprofessional Health and Human Service (IHHS) course prepares students to practice patient-centred interprofessional collaboration in a specific area of healthcare. Offered as IHHS 480 prior to September 2015. Credit will be granted for only one of SOWK 456 or IHHS 480.

**SOWK 501 (3) Advanced Canadian Social Policy**
This course is not eligible for Credit/D/Fail grading.

**SOWK 502 (6) Social Work Practice**
This course is not eligible for Credit/D/Fail grading.

**SOWK 503 (3) Communication Skills in Social Work Practice**
This course is not eligible for Credit/D/Fail grading.

**SOWK 504 (3/6) d Feminism and Social Work Praxis**
This course is not eligible for Credit/D/Fail grading.

**SOWK 505 (3) Social Analysis for Social Work Practice**
This course is not eligible for Credit/D/Fail grading.

**SOWK 506 (6) Directed Field Studies in Social Work I**
Pass/Fail. This course is not eligible for Credit/D/Fail grading.

**SOWK 510 (3) First Nations Social Issues**
This course is not eligible for Credit/D/Fail grading.

**SOWK 511 (3/6) d Theoretical Foundations of Social Work**
This course is not eligible for Credit/D/Fail grading.

**SOWK 512 (3/6) d Theories of Canadian and International Social Development**
This course is not eligible for Credit/D/Fail grading.

**SOWK 513 (3/6) d Theoretical Foundations of Social Work in the Health Field**
This course is not eligible for Credit/D/Fail grading.

**SOWK 514 (3/6) d Feminism and Social Work Praxis**
This course is not eligible for Credit/D/Fail grading.

**SOWK 516 (3) Foundation MSW Integrative Seminar**
Development of professional judgment, critical reflection, and integration of theory, practice, research and policy. This course is not eligible for Credit/D/Fail grading.

**SOWK 521 (3) Social Work Practice in Addictions**
This course is not eligible for Credit/D/Fail grading.

**SOWK 522 (3) Family Mediation and Conflict Resolution**
This course is not eligible for Credit/D/Fail grading.

**SOWK 523 (3/6) d Advanced Analysis of Culture and Race in Social Work Practice**
This course is not eligible for Credit/D/Fail grading.

**SOWK 524 (3/6) d Social Services Management**
This course is not eligible for Credit/D/Fail grading.

**SOWK 525 (3) Advanced Social Work Practice: Mental Health**
This course is not eligible for Credit/D/Fail grading. Prerequisite: A version of SOWK 440 with a focus on mental health, or equivalent (as specified by the School), including one-year employment experience in BC Mental Health system.

**SOWK 526 (3/6) d Social Work Practice with Individuals and Couples**
This course is not eligible for Credit/D/Fail grading.
SOWK 527 (3/6) d Social Work Practice with Children
This course is not eligible for Credit/D/Fail grading.

SOWK 528 (3/6) d Social Work Practice with Groups
This course is not eligible for Credit/D/Fail grading.

SOWK 529 (3/6) d Communities and Social Development: Debates, Approaches and Fields of Practice
This course is not eligible for Credit/D/Fail grading.

SOWK 530 (3/6) d Methods for Popular Sector Organizing
This course is not eligible for Credit/D/Fail grading.

SOWK 531 (3) Social Work Practice in the Field of Aging
This course is not eligible for Credit/D/Fail grading.

SOWK 532 (3/6) d Social Work Practice with the Family
This course is not eligible for Credit/D/Fail grading.

SOWK 548 (3) Graduating Essay
This course is not eligible for Credit/D/Fail grading.

SOWK 549 (6/9) d Master's Thesis
This course is not eligible for Credit/D/Fail grading.

SOWK 550 (3) Social Work and Social Justice
This course is not eligible for Credit/D/Fail grading.

SOWK 551 (3) Health and Social Care Praxis
This course is not eligible for Credit/D/Fail grading.

SOWK 552 (3/6) d Clinical Research and Social Work
This course is not eligible for Credit/D/Fail grading.

SOWK 553 (3/6) d Quantitative Methods in Social Work Research
This course is not eligible for Credit/D/Fail grading.

SOWK 554 (3/6) d Qualitative Methods in Social Work Research
This course is not eligible for Credit/D/Fail grading.

SOWK 555 (3/6) d Seminar in Methodological Issues in Social Welfare
This course is not eligible for Credit/D/Fail grading.

SOWK 556 (3/6) d Seminar in Social Welfare Theory
This course is not eligible for Credit/D/Fail grading.

SOWK 557 (3/6) d Seminar in Social Work Practice Theory
This course is not eligible for Credit/D/Fail grading.

SOWK 559 (3) Advanced Integrative Seminar
Advanced development of professional judgment, critical reflection, and integration of theory, practice, research, policy. This course is not eligible for Credit/D/Fail grading.

SOWK 560 (3/6) d Directed Field Studies in Social Work II
This course is not eligible for Credit/D/Fail grading.

SOWK 570 (3/6) d Directed Studies in Social Work
This course is not eligible for Credit/D/Fail grading.

SOWK 571 (3/6) d International Social Development
This course is not eligible for Credit/D/Fail grading.

SOWK 572 (3/6) d Child and Family: Policy and Practice
This course is not eligible for Credit/D/Fail grading.

SOWK 573 (3/6) d Social Policy and Program Planning in the Health Field
This course is not eligible for Credit/D/Fail grading.

SOWK 601 (3) Social Work Doctoral Seminar
Critical examination of research, teaching, proposal writing and publication. This course is not eligible for Credit/D/Fail grading.
SOWK 621 (3) Social Theory, Ideology and Ethics
Critical analysis of major social theories, differentiating competing approaches to understanding human behaviour; social theory, social ideology, and social ethics. This course is not eligible for Credit/D/Fail grading.

SOWK 623 (3) Advanced Data Analysis in Social Work
This course is not eligible for Credit/D/Fail grading.

SOWK 654 (3) Advanced Qualitative Inquiry
This course is not eligible for Credit/D/Fail grading.

SOWK 699 (0) Doctoral Dissertation

French, Hispanic and Italian Studies, Faculty of Arts

SPAN: Spanish

All 400-level Spanish courses titled "Topics in..." may be taken twice for credit, with different content, to a maximum of 6 credits.

SPAN 101 (3) Beginners' Spanish I
Fundamentals of the Spanish language; speaking and writing on everyday activities and future plans in the context of common tasks and situations, including interactive communication, grammatical explanations, and cultural awareness.

SPAN 102 (3) Beginners' Spanish II
Speaking and writing on past events, and expressing desires and wishes in the context of common situations, including interactive communication, grammatical explanations, and cultural awareness.
Prerequisite: SPAN 101.

SPAN 201 (3) Intermediate Spanish I
Reviews the fundamentals of the Spanish language, and introduces more complex structures; listening, speaking, writing, and reading on a range of situations related to everyday life and Hispanic culture.
Prerequisite: One of SPAN 102, SPAN 11.

SPAN 202 (3) Intermediate Spanish II
Expands on the fundamentals of the Spanish language, and presents more complex structures in a variety of tenses and modes; interacting through discussions and gaining cultural awareness through literature and film.
Prerequisite: SPAN 201.

SPAN 206 (3) Conversational Spanish I
Emphasizes communication skills through discussion, debate, and presentations; developing oral fluency and listening comprehension, through discussion of written texts and films. May include experiential learning projects involving native speakers from the Hispanic community.
Prerequisite: One of SPAN 12, SPAN 202.

SPAN 207 (3) Conversational Spanish II
Builds on communication skills through discussion, debate, and presentations; exploration of cultural topics through discussion of written texts and other media. May include experiential learning projects involving native speakers from the Hispanic community.
Prerequisite: SPAN 206.

SPAN 221 (3) Introduction to Hispanic Literature
Major texts, authors, periods, and genres of Hispanic literature; key concepts, terminology, and practices of literary analysis that serve as a foundation for higher-level Spanish literature courses.
Prerequisite: SPAN 202.

SPAN 222 (3) Introduction to Hispanic Culture
Media, figures, periods, and genres of Hispanic culture; key concepts, theories, and practices of cultural analysis that serve as a foundation for higher-level Spanish culture courses.
Prerequisite: SPAN 202.

SPAN 280 (3) Revolution! (in English)
Concepts, theories, and practice of protest, revolt, and revolution in the Hispanic world, highlighting the intersection of politics
and culture through novels, poetry, letters, diaries, and/or historical accounts of specific revolutionary uprisings.

SPAN 301 (3) Advanced Spanish I
Advanced grammar structures in context, lexical repertoire, fluency and cultural awareness to broaden and develop language skills.
Prerequisite: One of SPAN 202, SPAN 207.

SPAN 302 (3) Advanced Spanish II
Advanced grammar structures in context; students expand lexical repertoire, and gain fluency and flexibility as they deepen cultural awareness through reading, listening, discussion, and writing.
Prerequisite: SPAN 301.

SPAN 303 (3) Conversational Spanish for Advanced Speakers
Expands the comprehension and communicative skills of upper-level students and heritage speakers through topics drawn from Hispanic culture and current events.
Prerequisite: One of SPAN 207, SPAN 302. Or placement test for heritage speakers.

SPAN 308 (3) Spanish for Business
Language of commerce, finance, marketing, and economics. Competence in business practices of the Hispanic world.
Prerequisite: One of SPAN 207, SPAN 302.

SPAN 309 (3) Business Spanish of International Trade in the Hispanic World (in Spanish)
Language of international commerce through real world business practices in the Hispanic world; key issues concerning business practices, engaging with real-world materials, and interacting with professionals specializing in trade with the Hispanic world.
Prerequisite: One of SPAN 207, SPAN 302.

SPAN 312 (3/6) d Hopscotch: Topics in Hispanic Literature (in English)
Spain and Latin America's contributions to global culture through popular Hispanic literature in translation.

SPAN 321 (3) Tradition and Diversity in Spanish History and Culture
Conservation and progress on the Iberian Peninsula, from the Middle Ages to the present. Includes the first modern European state and its diverse cultures.
Prerequisite: One of SPAN 202, SPAN 207.

SPAN 322 (3) Dependency and Revolution in Latin American History and Culture
Continuities and changes in the Americas from before Columbus to the present. Includes the first modern global empire and its ambivalent legacies.
Prerequisite: One of SPAN 202, SPAN 207.

SPAN 357 (3) The Golden Age of Peninsular Literature and Culture
Tradition, faith, conflict, prosperity, and decadence in literature and everyday life from the Middle Ages to 1700.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 358 (3) Divergent Visions: Peninsular Literature and Culture since 1700
Modern Spanish literature and culture, from Empire to the European Union. Includes Romanticism, Modernism, Republicanism, and Separatism.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 364 (3) Colonial Encounters in Spanish-American Literature and Culture
Spanish colonialism in the Americas from the Conquest to the 1820's and the dawn of Independence. Includes coloniality, hybridity, subalternity, and autonomy.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 365 (3) Modern Magics: Spanish-American Literature and Culture since the 1820s
Literary engagements with modernity in the Spanish Americas, from the 1820's to the present. Includes civilization, progress, politicization, and violence.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 401 (3) Translation
Purpose, practice, and methodologies of translation from Spanish into English and back. Includes translation theory, translation from a variety of sources (i.e. literary, journalistic, legal, technical).

Prerequisite: SPAN 302.

SPAN 402 (3) Advanced Spanish III
Developing linguistic proficiency and effective and accurate communication in both spoken and written Spanish. Includes close reading of texts, advanced written composition, cross-cultural analysis, and conversational skills.

Prerequisite: SPAN 302.

SPAN 403 (3) History of the Spanish Language
Major features of the development of the Spanish language, from its origins to the present. Includes the history of Spanish phonetics, phonology, morphology, syntax, semantics, and dialectology.

Prerequisite: SPAN 302.

SPAN 404 (3-6) d From World to Screen: Topics in Hispanic Cinema
Selected areas of study relating to Hispanic Cinema. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 405 (3-6) d Celebrating Diversity: Topics in Peninsular and Latin-American Culture
Selected topics relating to the diversity of cultural production in Peninsular and Latin American Culture. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 406 (3) Breaking the Mold: Gender Representation(s) in Hispanic Literature and Culture
Gender and sexuality in Spain and Latin America.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 410 (3-6) d Multicultural Beginnings: Topics in Medieval Literature and Culture
Selected areas of study relating to literature and culture of the Iberian Peninsula to the 15th century. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 411 (3) Hispanic Linguistics
Spanish as a linguistic system. Includes the structure of Spanish words and sentences, dialectal varieties in both Spain and Latin America, and linguistic theory.

Prerequisite: SPAN 302.

SPAN 420 (3-6) d Ascent and Decline: Topics in Golden-Age Peninsular Literature and Culture
Selected areas of study relating to sixteenth- and seventeenth-century Spain. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 430 (3-6) d Modernization and Autonomy: Topics in Peninsular Literature and Culture since the 18th Century
Selected areas of study relating to the literature and culture of modern Spain. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 450 (3-6) d Discourse and Dialect: Topics in Spanish Language
Selected areas of study relating to Spanish linguistics or its relation to other languages spoken in the Hispanic world. Consult the Department for this year's offerings.

Prerequisite: SPAN 302.

SPAN 470 (3-6) d Imperial Eyes and Foundational Fictions: Topics in Spanish-American Colonial and Nineteenth-Century Culture
Selected areas of study relating to colonial and/or nineteenth-century Spanish America. Consult the Department for this year's offerings.

Prerequisite: SPAN 221.
Corequisite: SPAN 302.
SPAN 490 (3-6) d Peoples and Nations: Topics in Twentieth- and Twenty-First Century Spanish-American Culture
Selected areas of study relating to modern and/or contemporary Spanish America. Consult the Department for this year's offerings.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 495 (3-6) d Research Intensive Seminar in Hispanic Literature and Culture
Theories and methodologies of the discipline. Consult the Department for this year's offering.
Prerequisite: SPAN 221.
Corequisite: SPAN 302.

SPAN 498 (3-6) c Directed Reading
Focus on a topic agreed on by both Faculty Supervisor and student. Restricted to students with 4th year standing and permission from both the Department Head and Faculty Supervisor.

SPAN 499 (3) Honours Essay

SPAN 501 (3/6) d Theoretical Approaches to Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 502 (3/6) d Studies in Hispanic Feminisms
This course is not eligible for Credit/D/Fail grading.

SPAN 504 (3/6) d Studies in Hispanic Cinema
This course is not eligible for Credit/D/Fail grading.

SPAN 505 (3/6) d Studies in Peninsular and Latin-American Culture
This course is not eligible for Credit/D/Fail grading.

SPAN 520 (3/6) d Golden-Age Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 527 (3/6) d Selected Topics in Medieval Spanish Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 530 (3/6) d Peninsular Literature of the Eighteenth, Nineteenth and Twentieth Centuries
This course is not eligible for Credit/D/Fail grading.

SPAN 548 (3) Graduating Essay
This course is not eligible for Credit/D/Fail grading.

SPAN 549 (6) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

SPAN 550 (3/6) d Studies in Peninsular and Latin-American Languages and Literatures
This course is not eligible for Credit/D/Fail grading.

SPAN 570 (3/6) d Spanish-American Colonial Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 580 (3/6) d Nineteenth-Century Spanish-American Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 590 (3/6) d Twentieth-Century Spanish-American Literature
This course is not eligible for Credit/D/Fail grading.

SPAN 649 (0) Doctoral Dissertation

Faculty of Medicine

SPHA: School of Population & Public Health

SPHA 501 (1.5) Basic Finance
Fundamental concepts of asset pricing and corporate finance. This course is not eligible for Credit/D/Fail grading.
SPHA 502 (1.5) Managerial Accounting
Development and use of accounting information for management planning and control, and the development of cost information for financial reports. Same as BAAC 550; credit will not be given for both. This course is not eligible for Credit/D/Fail grading.

SPHA 503 (1.5) Financial Accounting
Financial accounting concepts as they relate to health care administration, including the preparation of external financial reports and financial statement and analysis. This course is not eligible for Credit/D/Fail grading.

SPHA 510 (1.5) Canadian Health Policy and the Healthcare System
Analysis of topical Canadian health policy issues including an historical overview of the health care system, health care funding, public/private financing, health care personnel and pharmaceutical policy challenges. This course is not eligible for Credit/D/Fail grading.

SPHA 511 (1.5) Government, Business and Health Care Policy
This course is not eligible for Credit/D/Fail grading.

SPHA 521 (1.5) Organizational Behavior
The effects of individual and group behaviour on organizational processes and outcomes. The organization as an actor and how it behaves in different types of environments. This course is not eligible for Credit/D/Fail grading.

SPHA 522 (1.5) Strategic Human Resources Management
Aligning the management of human resources with organizational strategy. Best practices in HR management, as well as the role of health care leaders in effectiveness and efficiency. This course is not eligible for Credit/D/Fail grading.

SPHA 531 (1.5) Economic Evaluation
Maximizing health benefits from health care budgets. This course is not eligible for Credit/D/Fail grading.

SPHA 532 (1.5) Health Economics
Economic strengths and weaknesses of current arrangements, and the prospects and objectives of various proposals for reform. This course is not eligible for Credit/D/Fail grading.

SPHA 533 (1.5) Health Care Priority Setting
Application of priority setting and resource allocation methods to improve health from the perspective of the policy maker, health professional, and patient. This course is not eligible for Credit/D/Fail grading.

SPHA 542 (1.5) Operations and Logistics
The application of management tools and principles to production and allocation problems. This course is not eligible for Credit/D/Fail grading.

SPHA 543 (1.5) Information Technology for Management
The role of IT in health care management, the importance of effective IT in a health care setting, and the strategic uses of IT. This course is not eligible for Credit/D/Fail grading.

SPHA 544 (1.5) Health Information Systems
Information systems in planning and management of health care services provided through single-purpose units, comprehensive clinics and hospitals. Emphasis on computerized systems. This course is not eligible for Credit/D/Fail grading.

SPHA 551 (1.5) Design and Measurement 1
Basic concepts and methods in Epidemiology. This course is not eligible for Credit/D/Fail grading.

SPHA 552 (1.5) Design and Measurement 2
Clinical Epidemiology, trials and the evaluation of diagnostic tools and therapeutic interventions. This course is not eligible for Credit/D/Fail grading.

SPHA 553 (1.5) Program Planning and Evaluation
Basic concepts and principles underlying program planning and evaluation in health services. This course is not eligible for Credit/D/Fail grading.

SPHA 554 (1.5) Application of Statistics in Management
Data analysis and statistical inference. Applications in assessment of the legitimacy and significance of reports. This course is not eligible for Credit/D/Fail grading.

SPHA 555 (1.5) Biostatistics
Data collection, numeric and graphic summarization, and elementary statistical analysis. Examples primarily from health sciences. This course is not eligible for Credit/D/Fail grading.
SPHA 556 (1.5) Social Determinants of Health
Foundations of population health. An overview of research on determinants of health, with an emphasis on the social determinants of health. This course is not eligible for Credit/D/Fail grading.

SPHA 557 (1.5) Quality of Health Care
Current concepts, methods, and applications in health care quality assessment and improvement. This course is not eligible for Credit/D/Fail grading.

SPHA 561 (1.5) Strategic Management
Management of multi-faceted organizations; weighting functions, understanding industry and organization-specific effects. This course is not eligible for Credit/D/Fail grading.

SPHA 562 (1.5) Health Care Law
This course is not eligible for Credit/D/Fail grading.

SPHA 563 (1.5) Ethics and Ethical Decision Making in Health Care
Ethical dilemmas in the health care setting. Understanding how ethical features of the system may contribute to or perpetuate some of these problems. This course is not eligible for Credit/D/Fail grading.

SPHA 564 (1.5) Leadership and Management Skills
A comprehensive understanding of what it takes to be a credible leader in the health economy. Concepts of leadership through a number of lenses and perspectives, using case studies, group activities and individual assignments. This course is not eligible for Credit/D/Fail grading.

SPHA 580 (1.5) Selected Topics
Current and emerging trends and issues. This course is not eligible for Credit/D/Fail grading.

SPHA 581 (1.5-3) Directed Studies
Opportunity to focus on a selected topic under faculty supervision. This course is not eligible for Credit/D/Fail grading.

SPHA 590 (1.5-6) Research Project
Completion of a bounded project within a health agency and under individual faculty supervision. Honours/Pass/Fail. This course is not eligible for Credit/D/Fail grading.

Faculty of Medicine

SPPH: School of Population & Public Health

As of July 1, 2015, the IHHS courses have been distributed among the following units: School of Social Work, School of Population and Public Health, and Faculty of Land and Food Systems.

SPPH 200 (3) Understanding the Sociocultural Determinants of the Health of Populations
The Interprofessional Health and Human Service (IHHS) course covers the idea of “population health,” and the implementation and evaluation of programs or policies to improve health. Open to all students. Credit will be granted for only one of SPPH 200 or IHHS 200. [3-0-0]

SPPH 300 (3) Working in International Health
This is a tutored, web based Interprofessional Health and Human Service (IHHS) course on planning/preparing for work in a developing country. Causes of ill health amongst populations living in poverty: analysis of available solutions. Health Science background not essential. Credit will be granted for only one of SPPH 300 or IHHS 300.

SPPH 301 (3) Understanding the Sociocultural Determinants of the Health of Populations
The Interprofessional Health and Human Service (IHHS) course covers the idea of “population health,” and the implementation and evaluation of programs or policies to improve health. Open to all students. Credit will be granted for only one of SPPH 200 or IHHS 200. [3-0-0]

SPPH 302 (3) Topics in Health Informatics for Health/Life Sciences Students
Interprofessional Health and Human Service (IHHS) course. Credit will be granted for only one of SPPH 302 or IHHS 302.

SPPH 381 (1.5/3) Directed Studies
By seminar and directed readings, certain topics of current interest are explored in depth.
SPPH 400 (3) Statistics for Health Research
Planned collection, numeric and graphic summarization, and elementary statistical analysis of data. Examples primarily from health sciences illustrate standard techniques for parametric and non-parametric hypothesis testing, regression and correlation; contingency tables. Also randomization, "blindfolding" and other specifically biomedical topics in statistics. Class size may be limited. [3-0]
Prerequisite: Ability to use high school Algebra and simple graphs.

SPPH 404 (3) First Nations Health: Historical and Contemporary Issues
This Interprofessional Health and Human Service (IHHS) covers an epistemological approach that considers the determinants of health and spiritual-environmental-cultural perspectives. Credit will be granted for only one of SPPH 404 or IHHS 404. [3-0-0]

SPPH 406 (3) Aging from an Interdisciplinary Perspective
This Interprofessional Health and Human Service (IHHS) covers issues associated with aging in our society. For students registered in health and human services programs only. Credit will be granted for only one of SPPH 406 or IHHS 406.

SPPH 408 (6) Topics in Aboriginal Health: Community-based Learning Experience
In-depth cultural and interprofessional learning experience that enables students to live and study in BC First Nations communities while learning about health, wellness, and community strengths from a local perspective. Interprofessional Health and Human Service (IHHS) course. Credit will be granted for only one of SPPH 408 or IHHS 408.

SPPH 409 (3) International Indigenous Experiences of Colonization
This Interprofessional Health and Human Service (IHHS) course is an online, interprofessional, comparative inquiry of indigenous experiences of global colonization and the manifestations of that experience in the contemporary socio-cultural environment. Informed and guided by indigenous knowledge and drawing upon a range of disciplines such as public health, history, sociology and public policy. Credit will be granted for only one of SPPH 409 or IHHS 409.

SPPH 410 (3) Improving Public Health: An Interprofessional Approach to Designing and Implementing Effective Interventions
This Interprofessional Health and Human Service (IHHS) course promotes collaborating interprofessionally. Each student team will identify and research a critical public health issue, and develop a detailed practical and effective intervention. Intended for students in health and human service programs. Credit will be granted for only one of SPPH 410 or IHHS 410.

SPPH 411 (3) Violence Across the Lifespan
This Interprofessional Health and Human Service (IHHS) course covers violence in families across the lifespan. Particular emphasis on intersections of race, class, and gender; the long-term impact of childhood exposure to violence; and prevention-focused initiatives. Credit will be granted for only one of SPPH 411 or IHHS 411.

SPPH 481 (1-6) d Special Topics in Population and Public Health
Selected topics will vary. Multiple versions may be taken. This course takes an interprofessional approach and population/public health perspective in addressing current issues in healthcare and health-related fields.

SPPH 500 (3) Analytical Methods in Epidemiological Research
Basic epidemiological designs as a framework for commonly used biostatistical techniques such as the Mantel-Haenszel, chi-squared, linear and logistic regression, and survival analysis. Computer packages will be available for computation of assignmentsThis course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502 or (c) all of SPPH 500, SPPH 502.

SPPH 501 (3) Analysis of Longitudinal Data from Epidemiological Studies
To explore and compare methods of analyzing continuous and categorical longitudinal data. The issues of missing data and errors in measurement/misclassification will be covered in depth.This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of HCEP 400, HCEP 500, HCEP 502 or (b) all of SPPH 400, SPPH 500, SPPH 502 or (c) all of SPPH 500, SPPH 502, SPPH 506.

SPPH 502 (3) Epidemiological Methods 1
Sources and uses of epidemiologic data for health services planning and administration including methods of data collection and study design.This course is not eligible for Credit/D/Fail grading.
Prerequisite: Enrolment in a Health Care and Epidemiology graduate program, or permission of instructor.

SPPH 503 (3) Epidemiological Methods 2
Critical thinking in epidemiology; principles and methods of study design; context for epidemiological investigations of human health.This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502.
SPPH 504 (3) Application of Epidemiological Methods

This second level course will teach research trainees to apply methods taught in prior courses towards the development of a fundable research protocol and the analysis and interpretation of real epidemiologic data. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) all of HCEP 400, HCEP 500, HCEP 502 or (b) all of SPPH 400, SPPH 500, SPPH 502 and one of SPPH 503, SPPH 506, SPPH 519, SPPH 530.

SPPH 505 (3) Scientific Basis for Epidemiological Thinking

The course will provide a framework for students to use epidemiological and other scientific evidence to make decisions about causation and to recommend policy actions. This course is not eligible for Credit/D/Fail grading.

SPPH 506 (3) Quantitative Research Methods

Major quantitative research designs, measurement reliability and validity, common data sources used, internal and external validity, research proposals, and peer review. Credit will be granted for only one of SPPH 506 or SPPH 548. This course is not eligible for Credit/D/Fail grading.

SPPH 507 (1.5) M.Sc. Research Seminar

SPPH 507 in conjunction with SPPH 607 is a required course for students in the M.Sc. program. Students present and discuss their research and other topics of interest. This course is not eligible for Credit/D/Fail grading.

SPPH 508 (6) M.P.H. Practicum

Includes a significant component of applied epidemiology and biostatistics in a field setting. This course is not eligible for Credit/D/Fail grading.

Prerequisite: SPPH 400, SPPH 502, SPPH 525

SPPH 509 (3) Genetic Epidemiology

Human genetics and genomics, behavioural, social, and environmental factors in modifying or influencing genetics in the manifestation of disease. This course is not eligible for Credit/D/Fail grading.

Prerequisite: SPPH 502

SPPH 510 (3) Survey Methods in Health Measurement

Concepts and techniques of measurement in epidemiological research. Topics covered include validity, reliability and misclassification, scale design and the construction of questionnaires and indices for both health outcomes and exposures. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) HCEP 400 or (b) SPPH 400.

SPPH 511 (3) Cancer Control and Epidemiology

Collection and analysis of epidemiological data on cancer; genetic, occupational, and other risk factors; analytic techniques; cancer control, prevention, screening, early detection, and policy issues. This course is not eligible for Credit/D/Fail grading.

Prerequisite: SPPH 502 or equivalent.

SPPH 512 (3) The Design and Analysis of Clinical Trials

Ethical considerations, intention-to-treat versus efficacy trials, principles of sampling and exclusion, methods of allocation and techniques of randomization, parallel versus cross over design, monitoring treatment outcomes, adverse effects, stopping rules, analytic techniques and data interpretation, and logistical issues in the management of clinical trials. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) one of HCEP 502, HCEP 513 or (b) one of SPPH 502, SPPH 513.

SPPH 513 (3) Clinical Epidemiology

Principles and methods of epidemiology are applied to clinical problems. Evaluation and design of laboratory and clinical tests and of therapeutic interventions. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) one of HCEP 400, HCEP 502 or (b) one of SPPH 400, SPPH 502.

SPPH 514 (3) Decision Analysis in Health Care

Methods and application of decision analysis to improve health from the perspective of the policy maker, health professional, and patient. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502.

SPPH 515 (3) Surveillance and Monitoring in Public Health

This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502.

SPPH 516 (3) Methods for Systematic Reviews in Health Research
This course is not eligible for Credit/D/Fail grading.

SPPH 517 (3) Clinical Research methods for Surgical Procedures
This course is not eligible for Credit/D/Fail grading.

SPPH 518 (3) Mathematical Modeling of Communicable Diseases
Application of mathematical models in understanding communicable disease dynamics and control; interpretation of model outcomes; modeling methods and their applications. This course is not eligible for Credit/D/Fail grading.

SPPH 519 (3) Qualitative Methods in Health Research Design
Purposes, context, procedures, and relationships within qualitative health research and methodologies. This course is not eligible for Credit/D/Fail grading.

SPPH 520 (3) Control of Communicable Disease
Epidemiology of viral, bacterial and parasitic infections with emphasis on the control of these infections in human populations. Immunization programs will be stressed. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502.

SPPH 522 (3) Topics in Environmental Health
Role of air, water, food and solid waste as sources of human health risks; global environmental health issues; sustainability. This course is not eligible for Credit/D/Fail grading.

SPPH 523 (3) Global Health and Human Security
Global threats to human health stemming from conflict, poverty, and environmental degradation. This course is not eligible for Credit/D/Fail grading.

SPPH 524 (3) Core Biological Concepts of Public Health Practice
Cell biology, microbiology, molecular science, genetics, physiology, and evolution. This course is not eligible for Credit/D/Fail grading.

SPPH 525 (3) Issues and Concepts in Public Health
History of public health research and practice; occupational and environmental health; health services and systems; social and lifecourse determinants of health; and population health and emerging trends. This course is not eligible for Credit/D/Fail grading.

SPPH 526 (3) Leadership in Public Health
Organizational structure; engaging others in an organization; inter-organizational networking; building coalitions; identification of opportunities to bring change to organizations through knowledge development, management, synthesis, and implementation. This course is not eligible for Credit/D/Fail grading.

SPPH 527 (3) Social Determinants of Health
Foundational thinking giving rise to the concept of population health. Overview of the current state of research. This course is not eligible for Credit/D/Fail grading.

SPPH 528 (3) Rural and Remote Health
Issues and solutions to delivery of health services to underserved rural populations. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SPPH 400, 502.
Corequisite: SPPH 500

SPPH 529 (0) Major Essay
Required for all M.H.Sc. students.

SPPH 530 (3) Epidemiology of Occupational and Environmental Health
Design and analysis of etiologic research in occupational health. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SPPH 502 or permission of the instructor.

SPPH 531 (3) Health Care Systems Analysis
Theory, concepts, measurement, and practical skills using administrative data for analysis of health care systems. This course is not eligible for Credit/D/Fail grading.

SPPH 532 (3) Environmental Health Risk Assessment and Communication
This course is not eligible for Credit/D/Fail grading.

SPPH 533 (3) Toxicology and Public Health
Mechanism of action of commonly encountered occupational toxic agents; relevance of laboratory and epidemiological evidence. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of instructor.

SPPH 534 (3) Occupational Health and Illness Processes
Occupational diseases; research, historical perspectives, and surveillance. This course is not eligible for Credit/D/Fail grading.

SPPH 535 (3) Principles of Occupational and Environmental Hygiene
Scientific basis for the recognition, evaluation, and control of chemical, physical, and biological, exposures; standard setting; exposure monitoring methods. This course is not eligible for Credit/D/Fail grading. Equivalency: OCCH 501.

SPPH 536 (3) Aboriginal People and Public Health: Ethics, Policy, and Practice
Experience of colonization; Indian Act; the histories and intergenerational impact of the residential school; child-welfare systems; communicable disease prevention; the challenge of ethical public health practice; and traditional healing. This course is not eligible for Credit/D/Fail grading.

SPPH 537 (3) Perinatal Epidemiology
Indicators of maternal/newborn well-being across population subgroups, changing trends in obstetrical intervention, perinatal morbidity, and the analysis of perinatal data. This course is not eligible for Credit/D/Fail grading.

SPPH 538 (3) Application of Ethical Theories in the Practice of Public Health
This course is not eligible for Credit/D/Fail grading.

SPPH 539 (3) Epidemiology of Aging and Chronic Diseases
Biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status, and prevention of disease. This course is not eligible for Credit/D/Fail grading.

SPPH 540 (3) Program Planning and Evaluation
Examines the concept of evaluation in health services and how various methodological approaches can be used in evaluative studies. This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) all of HCEP 400, HCEP 502 or (b) all of SPPH 400, SPPH 502.

SPPH 541 (3) Economic Evaluation
Economic evaluation of health service interventions and programs, with emphasis on methods and components of program costing. This course is not eligible for Credit/D/Fail grading.

SPPH 542 (3) Canadian Health Policy
Analysis of the evolution and structure of the Canadian health care system. This course is not eligible for Credit/D/Fail grading.

SPPH 543 (3) Health Technology Assessment for Health Policy
This course is an advanced program evaluation course. This course is not eligible for Credit/D/Fail grading. Prerequisite: Either (a) HCEP 502 or (b) SPPH 502.

SPPH 544 (3) Social Determinants of Health Across the Life Course
The social determinants of health have profound impacts on inequities across the life course, as do population-level interventions. Builds on SPPH 527, with an emphasis on life course perspectives and vulnerable populations. This course is not eligible for Credit/D/Fail grading.

SPPH 545 (3) Community Health Promotion
Practice and community-based (participatory) research related to health promotion, including its historical and philosophical roots. Application of social and behavioural theories to participatory research and the planning, implementation, and evaluation of community health promotion initiatives. This course is not eligible for Credit/D/Fail grading.

SPPH 546 (3) Introduction to Health Economics
Broad understanding of the health system and health system change from an economics perspective, with a focus on delivery, organization, and financing of healthcare. This course is not eligible for Credit/D/Fail grading.

SPPH 547 (3) Health Care Priority Setting
Resource allocation, economics and ethics based approaches for decision making, uptake of evidence to inform resource use in health care. This course is not eligible for Credit/D/Fail grading.

SPPH 549 (3) Advanced Economic Evaluation in Health Care
Economic evaluation of health technologies, considering, in detail, the policy context for the use of economic evaluation. This course is not eligible for Credit/D/Fail grading.

**SPPH 550 (3) Public Health Approaches to Substance Use and Addictions**
Critical examination of strategies regarding addictive behaviours, substance use and related problems, in the context of a multidisciplinary approach. This course is not eligible for Credit/D/Fail grading.

**SPPH 552 (3) Risk and Communication in Public Health**
Theory and practice of risk communication in public health, basic principles underlying effective science communication with peers, the media, and the public. This course is not eligible for Credit/D/Fail grading.

**SPPH 554 (3) Addiction and Mental Health**
Severe addiction and mental illness and the systemic context in which they occur. This course is not eligible for Credit/D/Fail grading.

**SPPH 555 (3) Principles and Practices of Injury Prevention**
Injury epidemiology; surveillance; development, implementation, and evaluation techniques of preventive strategies; determinants of health; social marketing; injury policy; evidence-based prevention strategies; utilization of injury datasets. This course is not eligible for Credit/D/Fail grading.

**SPPH 559 (3) Major Essay**
Required for Master of Health Administration (M.H.A.) non-thesis program. This course is not eligible for Credit/D/Fail grading.

**SPPH 562 (3) Chemical and Biological Hazard Measurement**
Industrial hygiene and environmental exposure monitoring, methods, and instrumentation, and theory. Laboratories demonstrate workplace sampling and analysis techniques. This course is not eligible for Credit/D/Fail grading. [2-3]

**SPPH 563 (3) Technical Aspects of Chemical and Biological Hazard Control**
Industrial ventilation, heating and air conditioning systems, respiratory protection, chemical protective clothing. This course is not eligible for Credit/D/Fail grading.

**SPPH 565 (3) Ergonomics**
Human factors in workplace design, anthropometry, work physiology. This course is not eligible for Credit/D/Fail grading.

**SPPH 566 (3) Occupational Hygiene Practice**
Application of occupational hygiene principles using field investigations, critical appraisal of results, and communication with labour and management. This course is not eligible for Credit/D/Fail grading. [2-3]

**SPPH 567 (3) Quantitative Methods for the Assessment and Analysis of Exposure Data**
Determinants of exposure, sampling strategies. This course is not eligible for Credit/D/Fail grading.

**SPPH 568 (3) Safety**
Safety management; systems analysis; accident investigation; collection of accident data; fault trees; total loss control. This course is not eligible for Credit/D/Fail grading.

**SPPH 570 (6) Current Issues in Public Health Practice**
This course is not eligible for Credit/D/Fail grading.

**SPPH 571 (3) Public Health, Transportation, and the Built Environment**
Health issues associated with transportation and the built environment; design of urban form for non-motorized transportation for the improvement of personal and environmental health; factors that impact transportation choices; applying findings from research to specific transportation planning processes and projects. Credit will be granted for only one of PLAN 579 or SPPH 571. This course is not eligible for Credit/D/Fail grading.

**Equivalency:** PLAN 579.

**SPPH 576 (1.5) Introduction to Indigenous Health Research Ethics**
Principles and regulatory requirements related to conducting health research with Indigenous communities. This course is not
eligible for Credit/D/Fail grading.

**SPPH 577 (1.5) Environmental Health and Indigenous Communities**
Environmental risk factors faced by Indigenous communities in land, air and water. This course is not eligible for Credit/D/Fail grading.

**SPPH 578 (1.5) Social Determinants of Indigenous Health**
Survey of impacts of land and resources, housing, education, criminal justice systems, child apprehension and other determinants on the health of Indigenous peoples in Canada. This course is not eligible for Credit/D/Fail grading.

**SPPH 579 (1.5) Collecting, Analyzing and Using Public Health Data in Indigenous Communities**
Applied biostatistics, epidemiology and data management addressing public health priorities and clinical research in Indigenous communities. This course is not eligible for Credit/D/Fail grading.

**SPPH 580 (3/6) d Directed Studies**
This course is not eligible for Credit/D/Fail grading.

**SPPH 581 (1.5/3) d Selected Topics**
By seminar and directed readings, certain topics of current interest are explored in depth. This course is not eligible for Credit/D/Fail grading.

**SPPH 586 (1.5) Indigenous Health Policy in Canada**
Indigenous health policy and history in Canada through four substantive areas: economics and financing; need and demand; ethics, rights and law; quality and effectiveness. This course is not eligible for Credit/D/Fail grading.

**SPPH 587 (1.5) Mental Health Care and Delivery in Indigenous Communities**
Approaches to mental health and resilience concepts and strength based interventions with Indigenous communities. This course is not eligible for Credit/D/Fail grading.

**SPPH 588 (1.5) Introduction to Quantitative and Qualitative Research Methods in Indigenous Health Research**
Qualitative, quantitative and mixed methods research as applied to Indigenous public health priorities. This course is not eligible for Credit/D/Fail grading.

**SPPH 589 (1.5) Interdisciplinary Approach to Understanding the Health of Indigenous Peoples**
Indigenous health through core public health disciplines and interdisciplinary approaches. This course is not eligible for Credit/D/Fail grading.

**SPPH 598 (6) Occupational and Environmental Hygiene Project**
Applied project on approved topic based on practicum: requires a written and oral report. This course is not eligible for Credit/D/Fail grading.

**SPPH 599 (12) M.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**SPPH 607 (1.5) Ph.D. Research Seminar**
Required course in Ph.D. program. Topics of current interest will be presented and discussed by students and various faculty. This course is not eligible for Credit/D/Fail grading.

**SPPH 621 (3) Approaches to Enquiry in Population and Public Health**
Research approaches in the area of population and public health; focus on developing research questions and the centrality of research questions in conducting research. This course is not eligible for Credit/D/Fail grading.

**SPPH 681 (1.5/3) d Selected Topics**
By seminar and directed readings, certain topics of current interest are explored in depth. This course is not eligible for Credit/D/Fail grading.

**SPPH 699 (0) Doctoral Dissertation**

**SPPH 710 (0) Current Issues in Public Health Practice**

**SPPH 711 (0) Field Experience**
A series of visits to facilities and organizations related to Community Medicine Practice. Directed by Faculty. At least four hours per month.

**SPPH 712 (0) Supervised Work**
A weekly review by Faculty of the work carried out by the resident with discussion on the objectives, planning, method of operation and outcome. Two hours per week.
SPPH 713 (0) Community Health Tutorials
Topics of Public Health interest presented throughout the year by Faculty and guest lecturers. Two hours per month.

SPPH 714 (0) Community Medicine Seminars
Selected topics of current interest in Community Medicine Practice or in its basic sciences. Presented by residents and discussed with Faculty and invited guests. Three hours per month.

SPPH 715 (0) Journal Seminars
A monthly two-hour seminar on selected journal articles of Community Medicine interest are presented by the residents and discussed with Faculty and invited guests.

SPPH 716 (0) Research in Community Medicine or its Basic Sciences by a Resident
Up to two days per week. Supervised by Faculty.

SPPH 717 (0) Introduction to Occupational Medicine Practice
An introductory survey to Occupational Medicine practice.

SPPH 718 (0) Fundamentals of Clinical Epidemiology
Seminar series covering critical appraisal of the medical literature and basic research methods for residents in any post-graduate training program.

Statistics, Faculty of Science

STAT: Statistics

Introductory courses in probability and statistics are offered by many different departments at UBC. For a list of these courses and details concerning restrictions on the number of credits students may obtain for such courses, see "Pairing Lists" and "Probability and Statistics" in the Science section. The following course is for students in the Faculty of Applied Science: STAT 251. Additional fees are charged for some courses.

STAT 200 (3) Elementary Statistics for Applications
Classical, nonparametric, and robust inferences about means, variances, and analysis of variance, using computers. Emphasis on problem formulation, assumptions, and interpretation. See the Faculty of Science Credit Exclusion Lists: www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,414. [3-1-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

STAT 203 (3) Statistical Methods
Organizing, displaying and summarizing data. Inference estimation and testing for elementary probability models. Not for credit towards a B.Sc. (Consult the Credit Exclusion list within the Faculty of Science section in the Calendar.) [3-1-0]
Prerequisite: MATH 11. Or Pre-calculus 11.

STAT 241 (3) Introductory Probability and Statistics
Probability models, random variables and vectors, estimation, testing, regression, analysis of variance, goodness of fit, quality control. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar). [3-1-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

STAT 251 (3) Elementary Statistics
Probability, discrete and continuous random variables, joint probability distributions, estimation, hypothesis testing, regression, analysis of variance, goodness of fit. (Consult the Credit Exclusion list within the Faculty of Science section of the Calendar). [3-1-0]
Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

STAT 300 (3) Intermediate Statistics for Applications
Further topics in statistical inference, including parametric and non-parametric methods, goodness-of-fit methods, analysis of variance and covariance, regression analysis, categorical data analysis, experimental designs, time series, model fitting, and statistical computing. [3-1-0]
Prerequisite: One of STAT 200, STAT 241, STAT 251, BIOL 300, COMM 291, ECON 325, ECON 327, FRST 231, PSYC 218, PSYC 278, PSYC 366.
Equivalency: COMM 411.
STAT 302 (3) Introduction to Probability
Basic notions of probability, random variables, expectation and conditional expectation, limit theorems. (Consult the Credit Exclusion list within the Faculty of Science section in the Calendar.) [3-0-0]

Prerequisite: One of MATH 200, MATH 226, MATH 217, MATH 253, MATH 263.
Equivalency: MATH 302.

STAT 305 (3) Introduction to Statistical Inference
Review of probability theory. Sampling distribution theory, large sample theory and methods of estimation and hypothesis testing, including maximum likelihood estimation, likelihood ratio testing and confidence interval construction. [3-0-1]

Prerequisite: Either (a) one of STAT 200, BIOL 300, STAT 241, STAT 251, COMM 291, ECON 325, FRST 231, PSYC 318, PSYC 366 and one of MATH 302, STAT 302; or (b) a score of 65% or higher in one of MATH 302, STAT 302. The Department recommends that students meet the prerequisite through option (a). Note there is credit exclusion between MATH 302, STAT 302 and STAT 241, STAT 251.

STAT 306 (3) Finding Relationships in Data
Modeling a response (output) variable as a function of several explanatory (input) variables: multiple regression for a continuous response, logistic regression for a binary response, and log-linear models for count data. Finding low-dimensional structure: principal components analysis. Cluster analysis. (Consult the Credit Exclusion List within the Faculty of Science section in the Calendar). [3-0-1]

Prerequisite: One of MATH 152, MATH 221, MATH 223 and one of STAT 200, STAT 241, STAT 251, STAT 300, BIOL 300, COMM 291, ECON 325, ECON 327, FRST 231, PSYC 218, PSYC 278, PSYC 366 and one of MATH 302, STAT 302.

STAT 307 (2) Statistics Laboratory I
Implementing theory in applications. Problem based learning. Generation and analysis of case data. Modelling, computation and reporting. [0-4-0]

Corequisite: STAT 306.

STAT 308 (1) Statistics Laboratory II
Continuation of STAT 307. [0-2-0]

STAT 321 (4) Stochastic Signals and Systems
Stochastic behaviour of signals and systems (e.g., communication systems); discrete and continuous probability; random processes; modeling and identification of linear time-invariant systems; binary hypothesis testing and decision making. [3-0-2]

Prerequisite: One of EECE 269, ELEC 221, STAT 305. STAT 305 may be taken concurrently, with registration assistance from Statistics Student Services.
Equivalency: ELEC 321.

STAT 335 (3) Statistics in Quality Assurance
Philosophy of quality improvement and total quality control. Definitions of quality. Deming's principles, Ishikawa's tools, control charts, acceptance sampling, continuous improvement, quality design. Credit cannot be obtained for both STAT 335 and WOOD 335. [3-0-1]

Prerequisite: One of STAT 200, STAT 241, STAT 251, BIOL 300.

STAT 344 (3) Sample Surveys
Planning and practice of sample surveys. Random sampling, bias and variance, unequal probability sampling, systematic, multistage and stratified sampling, ratio and regression estimators, post-stratification, establishing a frame, pretesting, pilot studies, nonresponse and additional topics. [3-0-1]

Prerequisite: One of STAT 200, STAT 241, STAT 251, BIOL 300, COMM 291, ECON 325, ECON 327, FRST 231, PSYC 218, PSYC 278, PSYC 366.
Corequisite: One of MATH 302, STAT 302.

STAT 398 (3) Co-operative Work Placement I
Work experience in an industrial research setting. Normally taken during Winter Session of third year. Restricted to students admitted to the Co-operative Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Registration in Statistics Honours or Major Program.

STAT 399 (3) Co-operative Work Placement II
Work experience in an industrial research setting. Normally taken during Summer Session following third year. Restricted to students admitted to the Co-operative Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.
Prerequisite: STAT 398.

STAT 404 (3) Design and Analysis of Experiments
Theory and application of analysis of variance for standard experimental designs, including blocked, nested, factorial and split plot designs. Fixed and random effects, multiple comparisons, analysis of covariance. (Consult the Credit Exclusion list within the Faculty of Science section in the Calendar). [3-0-1]
Prerequisite: STAT 305.
Corequisite: STAT 306.

STAT 406 (3) Methods for Statistical Learning
Flexible, data-adaptive methods for regression and classification models; regression smoothers; penalty methods; assessing accuracy of prediction; model selection; robustness; classification and regression trees; nearest-neighbour methods; neural networks; model averaging and ensembles; computational time and visualization for large data sets. [3-0-1]
Prerequisite: One of STAT 306, CPSC 340.

STAT 443 (3) Time Series and Forecasting
Trend and seasonality, autocorrelation, stationarity, stochastic models, exponential smoothing, Holt-Winters methods, Box-Jenkins approach, frequency domain analysis. [3-0-1]
Prerequisite: One of MATH 302, MATH 318, STAT 302 and one of STAT 200, ECON 325.
Corequisite: STAT 305.

STAT 445 (3) Introduction to Exploratory Data Analysis
Methods for exploring and presenting the structure of data: one group of numbers, several groups, bivariate data, time series data and two-way tables. Data displays, outlier identification, transformations, resistant regression, several types of data smoothing, comparisons with standard statistical methods. [3-0-1]
Prerequisite: STAT 306.

STAT 447 (2-6) Special Topics in Statistics
Students should consult the Statistics Department for the particular topics offered in a given year.
Prerequisite: STAT 305. Permission of the instructor is required.

STAT 450 (3) Case Studies in Statistics
Readings and projects in areas of current statistical application including environmental science, industrial statistics, official statistics, actuarial statistics, and medical statistics. [3-0-1]
Prerequisite: STAT 306.

STAT 460 (3) Statistical Inference I
A detailed theoretical development. Statistical models, exponential families, sufficiency, completeness, and detailed properties of point estimation. Intended for Honours students. [3-0-0]
Prerequisite: MATH 320. STAT 305 is recommended.

STAT 461 (3) Statistical Inference II
Detailed development of the theory of testing hypotheses and confidence regions, Bayesian models and inference, elements of decision theory and additional topics. Intended for Honours students. [3-0-0]
Prerequisite: STAT 460.

STAT 498 (3) Co-operative Work Placement III
Work experience in an industrial research setting. Normally taken during Summer Session following fourth year. Restricted to students admitted to the Co-operative Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.

STAT 499 (3) Co-operative Work Placement IV
Work experience in an industrial research setting. Normally taken during Term 1 of Winter Session of fifth year. Restricted to students admitted to the Co-operative Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.

STAT 518 (3) Theoretical Statistics
This course is not eligible for Credit/D/Fail grading.

STAT 520 (1-6) Topics in Bayesian Analysis and Decision Theory
This course is not eligible for Credit/D/Fail grading.

STAT 521 (1-6) Topics in Multivariate Analysis
This course is not eligible for Credit/D/Fail grading.

STAT 522 (1-6) Topics in Asymptotic Theory and Statistical Inference
This course is not eligible for Credit/D/Fail grading.

STAT 526 (1-6) Topics in Smoothing Methods

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This course is not eligible for Credit/D/Fail grading.

**STAT 527 (1-6) d** Topics in Biostatistics  
This course is not eligible for Credit/D/Fail grading.

**STAT 530 (1-3) d** Bayesian Inference and Decision  
This course is not eligible for Credit/D/Fail grading.

**STAT 533 (1-3) d** Survival Analysis  
This course is not eligible for Credit/D/Fail grading.

**STAT 535 (1-3) d** Statistical Computing  
This course is not eligible for Credit/D/Fail grading.

**STAT 536 (1-3) d** Statistical Theory for the Design and Analysis of Clinical Studies  
This course is not eligible for Credit/D/Fail grading.

**STAT 538 (1-3) d** Generalized Linear Models  
This course is not eligible for Credit/D/Fail grading.

**STAT 540 (1-3) d** Statistical Methods for High Dimensional Biology  
This course is not eligible for Credit/D/Fail grading. Equivalency: BIOF 540, GSAT 540.

**STAT 541 (1-3) d** Applied Multivariate Analysis  
This course is not eligible for Credit/D/Fail grading.

**STAT 543 (1-3) d** Time Series Analysis  
This course is not eligible for Credit/D/Fail grading.

**STAT 545 (1-3) d** Exploratory Data Analysis  
This course is not eligible for Credit/D/Fail grading.

**STAT 547 (1-6) d** Topics in Statistics  
Students should consult the Statistics Department for the particular advanced topics offered in a given year. This course is not eligible for Credit/D/Fail grading.

**STAT 548 (1-6) c** Directed Studies in Statistics  
This course is not eligible for Credit/D/Fail grading.

**STAT 549 (6/12) c** Thesis for Master’s Degree  
This course is not eligible for Credit/D/Fail grading.

**STAT 550 (3)** Techniques of Statistical Consulting  
This course is not eligible for Credit/D/Fail grading.

**STAT 551 (3)** Statistical Consulting Practicum  
This course is not eligible for Credit/D/Fail grading.

**STAT 560 (3)** Statistical Theory I  
Credit will not be given for both STAT 460 and STAT 560. This course is not eligible for Credit/D/Fail grading. [3-0-0]

**STAT 561 (3)** Statistical Theory II  
This course is not eligible for Credit/D/Fail grading.

**STAT 589 (3)** M.Sc. Project  
This course is not eligible for Credit/D/Fail grading.

**STAT 598 (3)** Co-operative Work Placement I  
Restricted to students admitted to the Co-operative M.Sc. Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.

**STAT 599 (3)** Co-operative Work Placement II  
Restricted to students admitted to the Co-operative M.Sc. Education Program in Statistics. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: STAT 598.

**STAT 649 (0)** Doctoral Dissertation
Philosophy, Faculty of Graduate and Postdoctoral Studies

STS: Science and Technology Studies

STS 501 (3) Proseminar in Science and Technology Studies
Classic work in the history, philosophy, rhetoric, and sociology of science, and the development of a unified science and technology studies. Required for all students in the STS Program. This course is co-taught. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Enrolment in STS Program or permission of the STS Advisory Committee.

STS 502 (3) Core Seminar in Science and Technology Studies
Thematizes the relations of historical, philosophical, literary, rhetorical, sociological, and anthropological approaches to science and technology. This course is not eligible for Credit/D/Fail grading.
Prerequisite: STS 501.

STS 597 (3) Master's Colloquium in Science and Technology Studies
This course is not eligible for Credit/D/Fail grading.

STS 598 (3-6) Doctoral Colloquium in Science and Technology Studies
This course is not eligible for Credit/D/Fail grading.

STS 599 (12) Master's Thesis
This course is not eligible for Credit/D/Fail grading.

Surgery, Faculty of Medicine

SURG: Surgery

SURG 500 (4) Experimental Surgery
Lectures and seminars dealing with the selected application of surgical techniques in biological investigation. This course is not eligible for Credit/D/Fail grading.

SURG 501 (4) Surgical Methodology in Research
Seminars with the laboratory preparation of advanced procedures used in modern physiological and surgical research. Courses 502 to 511 consist of a series of two-year courses common to all branches of surgery (core). This course is not eligible for Credit/D/Fail grading.
Prerequisite: Plus lectures structured for selected major disciplines in surgery.

SURG 502 (2) Surgical Core - POS Series
The basic principles of surgery common to all branches of surgery. This course is not eligible for Credit/D/Fail grading.

SURG 504 (4) Advanced General Surgery I
Fundamental concepts in general surgery. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

SURG 505 (4) Advanced General Surgery II
The second year of the above program. Given in alternate years. This course is not eligible for Credit/D/Fail grading.

SURG 510 (3) Surgical Care in International Health
Online course. Foundation to international surgery. The discussion of the global burden of unmet surgical needs and a professional response in low and middle income regions of the world. This course is not eligible for Credit/D/Fail grading.

SURG 512 (3) Global Disability: A Surgical Care Mandate
Online course. Relationship of surgery to preventing and treating disabling impairments in lower income countries. Focus will be on sensory impairments (blindness and deafness) and physical impairment. This course is not eligible for Credit/D/Fail grading.
Prerequisite: SURG 510.

SURG 514 (3) Surgical Care in Humanitarian Disaster Response
Online course. Examines response to humanitarian disasters. Includes case models of surgical care responses and strategies to move from relief to recovery. This course is not eligible for Credit/D/Fail grading.

SURG 516 (3) Program Planning and Evaluation in Surgical Care Low Resource Settings
Online course. Program Planning and Evaluation in Surgical Care contexts. Theory, approaches and methods for conducting
surgical care programs among populations in various low resource contexts. Key concepts, ethical approaches and practices, and practical skills development. Credit will be granted for only one of SPPH 540 or SURG 516.

**Prerequisite:** SURG 510.

**SURG 518 (3) Surgical Care in Canada's Rural and Remote Indigenous Communities with Global Comparisons**

Online Course. Critiques the current and historical provision of surgical care services to indigenous communities in Canada and globally. Examines challenges and opportunities confronting both the clinician and the service delivery system, embracing lessons learned from these communities.

*This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** SURG 510.

**SURG 542 (3) Directed Study in Global Surgical Care**

Online course. Literature review of a global surgical care topic chosen in consultation with an advisor. Includes analysis of existing literature and research, and identification of gaps in current knowledge.

*This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** All of SURG 510, SURG 512, SURG 514.

**SURG 548 (2-4) Seminar in Surgery**

*This course is not eligible for Credit/D/Fail grading.*

**SURG 549 (6-18) M.Sc. Thesis**

*This course is not eligible for Credit/D/Fail grading.*

**SURG 560 (6) Global Surgical Care Field Practicum**

Online Course with a four to eight week on-site field placement. Proposal development, implementation and high-level written report of a surgical care field practicum in an underserved location globally, producing practical "on-the-ground" skills.

*This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** All of SURG 510, SURG 512, SURG 514, SPPH 540.

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**Central, Eastern and Northern European Studies, Faculty of Arts**

**SWED: Swedish**

**SWED 100 (3) Elementary Swedish I**

**SWED 110 (3) Elementary Swedish II**

**SWED 200 (3) Intermediate Swedish I**

**SWED 210 (3) Intermediate Swedish II**

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**Theatre and Film, Faculty of Arts**

**THTR: Theatre**

**THTR 120 (3) Introduction to Theatre**

Theory and practice of the theatrical arts. Attendance at plays is required.

**THTR 130 (3) Introduction to Stage Acting**

**THTR 150 (1-3) d Introduction to Technical Production**

Foundation study of production technologies for the performing arts.

**THTR 205 (3/6) d Graphics for Theatre and Film Design**

**THTR 210 (3) Drama: Forms and Ideas I**

The Anatomy of Drama: Its history, aesthetic principles, performative potential.

**THTR 211 (3) Drama: Forms and Ideas II**

Topics in comparative drama; drama and the other performing arts; dramaturgy.

**THTR 230 (3) Performance Study I**

Study of the actor's process.
THTR 245 (3) Play-Interpretation and Production-Analysis
Basic methods of interpreting dramatic texts and analyzing plays in performance. The plays presented on the Frederic Wood Stage will be studied in this course.

THTR 250 (3) Technical Production
The construction and execution of scenery, costumes, properties, lighting, and sound for the stage.
Prerequisite: THTR 150.
Equivalency: THTR 254.

THTR 271 (3) Beginning B.F.A. Acting I
Open only to B.F.A. Acting students. An audition is required.
Prerequisite: At least one theatre course.

THTR 272 (3) Beginning B.F.A. Acting II
Open only to B.F.A. Acting students.

THTR 273 (3) Beginning Voice and Movement I
Open only to B.F.A. Acting students. An audition is required.
Prerequisite: At least one theatre course.

THTR 274 (3) Beginning Voice and Movement II
Open only to B.F.A. Acting students.

THTR 299 (3/6) Production I
Assigned projects in theatre production.
Corequisite: One of THTR 205, THTR 250.
Equivalency: THTR 251.

THTR 301 (3/6) Styles of Decor and Dress
Artistic, decorative, cultural, and social contexts of selected theatrical genres and periods.

THTR 305 (3) Scenery Design I
Principles and practice of scenery design for the performing arts.
Prerequisite: THTR 205.

THTR 306 (3) Costume Design I
Principles and practice of costume design for the performing arts.

THTR 307 (3) Lighting Design I
The optical, distribution, and control systems used in stage lighting design.

THTR 308 (3) Sound Design
Audio design and production for theatre and other performance forms.

THTR 310 (3) Theory of Drama Performance
The basic principles of dramaturgy and theory of performance. Historical and contemporary writing on dramatic theory and criticism and their relation to theatrical practice.

THTR 311 (3) Studies in Drama
Topics will vary from year to year.

THTR 317 (3) Introduction to Directing
Prerequisite: One of THTR 130, THTR 230 and THTR 299.
Corequisite: One of THTR 299, THTR 399.

THTR 320 (3) History of Theatre I
Core concepts in world theatre history and the development of theatre prior to the nineteenth century.

THTR 323 (3) History and Theory of Directing
Equivalency: THTR 321.

THTR 325 (3/6) History of Canadian Theatre

THTR 330 (3) Performance Study II
Study of performance styles.
Prerequisite: One of THTR 130, THTR 230.
THTR 335 (3) Voice and Movement Study  
*Prerequisite:* One of THTR 130, THTR 230.

THTR 339 (3) Creating Theatre I  
Study and practice of processes and forms used to create ensemble performance.  
*Prerequisite:* One of THTR 130, THTR 230.

THTR 340 (3/6) d Studies in Asian Theatre  
Open to all students in third year and above.

THTR 350 (3) Scenery Production I  
Scenery construction, rigging, and systems.

THTR 352 (3) Scene Painting I  
Media, techniques, and textural treatments used in scene painting.

THTR 354 (3) Stage Management  
Principles and procedures of stage management: organizations, systems, and operations.

THTR 356 (3) Costume Construction  
Advanced assembly and specialized construction methods for producing costume for stage and screen.

THTR 371 (3) Intermediate B.F.A. Acting I  
Open only to B.F.A. Acting students.  
*Prerequisite:* All of THTR 271, THTR 272, THTR 273, THTR 274.

THTR 372 (3) Intermediate B.F.A. Acting II  
Open only to B.F.A. Acting students.  
*Corequisite:* All of THTR 371, THTR 373, THTR 374.

THTR 373 (3) Intermediate Voice, Speech, and Movement I  
Open only to B.F.A. Acting students.  
*Prerequisite:* All of THTR 271, THTR 272, THTR 273, THTR 274.

THTR 374 (3) Intermediate Voice, Speech, and Movement II  
Open only to B.F.A. Acting students.  
*Corequisite:* All of THTR 371, THTR 372, THTR 373.

THTR 391 (3-12) d Rehearsal and Performance  
Open only to B.F.A. Acting students.  
*Prerequisite:* All of THTR 271, THTR 272, THTR 273, THTR 274.

THTR 399 (3/6) d Production II  
Assigned projects in theatre design and production.  

THTR 405 (3) Scenery Design II  
Exploration of complex scenery design and development of design portfolio.  
*Prerequisite:* THTR 305.

THTR 406 (3) Costume Design II  
Complex problems and selected historical studies in costume design.  
*Prerequisite:* THTR 306.

THTR 407 (3) Lighting Design II  
Complex design and advanced technologies in stage lighting and scenography.  
*Prerequisite:* THTR 307.

THTR 408 (3/6) d Advanced Study in Design and Scenography  
Topics will vary from year to year. Consent of Department required.  
*Equivalency:* THTR 459.

THTR 410 (3) Dramaturgy  
Advanced problems in dramaturgy, both in a historical and a contemporary context.

THTR 417 (3) Directing Lab
Prerequisite: THTR 317. Permission of the instructor is required for admission to this course.

THTR 420 (3) History of Theatre II
Key movements in world theatre history from the nineteenth century to the present.
Prerequisite: THTR 320.
Equivalency: THTR 415.

THTR 421 (3) History of Theatre from 1900 to the present
The development of Western Theatre from 1900 to the present

THTR 425 (3/6) d Topics in Canadian Theatre

THTR 430 (6) Theory of Drama and Performance
The basic principles of dramaturgy and theory of performance. Historical and contemporary writing on theatrical theory and criticism and their relation to theatrical practice.

THTR 439 (3/6) d Creating Theatre
Ensemble creation culminating in the presentation of a theatrical work. Permission of the instructor is required.
Equivalency: THTR 490.

THTR 440 (3/6) d Topics in Theatre
An examination in depth of a selected area of theatre history, theory or practice. Topics will change from year to year. May be repeated for credit when topics differ.
Prerequisite: 6 credits of THTR at the 300-level or above.

THTR 443 (3/6) d Women in Theatre and Film
A course dealing with women's involvement in and contribution to various aspects of Theatre and/or Film. Topics will change from year to year.
Equivalency: THTR 415.

THTR 445 (3) Majors and Honours Seminar

THTR 448 (3/6) c Directed Studies in Theatre Theory and Practice

THTR 449 (6) Supervised Study and Honours Essay

THTR 450 (3) Scenery Production II
Technical direction; complex techniques and problems in scenery production.
Prerequisite: THTR 350.

THTR 452 (3) Scene Painting II
Study of selected scene painting styles.
Prerequisite: THTR 352.

THTR 454 (3) Production and Theatre Management
Production and theatre management with emphasis on budgeting, publicity, scheduling, press relations, special events, legal issues, season selection, resumes and interpersonal skills.
Prerequisite: THTR 354.

THTR 456 (3) Costume Construction II
Pattern development and cutting for costume for stage and screen using flat pattern and draping.
Prerequisite: THTR 356.

THTR 469 (3/6) d Interdisciplinary Projects
Group projects and workshops with students majoring in other creative arts.
Prerequisite: Permission of instructor.
Equivalency: CRWR 440, VISA 469, MUSC 469.

THTR 471 (3) Advanced B.F.A. Acting I
Open only to B.F.A. (Acting) students.
Prerequisite: All of THTR 371, THTR 372, THTR 373, THTR 374, THTR 391.

THTR 472 (3) Advanced B.F.A. Acting II
Open only to B.F.A. Acting students.
Corequisite: All of THTR 471, THTR 473, THTR 474.

THTR 473 (3) Advanced Speech and Movement I
Open only to B.F.A. Acting students.

Prerequisite: Three of THTR 371, THTR 372, THTR 373, THTR 374, THTR 391.

THTR 474 (3) Advanced Speech and Movement II
Open only to B.F.A. Acting students.
Corequisite: THTR 471, THTR 472, THTR 473

THTR 491 (3-12) d Advanced Rehearsal and Performance
Open only to B.F.A. Acting students.
Prerequisite: Three of THTR 371, THTR 372, THTR 373, THTR 374, THTR 391.

THTR 499 (6-12) d Production III
Assigned projects in Theatre or Film design and production.
Prerequisite: THTR 399.
Corequisite: One of THTR 405, THTR 406, THTR 407, THTR 408, THTR 450, THTR 452, THTR 454, THTR 456, THTR 470.

THTR 500 (3) Bibliography and Research Methods
This course is not eligible for Credit/D/Fail grading.

THTR 505 (3) Scenery Design Studio I
Scenery design for theatre and other performance forms. This course is not eligible for Credit/D/Fail grading.

THTR 506 (3) Costume Design Studio I
Costume design for theatre and other performance forms. This course is not eligible for Credit/D/Fail grading.

THTR 507 (3) Scenery Design Studio II
Complex scenery design for opera, dance, theatre, and other performance forms. This course is not eligible for Credit/D/Fail grading.

THTR 508 (3) Costume Design Studio II
Complex costume design for opera, dance, theatre, and other performance forms. This course is not eligible for Credit/D/Fail grading.

THTR 510 (3/6) d Seminar in Comparative Dramatic Literature
This course is not eligible for Credit/D/Fail grading.

THTR 515 (3/6) d Seminar: Studies in Theatrical Style
This course is not eligible for Credit/D/Fail grading.

THTR 520 (6) Direction and Production
This course is not eligible for Credit/D/Fail grading.

THTR 521 (6) Styles in Directing
An advanced course in directing; detailed study of the major styles in the history of production. This course is not eligible for Credit/D/Fail grading.
Prerequisite: THTR 520.

THTR 525 (3/6) d Seminar: Study of a Major Dramatist
This course is not eligible for Credit/D/Fail grading.

THTR 530 (3/6) d Seminar: Relationships Between Theatre and the Other Arts
Studies in a selected area of theatre in relation to one or more of the other arts. This course is not eligible for Credit/D/Fail grading.

THTR 547 (3/6) d Directed Studies in Theatre and Drama and Film/Television
This course is not eligible for Credit/D/Fail grading.

THTR 549 (6/12) c Master's Thesis
This course is not eligible for Credit/D/Fail grading.

THTR 550 (6) Studies in Historic Design
Seminar in theatre scenery, costumes, and architecture of selected historical periods. Pre- or co-requisite: THTR 505 and THTR 506. This course is not eligible for Credit/D/Fail grading.

THTR 551 (3) Lighting Design Studio 1
Lighting design for theatre and other performance forms. This course is not eligible for Credit/D/Fail grading.
THTR 555 (3) Structural Design for the Stage I  
This course is not eligible for Credit/D/Fail grading.

THTR 556 (3) Structural Design for the Stage II  
This course is not eligible for Credit/D/Fail grading. Prerequisite: THTR 555.

THTR 560 (3/6) d Studies in Theatrical History  
This course is not eligible for Credit/D/Fail grading.

THTR 561 (3/6) d Studies in Dramatic Literature  
This course is not eligible for Credit/D/Fail grading.

THTR 562 (3/6) d Studies in Dramatic Theory and Criticism  
This course is not eligible for Credit/D/Fail grading.

THTR 649 (0) Doctoral Dissertation

Asian Studies, Faculty of Arts

TIBT: Tibetan Languages

TIBT 100 (3) Introduction to Tibetan I  
Concepts, grammar, syntax of spoken and written Tibetan for beginners. Also covers aspects of Tibetan worldview.

TIBT 101 (3) Introduction to Tibetan II  
Focus on grammar, syntax, and structures to improve comprehension and communication skills. Also covers aspects of Tibetan worldview.  
Prerequisite: TIBT 100.

School of Architecture and Landscape Architecture, Faculty of Applied Science

UDES: Urban Design

UDES 501 (9) Design Studio: Ecological Regional Design  
This course is not eligible for Credit/D/Fail grading.

UDES 502 (9) Design Studio: Sustainable Neighbourhood Design  
This course is not eligible for Credit/D/Fail grading.

UDES 503 (9) Design Studio: The Urban Block Design  
This course is not eligible for Credit/D/Fail grading.

UDES 504 (3) History and Theory of Urban Design  
This course is not eligible for Credit/D/Fail grading.

UDES 505 (3) Urban Design as Public Policy: Policymaking for a Sustainable Region  
This course is not eligible for Credit/D/Fail grading.

UDES 506 (3) Real Estate Economics: Development Feasibility and Financing  
This course is not eligible for Credit/D/Fail grading.

UDES 509 (1-6) d Topics in Urban Design  
Faculty-initiated graduate seminars related to topics in urban design. This course is not eligible for Credit/D/Fail grading.

Faculty of Forestry

UFOR: Urban Forestry

UFOR 100 (3) Greening the City  
Roles played by urban forestry and greenspace systems in a rapidly changing world; topics include urban ecology, urban forest
conservation, urban forest management, climate change, society and human well-being, design and planning, urban/rural interface issues, and urban forest policy. [2-0-2]

**UFOR 101 (3) Urban Forest Inventory and Assessment**
Overview of urban forest resources: structure and composition, extent, and ecosystem services and benefits provided; introduces methods and tools for urban forest inventory, monitoring, and assessment, and how they are integrated into the planning and management of urban forests.

**UFOR 200 (3) Urban Forests and Well-Being**
Basic relationships between urban residents’ mental and physical well-being and their urban forest environment. [2-0-2]

**UFOR 201 (3) Introduction to Urban Forest Design**
Basic concepts of landscape design as it relates to urban forestry.
*Prerequisite:* UFOR 100.
*Corequisite:* UFOR 200.

**UFOR 300 (3) Arboriculture Principles and Practice**
Sustainable practice within the arboricultural discipline with emphasis on a comprehensive understanding of techniques and equipment used in a range of arboricultural operations. [3-1-0]
*Prerequisite:* UFOR 200.

**UFOR 316 (3) Trees and Shrubs in Landscape**
Culture and identification of landscape materials with emphasis on woody plants. Elementary principles of landscape composition. Suitable for students of other faculties and departments interested in landscape materials and their uses, but priority given to Agroecology and Landscape Architecture students. Credits toward the completion of the Bachelor of Urban Forestry will be granted for only one of LARC 316 or UFOR 316.
*Prerequisite:* All of UFOR 101, UFOR 201.

**UFOR 400 (3) Urban Forestry Field School**
Development of field skills, professional judgment, critical reflection, and integration of theory, practice, and policy. Offered at Malcolm Knapp Research Forest over a 7-day period in April.
*This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* UFOR 200. And third year standing in the B.U.F. program.

**UFOR 401 (6) Integrated Urban Forestry Capstone Studio**
Integration of biophysical and socio-economic components of urban greenspace management and planning through within a collaborative holistic group project linked to a real-world urban forestry situation.
*This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* All of UFOR 300, UFOR 400. And fourth year standing in the B.U.F. program.

**UFOR 402 (3) Urban Forestry Administration, Policy and Law**
The administrative, legal, policy, and business environments for urban forestry governance, management, and planning.
*Prerequisite:* UFOR 300. And third year standing.

**UFOR 403 (3) Ecological Restoration**
Ecological principles relevant to restoration of ecosystems are applied to the restoration of several types of ecosystems.
*This course is not eligible for Credit/D/Fail grading.*
*Prerequisite:* One of FRST 201, BIOL 230. And third year standing

**UFOR 449 (1-6) Directed Studies in Urban Forestry**
In special cases and with the approval of the instructor concerned, a student may carry out directed studies on a specific topic/problems in Urban Forestry and related greenspace planning, management, or governance.

**UFOR 495 (3) Biodiversity in Urban Areas**
Urban centres can be designed and managed to contribute to biodiversity conservation commitments. Topics include designing human-dominated landscapes to promote biodiversity, the tools required, assessing outcomes, and the benefits and negatives of nature in the city.
*Prerequisite:* All of FRST 200, BIOL 230 or permission of the instructor.

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**Central, Eastern and Northern European Studies, Faculty of Arts**

**UKRN: Ukrainian**
UKRN 125 (6) Basic Ukrainian

UKRN 225 (6) Advanced Ukrainian

Prerequisite: UKRN 125.

Surgery, Faculty of Medicine

UROL: Urological Surgery

UROL 510 (2) Advanced Urology I
This course is not eligible for Credit/D/Fail grading.

UROL 511 (2) Advanced Urology II
This course is not eligible for Credit/D/Fail grading.

UROL 760 (0) Urology Conference I

UROL 761 (0) Urology Conference II

UROL 762 (0) Urologic Radiology

UROL 764 (0) Urology Seminars

UROL 765 (0) Operative Urologic Surgery

Faculty of Arts

URST: Urban Studies

URST 200 (3) Cities
An interdisciplinary introduction to the city in the context of contemporary globalization. Analysis of urban patterns and processes from the theoretical perspectives of various disciplines and methodologies.
Equivalent: GEOG 250.

URST 400 (3) Seminar in Urban Studies
A seminar for senior students who wish to explore some common topics of importance to urban studies from the viewpoints of several disciplines.
Prerequisite: Fourth-year standing.

Community and Regional Planning, Faculty of Applied Science

URSY: Urban Systems

URSY 510 (3) Urban Systems and Society
Urban systems in society and economy; spatial issues; equity and social justice. Governance, policy, regulation. Globalization and international development; implications for urban systems. Urban and regional economics; infrastructure financing. Urban systems and technology; tradeoffs; socio-economic-technical systems; emerging and green technologies.
This course is not eligible for Credit/D/Fail grading.

URSY 520 (3) Urban Systems Analysis and Planning
This course is not eligible for Credit/D/Fail grading.

URSY 530 (3) Urban Systems Engineering
Technical infrastructure systems that support communities: water; waste and storm water; solid waste; transportation; energy and data. Systems' services and demands; technical alternatives; distribution systems; modeling, design, construction, operations and maintenance issues.
This course is not eligible for Credit/D/Fail grading.

URSY 540 (3) Urban Systems Project Delivery and Economics
Stakeholder practices: stakeholder engagement, public consultation, partnerships, stakeholder management, buy-in. Project delivery: project delivery options, public-private partnerships (P3), integrated project delivery (IPD), partnering. Modeling, analytical methods, and decision support: economic and risk modeling. This course is not eligible for Credit/D/Fail grading.
Corequisite: STAT 251 or equivalent course in elementary statistics, CIVL 403 or equivalent course in Engineering Economics.

**URSY 550 (3) Infrastructure Asset Management**
General frameworks for infrastructure management, system-specific asset management (road conditions, pipe inspection), maintenance and renewal. Data, metrics, indicators and assessment: data sources, performance indicators, assessment, assessing condition and sustainability, multi-objective, multi-criteria decision making, performance prediction, lifecycle cost analysis (LCA), sustainability. This course is not eligible for Credit/D/Fail grading.

**Vantage College**

**VANT: Vantage College**

**VANT 140 (1-7) d Content and Language Enrichment Tutorials**
Sustained language support for linked content courses in International Program. Students develop strategies for self-directed learning.

**VANT 148 (2) UBC Vantage College Projects**
Projects linked to topics explored in the UBC Vantage College International Program curricula. [1-0-1; 1-0-1]

**VANT 149 (1) Multidisciplinary Research Project**
Research project that culminates in student-led conference and research presentation. [1-0-1]
Prerequisite: VANT 148.

**VANT 150 (3) Sustainability and Engineering Design**
Topics in sustainability, including the impact of technology on the environment and society, and fundamentals of engineering design. Restricted to students in the UBC Vantage College Engineering Stream. [1-0-2; 1-0-2]

**VANT 151 (3) Multidisciplinary Engineering Design Project**
Design project that culminates in student-led project fair. Restricted to students in the UBC Vantage College Engineering Stream. [2-0-3]
Prerequisite: VANT 150.

**Art History, Visual Art and Theory, Faculty of Arts**

**VISA: Visual Arts**

Not every course is given every year. For details of current offerings, consult the UBC Course Schedule at https://courses.students.ubc.ca. Credit will be given to either the current VISA listing or its former VISA/FINA equivalent. In special circumstances VISA 110 may be taken as a co-requisite. A Studio Course Fee will be charged for each 3-credit undergraduate VISA course. Fees will be applied toward classroom supplies, equipment, and materials. Fees are included in your tuition.

**VISA 101 (3) BFA Studio Practice**
Introduction to a broad range of contemporary studio practice. Intended for first year Bachelor of Fine Arts VISA students.

**VISA 110 (3) Foundation Studio: Digital Media**
Foundation instruction in techniques and approaches to digital practice. The nature of digital technologies and their role in contemporary culture will be examined. (This course is open to all UBC students, regardless of prior experience.)

**VISA 180 (3) Foundation Studio: Approaches to Media**
Drawing, painting, and related media in an introduction to studio practice. (This course is open to all UBC students, regardless of prior experience.)

**VISA 183 (3) Foundation Studio: Ideas as Practice I**
Contemporary art practices, emphasizing the relationship between meanings and materials, art historical contexts and concepts, and non-traditional materials. (This course is open to all UBC students, regardless of prior experience.)
VISA 210 (3) Digital Arts
Examination of current art practices and issues related to digital technologies and contemporary culture, with an emphasis on the theoretical conceptualization of digital artistic media.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 220 (3) Drawing
Development of skills in drawing including life drawing. Introduction to the development of personal style and concepts.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 230 (3) Painting
Development of a variety of techniques and approaches to painting. Emphasis on developing a strong paint vocabulary as well as acquiring knowledge of historical and contemporary issues in painting.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 240 (3) Photography
Introduction to photography techniques and image-making. Emphasis on camera techniques and film and darkroom production.
Only one of VISA 240 or VISA 241 may be used toward requirements for Major, Minor, or Honours programs in Visual Art.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 241 (3) Digital Photography
Introduction to digital photography image creation in relation to contemporary art. Emphasis on digital camera use, file management, and digital print production.
Only one of VISA 240 or VISA 241 may be used toward requirements for Major, Minor, or Honours programs in Visual Art.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 250 (3) Print Media
Visual print culture, and contemporary and historical technical print practices. Emphasis on hand-drawn intaglio, relief, screen and/or stencil printing, and graphic digital applications.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 260 (3) Sculpture
Contemporary sculpture practice and theory. Various sculpture materials and technologies including machinery use.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 270 (3) Special Studies
Introduction to various aspects of contemporary studio practice. Not offered every year.
Prerequisite: A score of 72% or higher in one of VISA 110, VISA 180, VISA 183.

VISA 280 (3) Contemporary Art: Ideas as Practice II
Development and history of contemporary art practice, with a focus on how artists realize and exchange ideas. Intended for second year BFA VISA students.
Prerequisite: A score of 72% or higher in VISA 183.

VISA 310 (3) Intermediate Digital Arts I
Exploring issues and topics in interactive digital media and culture through the creation of critical contemporary art. Includes technical instruction with a focus on the development of individual and group projects.
Prerequisite: One of VISA 210, VISA 287, FINA 287.

VISA 311 (3) Intermediate Digital Arts II
Investigation of issues and topics in digital media and visual culture through the production of contemporary video art. Technical instruction in video manipulation software. Individual and/or group projects.
Prerequisite: One of VISA 210, VISA 287, FINA 287.

VISA 320 (3) Intermediate Drawing I
Investigation of drawing as a discipline in the context of contemporary art. Emphasis on expanding definitions of the drawing practice while focusing on technical and conceptual development.
Prerequisite: One of VISA 220, VISA 281, FINA 281.

VISA 321 (3) Intermediate Drawing II
Investigation of drawing as a discipline in the context of contemporary art and theory. Emphasis on self-directed projects in consultation with the instructor.
Prerequisite: One of VISA 220, VISA 281, FINA 281.

VISA 330 (3) Intermediate Painting I
Development of techniques and personal style in relation to ideas. History and contemporary issues in painting will be introduced to assist students in conceptualizing their painting practice.

Prerequisite: One of VISA 230, VISA 282, FINA 282.

VISA 331 (3) Intermediate Painting II
Further investigation of painting in the context of contemporary art. Emphasis on self-directed projects in consultation with the instructor.

Prerequisite: One of VISA 230, VISA 282, FINA 282.

VISA 340 (3) Intermediate Photography I
An investigation of approaches to photography and its meaning in the context of contemporary art. The term theme will be determined by the instructor. B & W, colour and digital production.

Prerequisite: One of VISA 240, VISA 241.

VISA 341 (3) Intermediate Photography II
An investigation of contemporary photography production and approaches to the constructed image with emphasis on medium and large format camera use and studio lighting techniques.

Prerequisite: One of VISA 240, VISA 241.

VISA 350 (3) Intermediate Print Media I: Interdisciplinary Approaches to Image Production
Intaglio and relief print applications (i.e., etching, wood and/or lino cut, and collagraph) in combination with digital and photographic technologies, and drawing; discussion of contemporary and historical visual print culture.

Prerequisite: Either (a) VISA 250 or (b) one of VISA 290, VISA 283, VISA 284, FINA 290, FINA 283, FINA 284.

VISA 351 (3) Intermediate Print Media II: Interdisciplinary Approaches to Image Production
Screen printing and other print applications in combination with digital and photographic technologies, and drawing, explored within the context of contemporary art.

Prerequisite: Either (a) VISA 250 or (b) one of VISA 283, VISA 284, VISA 290, FINA 283, FINA 284, FINA 290.

VISA 352 (3) Intermediate Print Media III: Interdisciplinary Approaches to Image Production
Lithographic printing; suitable for students interested in drawing and print media interface in context of contemporary art; related digital and photographic technologies employed.

Prerequisite: Either (a) one of VISA 220, VISA 250 or (b) one of VISA 281, FINA 281, VISA 283, VISA 284, VISA 290, FINA 283, FINA 284, FINA 290.

VISA 360 (3) Intermediate Sculpture I
Investigation of contemporary practices in sculpture and the use of scale. Emphasis on public sculpture.

Prerequisite: One of VISA 260, VISA 285, VISA 286, FINA 285, FINA 286.

VISA 361 (3) Intermediate Sculpture II
Development of personal concerns in three-dimensional work. Emphasis on the integration of diverse materials and techniques.

Prerequisite: One of VISA 260, VISA 285, VISA 286, FINA 285, FINA 286.

VISA 370 (3/6) d Special Studies I
Intermediate tutorial. Not offered every year.

Prerequisite: 6 credits of 200-level VISA.

VISA 371 (3/6) d Special Studies II
Intermediate tutorial. Not offered every year.

Prerequisite: 6 credits of 200 level VISA

VISA 375 (3) Artists in Society
Exploring artistic practice through community-engaged partnerships and critical study. This course is not eligible for Credit/D/Fail grading.

Prerequisite: Restricted to 3rd and 4th year students majoring in Visual Arts or Art History.

VISA 380 (3) Studio Theory
A seminar in problems in contemporary art practice and related theory. Preference given to Visual Art students. This course is not eligible for Credit/D/Fail grading.

VISA 381 (3) Studio Seminar
A seminar in problems in contemporary art practice and related theory. Preference given to Visual Art students. This course is not eligible for Credit/D/Fail grading.

Prerequisite: VISA 380.
VISA 390 (3) Performance Art  
Seminar-based studio focusing on performance and actions in the field of contemporary art.  
Prerequisite: 6 credits of 200-level VISA with an average of at least 72%.

VISA 401 (3-18) d Advanced Open Studio  
Research-based studio with thematic or disciplinary focus. Intended for senior Visual Art undergraduate students. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Three of VISA 310, VISA 311, VISA 320, VISA 321, VISA 330, VISA 331, VISA 340, VISA 341, VISA 350, VISA 351, VISA 360, VISA 361, VISA 370, VISA 390.

VISA 410 (3) Advanced Digital Arts I  
Development of contemporary art works utilizing digital technologies including 3-dimensional applications, spatial, interactive and time-based installations. Focus on student-generated projects, either individual or group. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of VISA 310, VISA 311. Plus an additional 3 credits of 300-level VISA.

VISA 411 (3) Advanced Digital Arts II: Video  
Contemporary practices in video media examined through individual projects and directed study. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of VISA 310, VISA 311. Plus an additional 3 credits of 300-level VISA.

VISA 430 (3) Advanced Drawing and Painting I  
Interdisciplinary studio practice with emphasis on drawing, painting, and related media. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Two of VISA 320, VISA 321, VISA 330, VISA 331.

VISA 431 (3) Advanced Drawing and Painting II  
Interdisciplinary studio practice with emphasis on drawing, painting, and related media. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Two of VISA 320, VISA 321, VISA 330, VISA 331.

VISA 440 (3) Advanced Photography I  
Photography practice in the context of contemporary art. Interdisciplinary connections to other media will be encouraged. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Two of VISA 340, VISA 341, VISA 310.

VISA 441 (3) Advanced Photography II  
The production of self-directed projects investigating photography as art. Focus on integrative approaches including conventional, digital and multi-media. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Two of VISA 340, VISA 341, VISA 440.

VISA 450 (3) Advanced Print Media and Sculpture I  
Studies in contemporary trends in studio practice and theory. Emphasis on advanced two and three-dimensional work developed out of experimental approaches to sculpture, installation art and print-based media. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of VISA 350, VISA 351, VISA 360, VISA 361. Plus an additional 3 credits of 300-level VISA.

VISA 451 (3) Advanced Print Media and Sculpture II  
Further studies in advanced two and three-dimensional work developed out of experimental approaches to sculpture, installation art and print-based media. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: One of VISA 350, VISA 351, VISA 360, VISA 361. Plus an additional 3 credits of 300-level VISA.

VISA 469 (3/6) d Interdisciplinary Projects  
Group projects and workshops with students majoring in other creative arts. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: Permission of instructor.  
Equivalency: THTR 469, CRWR 440, MUSC 469.

VISA 470 (3/6) d Advanced Special Studies I  
Advanced work in contemporary and historical aspects of studio practice. Not offered every year. This course is not eligible for Credit/D/Fail grading.  
Prerequisite: 6 credits of 300-level VISA

VISA 471 (3/6) d Advanced Special Studies II
Advanced work in contemporary and historical aspects of studio practice. Not offered every year. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** 300-level VISA

**VISA 475 (3) Exhibition Theory and Practice**
Exhibition course focusing on current curatorial practices and theories with an emphasis on contemporary visual art with the aim of preparing students to engage in the active organization of a large exhibition. Restricted to 4th year Majors in either VISA or ARTH, or permission of the instructor. *This course is not eligible for Credit/D/Fail grading.*

**VISA 479 (3) Performance Actions and Approaches**
Advanced performance art practices and research methodologies. *This course is not eligible for Credit/D/Fail grading.*

*Equivalency:* ARTH 479.

**VISA 480 (3) Advanced Seminar I**
Readings in art theory and criticism. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** VISA 380.

**VISA 481 (3) Advanced Seminar II**
Readings in art theory and criticism. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** VISA 480.

**VISA 490 (3) Advanced Tutorial in Studio I**
Advanced work in contemporary and historical aspects of studio practice. Permission of instructor required. Not offered every year. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** 6 credits of 300-level VISA and 3 credits of 400-level VISA.

**VISA 491 (3) Advanced Tutorial in Studio II**
Advanced work in contemporary and historical aspects of studio practice. Permission of instructor required. *This course is not eligible for Credit/D/Fail grading.*

**Prerequisite:** 6 credits of 300-level VISA and 3 credits of 400-level VISA.

**VISA 580 (0) Major Essay**
M.F.A. only.

**VISA 581 (12) MFA Studio V**
*This course is not eligible for Credit/D/Fail grading.*

**VISA 582 (12) MFA Studio VI**
*This course is not eligible for Credit/D/Fail grading.*

**VISA 583 (3/6) d MFA Research Seminar**
*This course is not eligible for Credit/D/Fail grading.*

**VISA 590 (3-6) c Directed Studies in Visual Art**
Tutorial work in visual arts and theory arranged by permission with an individual faculty member. Not available to students enrolled in the M.F.A. program in Visual Arts. *This course is not eligible for Credit/D/Fail grading.*

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**Educational and Counselling Psychology, and Special Education, Faculty of Education**

**VRHC: Vocational Rehabilitation Counselling**

**VRHC 501 (3) Issues in Vocational Rehabilitation Counselling**
*This course is not eligible for Credit/D/Fail grading.*

**VRHC 502 (3) Medical Aspects of Disability**
*This course is not eligible for Credit/D/Fail grading.*

**VRHC 503 (3) Vocational Implications of Disability**
*This course is not eligible for Credit/D/Fail grading.*

*Corequisite:* VRHC 502.

**VRHC 504 (3) Job Development and Placement**
*This course is not eligible for Credit/D/Fail grading.*
VRHC 505 (3) Rehabilitation Literature and Applications to Practice
   This course is not eligible for Credit/D/Fail grading. Prerequisite: EPSE 481.

VRHC 507 (3/6) d Practicum
   This course is not eligible for Credit/D/Fail grading.

VRHC 508 (6) Internship
   This course is not eligible for Credit/D/Fail grading.

VRHC 510 (8) Vocational Evaluation Internship
   This course is not eligible for Credit/D/Fail grading.

VRHC 511 (3) Case and Disability Management
   This course is not eligible for Credit/D/Fail grading. Prerequisite: All of VRHC 501, VRHC 502. At least 3 credits of VRHC 502 is required.

VRHC 512 (3) Psychosocial and Vocational Aspects of Disability
   This course is not eligible for Credit/D/Fail grading. Prerequisite: All of VRHC 501, VRHC 502, VRHC 511.

VRHC 590 (0) Major Paper
   Pass/Fail.

VRHC 599 (6-12) d Thesis
   This course is not eligible for Credit/D/Fail grading.

Faculty of Applied Science

VURS: Visiting Undergraduate Research Students

VURS 499 (0) Visiting Undergraduate Students

Faculty of Forestry

WOOD: Wood Products Processing

WOOD 120 (3) Introduction to Wood Products and Global Trade
   Introduction to forestry, wood products industry, processes, products, markets and global trade policy issues affecting the wood industry. Not available for credit to students in the B.S.F. degree. [2-3]

WOOD 225 (3) Communications Strategies
   Strategies for thinking critically and writing effectively about topics that engage practitioners in Forestry, particularly in Wood Products Processing. Planning, drafting and editing of professional-quality documents for specialists and other stakeholders. Developing oral presentation skillsThis course is not eligible for Credit/D/Fail grading. [3-0-0]
   Prerequisite: Three credits of first-year English.

WOOD 244 (3) Quantitative Methods in the Wood Industry
   Solving practical problems in the wood industry using computer-based mathematical tools including spreadsheets, visual basic programming and relational database systems. [3-2-0]
   Prerequisite: One of MATH 101, MATH 103, MATH 105, MATH 121.

WOOD 245 (3) Programming for Wood Products Manufacturing Applications
   Practical computer and problem solving cases taken from wood products manufacturing industrial applications. [2-4-0]
   Prerequisite: WOOD 244.

WOOD 249 (1) Contemporary Topics in Forestry and Wood Products
   Seminars on current forestry and wood products topics. This course is not eligible for Credit/D/Fail grading. [1-0-0]

WOOD 271 (4) Wood Products Chemistry I
   Chemistry relating to wood and wood products: chemistry of lignin, cellulose, hemicelluloses, extractives, and biological degradation of lignocellulosics; wood pressure impregnation procedures. [3-3-0]
   Prerequisite: WOOD 280 and one of CHEM 113, CHEM 123.
WOOD 276 (3) Mechanics of Wood Products
Introduction to the strength of materials with emphasis on the elastic properties and ultimate strength of wood and wood products. [3-2-0]
Prerequisite: One of PHYS 101, PHYS 117, PHYS 170 and one of MATH 101, MATH 103, MATH 105, MATH 121.

WOOD 280 (3) Wood Anatomy and Identification
Introduction to tree growth; macroscopic and microscopic anatomy and identification of softwoods and hardwoods; descriptions of cell wall ultra-structure, wood variability and wood quality. [3-2-0]
WOOD 353 (2) Mill Site Visits
One week of on-site study of forest products manufacturing plants immediately following Spring examinations of second or third year. Representative sawmills, plywood mills, remanufacturing plants, particleboard manufacturers, pulp mills, laminated timber plants and wood preservation facilities in the Interior are studied. Fees will be assessed to meet expenses. This course is not eligible for Credit/D/Fail grading.

WOOD 356 (2) Machine Components
Machines used for wood products manufacturing, design, maintenance, purchasing. Selection of components including drives, bearings, brakes, clutches, fasteners, springs. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: WOOD 276.
Corequisite: WOOD 386.

WOOD 373 (3) Wood Adhesives and Coatings
Introduction to structure and properties of polymers and wood finishes; chemistry of adhesives and preservatives. [2-3-0]
Prerequisite: One of CHEM 113, CHEM 123.

WOOD 384 (3) Wood Sawmilling and Drying
Introduction to primary log breakdown systems and lumber material flow in modern sawmills and planermills. Lumber drying equipment and methods. [3-2]
Prerequisite: WOOD 282.

WOOD 386 (3) Applied Mechanics of Materials
Beam analysis, shaft analysis, columns, stress/strain transformations, thin-walled pressure vessels, material strength failure, criteria, fatigue, design and sizing, ISO standards. [2-2-0]
Prerequisite: WOOD 276.

WOOD 400 (3) Co-operative Work Placement
Approved and supervised work experience with a public or private organization for a minimum of 13 weeks full-time. Final work term assignment required. Restricted to students in the Co-operative Education Program in Wood Products Processing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Permission of the Co-op Coordinator.

WOOD 411 (3) Cooperative Work Placement IV
Approved and supervised work experience with a public or private organization for minimum of 13 weeks full-time. Final work term assignment required. Restricted to students in the Co-operative Education Program in Wood Products Processing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: WOOD 312.

WOOD 412 (3) Co-operative Work Placement V
Approved and supervised work experience with a public or private organization for minimum of 13 weeks full-time. Final work term assignment required. Restricted to students in the Co-operative Education Program in Wood Products Processing. This course is not eligible for Credit/D/Fail grading.
Prerequisite: WOOD 411.

WOOD 430 (3) Plant Layout and Design
Techniques for developing a plan, setting goals, and evaluating the impact of changes in the design, layout and operation of the factory with an emphasis on computer simulation.
Prerequisite: All of WOOD 290, WOOD 330, WOOD 485.

WOOD 440 (3) Engineering Economics
Use of engineering economics to evaluate investment proposals of an engineering nature, including decision making processes, time value of money, cash flow analysis, comparison methods, depreciation, replacement analysis, taxes, inflation and sensitivity analysis. [3-1]
Prerequisite: WOOD 330.

WOOD 449 (1-6) Directed Studies in Wood Products Processing
In special cases and with the approval of the instructor concerned, a student may carry on directed studies of specific problems in wood products processing.

WOOD 461 (3) Globalization and Sustainability
Examination of globalization and its impact on sustainability, including social, economic, and environmental aspects. [3-1]
Prerequisite: At least third-year standing.
WOOD 464 (4) Wood Finishing and Protection
Introduction to polymeric coatings and finishes used in the wood products industry; surface preparation, application equipment and properties of various coatings; wood deterioration and its protection for external applications. [1-3-2]
Prerequisite: All of WOOD 282, WOOD 305, WOOD 373.

WOOD 465 (3) Wood Industry Business Management
Business management concepts common in the forest products industry including marketing, customer research, product development and design. [3-0-2]

WOOD 474 (2) Wood Properties and Products Manufacturing
Wood moisture, density and strength properties; manufacturing processes for major forest products. [2-0-0]

WOOD 475 (3) Wood Properties, Identification and Uses
Elementary chemical, physical and mechanical properties of wood and their variations in relation to structure; identification by hand lens features; manufacture of lumber, pulp and composite wood products. Not available for credit to Wood Products Processing students. [3-2]

WOOD 476 (3) Design of Timber Structures
Design of timber structural elements using limit states design principles; joints and fasteners, sawn lumber and engineered wood products, light frame systems and shear walls. This course is not eligible for Credit/D/Fail grading. [3-0-0]
Prerequisite: One of WOOD 276, CIVL 230.
Equivalency: CIVL 439.

WOOD 478 (3) Building Science
Building enclosure design considering heat and moisture transmission, air flow and ventilation, condensation, acoustics; roofing systems; diagnostic evaluations; fire protection. [3-0-0]
Equivalency: CIVL 478.

WOOD 482 (4) CAD/CAM
Introduction to computer assisted design and manufacturing with a focus on the fundamental issues of geometry and machine tools including an understanding of standard computer tools. Applications to secondary wood products manufacturing. This course is not eligible for Credit/D/Fail grading. [3-4-0]
Prerequisite: All of WOOD 290, WOOD 292.

WOOD 485 (3) Furniture Construction
The theory and practice of modern construction techniques used in the manufacture of furniture and cabinets. [3-1]
Prerequisite: All of WOOD 292, WOOD 305.

WOOD 487 (3) Wood Composites
Physical, chemical and mechanical variables involved in adhesive bonding of composite wood products; characteristics of adhesives; plywood, composite wood panels, hardboard, medium density fibreboard, laminated wood and engineered lumber composites manufacturing processes; important physical and chemical properties of products. [2-3-0]
Prerequisite: WOOD 373.

WOOD 488 (3) Wood Products Design and Development I
Introduction to wood products design, from the product idea to the production-ready design. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: All of WOOD 305, WOOD 482, WOOD 485.

WOOD 489 (3) Wood Products Design and Development II
Design and fabrication of wood products. This course is not eligible for Credit/D/Fail grading. [2-2-0]
Prerequisite: WOOD 488 and a portfolio demonstrating competence in the operation of woodworking machinery.

WOOD 491 (3) Environmental Facilities Design
Introduction to pneumatic and hydraulic power, design and selection of waste recycling systems, boilers, energy generation and environmental legislation. [3-2]
Prerequisite: All of WOOD 225, WOOD 464.
Corequisite: WOOD 499.

WOOD 492 (3) Modeling for Decision Support
Applications of mathematical modeling, optimization, and simulation in forest planning and manufacturing; formulating models and interpreting results for decision support. [3-3]
Prerequisite: One of FRST 232, WOOD 245.
WOOD 493 (3) Project in Program Major
A report (approved by a faculty supervisor and the Program Director) based on either a technical description of a study, an extension of the senior co-op report, a detailed literature review, a research-based project, or a guided independent study developed by the student.
Prerequisite: Fourth-year standing

WOOD 494 (3) Principles of Wood Cutting and Tooling
Wood cutting fundamentals, chip formation, cutting conditions, cutting edge maintenance, sawing, planing and molding, veneer cutting, chipping, turning. [2-3-0]
Prerequisite: WOOD 356.

WOOD 499 (6) Wood Products Capstone
Development of a wood products manufacturing start-up company. Development of comprehensive business plan, marketing strategy, product design, equipment selection and justification, manufacturing plant layout, and economic analyses. This course is not eligible for Credit/D/Fail grading. [4-2-3]
Prerequisite: All of WOOD 440, WOOD 465 and fourth-year standing in Wood Products Processing.

Art Studies in Research and Writing, Faculty of Arts

WRDS: Arts Studies in Writing

WRDS 150 (3) Research and Writing in the Humanities and Social Sciences
Writing and reading in the social sciences and humanities, focusing on practices which the research disciplines share, and those which differentiate them. Credit will be granted for only one of WRDS 150 or ASTU 150. This course is not eligible for Credit/D/Fail grading.

WRDS 350 (3) Knowledge-Making in the Disciplines
An advanced scholarly research and writing course that allows students to build on their existing knowledge of academic research and writing practices by studying specific features of scholarly writing relevant to their own interests and disciplines. This course is not eligible for Credit/D/Fail grading.
Prerequisite: Restricted to Faculty of Arts students with 3rd-year standing.

Centre for Continuing Education

WRIT: University Writing Centre Courses

WRIT 098 (0) Preparation for University Writing and the LPI
WRIT 099 (0) Advanced Composition

Zoology, Faculty of Science

ZOOL: Zoology

All undergraduate courses in Zoology are listed under Biology.

ZOOL 500 (1-6) Directed Studies in Zoology
This course is not eligible for Credit/D/Fail grading.

ZOOL 502 (6) Ecology Seminar
This course is not eligible for Credit/D/Fail grading.

ZOOL 503 (6) Comparative Animal Physiology Seminar
This course is not eligible for Credit/D/Fail grading.

ZOOL 521 (6) Fisheries Biology and Management
This course is not eligible for Credit/D/Fail grading.

**ZOOL 522 (4) Limnology Seminar**
Offered in alternate years. This course is not eligible for Credit/D/Fail grading. Prerequisite: ZOOL 502.

**ZOOL 524 (3) Topics in Conservation Genetics**
This course is not eligible for Credit/D/Fail grading. Equivalency: CONS 501.

**ZOOL 527 (6) Theoretical Population Dynamics**
This course is not eligible for Credit/D/Fail grading. Corequisite: ZOOL 502.

**ZOOL 549 (18) M.Sc. Thesis**
This course is not eligible for Credit/D/Fail grading.

**ZOOL 553 (6) Workshop in Comparative and Environmental Physiology**
This course is not eligible for Credit/D/Fail grading.

**ZOOL 554 (3) Topics in Comparative and Environmental Physiology**
This course is not eligible for Credit/D/Fail grading.

**ZOOL 649 (0) Doctoral Dissertation**