



OKANAGAN

THE UNIVERSITY OF BRITISH COLUMBIA

# **UBC Okanagan**

# **ACADEMIC**

# **CALENDAR**

**2022/23**

[www.calendar.ubc.ca/okanagan](http://www.calendar.ubc.ca/okanagan)



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THE UNIVERSITY OF BRITISH COLUMBIA

## School of Engineering

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Other Graduate Programs (M.A.Sc., M.Eng., M.Des., Ph.D.)

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## Introduction

### *A School within the Faculty of Applied Science*

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The School of Engineering at the UBC Okanagan campus offers the Bachelor of Applied Science (B.A.Sc.) degree in Civil Engineering, Electrical Engineering, and Mechanical Engineering. Each program is accredited by the Canadian Engineering Accreditation Board. The School also offers a Bachelor of Applied Science (B.A.Sc.) degree in Manufacturing Engineering. Qualified applicants can be admitted directly from secondary school into Engineering One. Students may also enter the Engineering program after having successfully completed the equivalent of first-year Science. There are also admission routes via engineering transfer programs at various colleges and Engineering Bridge programs with Okanagan College and Camosun College.

Following entry from secondary school, the B.A.Sc. degree generally requires four or five years to complete.

The first-year program is common to all Engineering disciplines and lays the foundation for Engineering specializations in subsequent years. It is equivalent to first-year Engineering at the UBC Vancouver campus. The engineering-specific curriculum emphasizes project-based team learning, and offers first-year students the opportunity to implement the principles of engineering in a second-term design project. Upon successful completion of year one, students have the option of continuing at the UBC Okanagan campus in the second year of the integrated program or transferring to the UBC Vancouver campus. Students who elect to transfer compete for program spaces with students at the UBC Vancouver campus and limited seats are available.

Scheduled field trips and the activities of professional and technical societies complement the undergraduate programs, and students are expected to participate in them as fully as circumstances permit.

An optional Co-operative Education program, which integrates academic study with supervised work experience, is available during the second year.

## Bachelor of Applied Science Program

### Bachelor of Applied Science Program > Admission Requirements

Application for admission to the School of Engineering must be made through Enrolment Services. Procedures, policies, and admission requirements of UBC and the School of Engineering are specified in Admissions (<http://www.calendar.ubc.ca/okanagan/index> <http://www.calendar.ubc.ca/okanagan/index.cfm?tree=2,0,0,0>).



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Due to limited resources, the School has been authorized to restrict enrolment in year one and within individual Engineering programs at the second-year level. Attainment of the minimum academic requirements listed below implies that the applicant is eligible for selection, but does not provide assurance of admission. The selection is based on academic standing. For most Engineering programs, the competition for places is such that standing above the minimum prescribed requirements is necessary to ensure admission.

**Note:** proficiency in mathematics is an important part of preparing for Engineering courses. Experience has shown that UBC students with grades below 65% in mathematics (below B at a college) are likely to have difficulty with many Engineering courses.

### *Admission from BC/Yukon Grade 12 (or equivalent)*

In addition to satisfying University admission requirements, applicants must have completed mathematics, physics, and chemistry at the British Columbia Grade 12 level, or the equivalent. Students will be selected on the basis of their standing in Grade 12 courses in mathematics, chemistry, physics, and English. Applicants from schools where either Physics 12 or Chemistry 12 is not available may petition to be excused this deficiency.

### *Admission from a Post-Secondary Institution*

Applicants from another faculty at UBC or another post-secondary institution may be considered for admission to the School of Engineering. An overall average of at least 65%, including any failed courses, is required. The overall average is calculated in accordance with the general admission requirement for undergraduate admission as specified in Applicants from a College or University (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=2,344,0,0>).

Applicants must also have an average of at least 70% in all chemistry, mathematics, and physics courses that transfer to the first-year Engineering program. Courses to be considered in this average of mathematics, chemistry, and physics courses are not limited to the last 30 credits only. Where two courses, or one repeated course, have been taken which transfer to one of the courses of the first-year engineering program, only the grade of the latest course will be used in calculating this average.

Admission to the Engineering program is competitive. Applicants who meet all of these criteria are not guaranteed admission.

Applicants with fewer than 24 transferable credits from a post-secondary institution are evaluated against both secondary and post-secondary admission criteria.

Applicants with more than 24 credits that transfer to first-year Engineering may be eligible for second-year Engineering. Advice on transfer credit is available from the School of Engineering. Deficiencies from first year must be completed prior to graduation.

Students admitted to second year must complete a Second-Year Program Preference Form by June 15.

### *Admission from UBC Engineering Transfer Programs*

Students who have completed first-year Engineering at a college offering a UBC transfer program are eligible to be considered for admission to second-year Engineering provided that they have obtained an overall grade average of at least 65%.

### *Transition from UBC Vantage One Engineering*

The Faculty of Applied Science delivers engineering programs at both UBC campuses: Okanagan and Vancouver. The Faculty has reserved space for all UBC Vantage One Engineering students to be able to transition to a second year program. Half of the



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reserved spaces are located on the Okanagan campus, and the other half are located at the Vancouver campus.

UBC Vantage One Engineering students who pass all courses in the Engineering stream with an average of at least 60% will be eligible for year two of the B.A.Sc. degree program.

Program selection is competitive, and all students will be asked to rank both their preferred campus and their eligible program.

Academic performance at the end of the winter session and a personal statement are considered in placing students into programs in second year. Students who do not successfully complete the full UBC Vantage One Engineering or who achieve an average lower than 60% in the full program can apply to be reviewed on a case-by-case basis for evidence of academic promise for continued study in Engineering at UBC. Upon successful completion of the UBC Vantage One Engineering program, students will be eligible for second year standing. Additional program requirements (humanities elective or APSC 181, depending on program) that are normally completed in first year will not have been met and must also be completed prior to graduation. Students transferring into the second year of the Biomedical Engineering program who have not completed all required first year BME courses may be required to complete additional first year course work during second year. Eligible programs include: Okanagan Campus: Civil, Electrical, Manufacturing, and Mechanical Engineering. Vancouver Campus: Biomedical, Chemical, Chemical and Biological, Civil, Computer, Electrical, Engineering Physics, Environmental, Geological, Integrated, Manufacturing, Materials, Mechanical and Mining Engineering. Admission from Okanagan College Bridge Programs to Civil, Electrical, or Mechanical Engineering Students with a two-year diploma in Civil, Electronic, or Mechanical Engineering Technology from Okanagan College may be admitted to the second year of the B.A.Sc. program upon successful completion of the corresponding Okanagan College Engineering Bridge program. Students must successfully complete an Engineering Technology program with a minimum graduating grade average of 80%. Students must also successfully complete the corresponding Engineering Bridge program with a minimum grade of 60% in each course, and a minimum average of 70% in all courses other than University Writing (ENGL 100). Admitted students will be required to take UBC Okanagan courses from a list provided by the School of Engineering to fulfill B.A.Sc. degree requirements. Typically, students admitted from each Engineering Bridge program will require two and a half years of additional study at UBC Okanagan to complete B.A.Sc. degree requirements. Admission from Camosun College Engineering Bridge Programs to Civil or Mechanical Engineering Students with a two-year diploma in Civil or Mechanical Technology may be admitted to the third year of the B.A.Sc. program in Civil Engineering or Mechanical Engineering upon successful completion of an Engineering Bridge program offered by Camosun College. Students must achieve a minimum of 60% in each course and a minimum average of 65% on all courses to be considered for admission to the B.A.Sc. program. Admitted students will be required to take additional UBC Okanagan campus courses from a list provided by the School of Engineering to fulfill B.A.Sc. degree requirements. Typically, students admitted from a Camosun College Engineering Bridge program will require two and a half years of additional study at the UBC Okanagan campus to complete the B.A.Sc. degree requirements. Admission Following Two-Year Technology Diploma Programs Not Including Bridge Programs Students are eligible to be considered for admission if they have completed an appropriate two-year technology diploma program with an overall average of at least 70%. Admission is normally into first-year Engineering, unless the student has completed an approved Engineering bridge program.

Bachelor of Applied Science Program > Academic Advising

Academic advising is available through Engineering Advising. Engineering Advising assists students in academic planning, interpreting Faculty course requirements and regulations, and resolving academic and personal problems.

Bachelor of Applied Science Program > Academic Regulations

Dean's Honour List Students in any Winter Session with a sessional average of at least 80% while taking 30 or more credits will receive the notation "Dean's Honour List" on their record. Degree with Distinction A student will be granted a degree with distinction upon graduation if he or she achieves an overall average of at least 80% on all 200-level and higher courses while registered in the B.A.Sc. program. Student Classification The required courses and electives for the Winter Session are shown in the following sections. The normal completion time is four to five years. Students may take higher loads than those shown below with the approval of the Dean's Office. To be considered full time, students must carry a credit load in the Winter Session equal to at least 80% of the standard credit load for the year and program in which they are registered. Note: The Faculty's definition of full-time status may differ from that of the Student Financial Assistance and Awards office in determining eligibility for financial assistance. Check with Student Services and Financial Support (http://www.calendar.ubc.ca/okanagan/index.cfm?tree=6,308,1006,(#14205) to ensure eligibility for scholarships and awards. Students with approval for a Winter Session credit load less than that required for full-time status will be considered part time. Part-time students will not normally be eligible for scholarships or for "Degree with Distinction" status. Students taking courses from more than one year level will normally be given academic year status based on the program year of the majority of credits being taken. Examinations Examinations are held in December and in April. In any course that includes both lecture and laboratory work, students must complete the laboratory assignments with satisfactory standing before being admitted to the written examination of the course, and must pass in the material of both components before standing will be granted in the subject. The minimum passing mark in each course is 50%. Applications for special consideration for examinations missed due to a medical condition, emotional or other problems, or religious observance must be submitted to the Engineering Student Services office before or immediately after the missed examination(s). For more information, see Academic Concession (Calendar page: http://127.0.0.1/okanagan/index.cfm?tree=3,48,0,(#11831). Advancement To pass the year, students must obtain an overall average of at least 55% in the Winter Session, and a pass in 65% of credits taken. Students who fail a year will be required to discontinue studies in the School for at least one year, but are eligible to apply for readmission after that year. Students who fail a second time will be required to withdraw. In a failed year, students will be granted credit for all courses passed. Students who withdraw during Term 2 of Winter Session after obtaining less than 55% on the December examinations will not be readmitted for the following Winter Session, but are eligible to apply for readmission after that year. Progression requirements are governed by the following:

<b>First Year</b>	0-27 credits
<b>Second Year</b>	28-63 credits
<b>Third Year</b>	64-99 credits
	Pass APSC 176 (or equivalent)
	Pass APSC 169 (or equivalent)
<b>Fourth Year</b>	100+ credits
	Pass APSC 201 (or equivalent)
	Pass APSC 258 (or equivalent)

Students must pass APSC 176 (or equivalent) and APSC 169 (or equivalent) prior to promotion to third year. Students must pass APSC 201 (or equivalent) and APSC 258 (or equivalent) prior to promotion to fourth year. In addition, to be promoted to the subsequent year, students must have completed all courses from the prior year and at least 27 credits from the current year term essays and examination papers may be refused a passing mark if they are noticeably deficient in English. Supplemental Examinations There are no supplemental examinations for courses offered within the Faculty, with the exception of final year of study. Note: supplemental examinations may not be offered in all courses. At the discretion of the faculty, a supplemental exam may be granted to a student for a 300-level course, provided that the course is the last remaining course required for degree completion. Supplemental examinations are available only to students who have passed their year. Students must have failed a course but received a final grade of at least 40% in order to be eligible to write a supplemental examination in that course. Supplemental examinations are only offered during the deferred/supplemental examination period. Supplemental examinations for courses terminating in December will normally be made available to students only during the supplemental examination period in July-August. Appeals Current students may appeal year standing decisions to the Faculty of Applied Science Committee on Admissions, Standing, and Courses. Applications for readmission from non-current students should be directed to Enrolment Services. Field Trips Students who are required to participate in field trips will be responsible for expenses incurred during such trips.

Bachelor of Applied Science Program > Degree Requirements

Students will be granted a B.A.Sc. degree only after obtaining credit for all courses listed in the program of study for a given Engineering program. This requirement will normally be met by completing four Winter Sessions with full credit load (five Winter Sessions if completing the Co-operative Education program). With the approval of the Dean's Office, students may be allowed to study on a part-time basis. Credit will be granted for courses completed during the Summer Session. Students transferring into the program may be granted transfer credit if they have completed courses of equivalent content. Elective Courses in Engineering Note: enrolment in elective courses offered by the School may be restricted. English Requirement The School of Engineering recognizes that good communication skills in English are essential to the understanding of course material and to the successful practice of engineering. To qualify for the B.A.Sc., students must complete APSC 176 and APSC 201 (or the equivalent). Complementary Studies Courses Students must take complementary studies courses totalling at least 21 credits. The minimum requirements are as follows:

- Professional Development - ENGR 413: Law and Ethics for Engineers (3 credits);
- Communication - APSC 176: Engineering Communication (3 credits) and APSC 201: Technical Communication (3 credits);
- Impact of Technology on Society - APSC 169: Fundamentals of Sustainable Engineering Design (3 credits);
- Management - ENGR 303: Engineering Project Management (3 credits);
- Engineering Economics - ENGR 305: Engineering Economic Analysis (3 credits);
- Humanities and Social Sciences electives (3 credits). In general, scientific geography courses, statistical courses, and studio/performance courses in visual arts, music, and theatre will not satisfy this requirement. Courses that teach language skills are not acceptable. Suggested subjects include Anthropology, Art History, Cultural Studies, Economics, English (not ENGL 109, 112, 114), Geography (GEOG 128 or 129), Health Studies (HEAL 100), History, Indigenous Studies, Philosophy (not PHIL 120 or 125), Political Science, Psychology, and Sociology.

Details of the specific courses conforming to the above requirements are available from Engineering Advising. Minors and Options Students can earn a minor and/or option by applying for and being admitted into the specific minor and/or option. Please refer to the individual minor and option program descriptions for course and credit requirements. Upon successful completion of a minor and/or option program, a notation will be added on the student's transcript. Students are limited to a maximum of one option and one minor. Double Counting of Credits in Program Requirements and Minors and Options: Students enrolled in a minor and/or an option are permitted to double count a limited number of credits between the program requirements and the minor or option requirements.

Bachelor of Applied Science Program > Years 1 and 2

First Year Students admitted into the Engineering program directly from secondary school will take the first-year Engineering curriculum. Other students will need to contact Engineering Advising for advice on their first-year program. Students proceeding to second year will have the option of continuing their Engineering program at the UBC Okanagan campus in Civil Engineering, Electrical Engineering, Manufacturing Engineering or Mechanical Engineering, or transferring to the UBC Vancouver campus into one of the following programs: Biomedical Engineering, Chemical and Biological Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Physics, Geological Engineering, Integrated Engineering, Manufacturing Engineering, Materials Engineering, Mechanical Engineering, or Mining Engineering. Admission to a selected program is dependent on performance in first year.

APSC 169	Fundamentals of Sustainable Engineering Design	3
APSC 171	Engineering Drawing and CAD/CAM	3
APSC 172	Engineering Analysis I	3



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APSC 173	Engineering Analysis II	3
APSC 176	Engineering Communication	3
APSC 177	Engineering Computation and Instrumentation	3
APSC 178	Electricity, Magnetism, and Waves	4
APSC 179	Linear Algebra for Engineers	3
APSC 180	Statics	3
APSC 181	Dynamics	3
APSC 182	Matter and Energy I	3
APSC 183	Matter and Energy II	3
Total Credits		37

\*Criteria must be met and include completion of 37 credits of first year UBC Okanagan Campus Applied Science. The admission process is competitive, with limited seats available. Second Year

APSC 201	Technical Communication	3
APSC 246	System Dynamics	3
APSC 248	Engineering Analysis III	3
APSC 252	Thermodynamics	3
APSC 254	Instrumentation and Data Analysis	3
APSC 256	Numerical Methods for Analysis <sup>1</sup>	3
APSC 258	Applications of Engineering Design <sup>1</sup>	3
APSC 259	Materials Science I	3
APSC 260	Mechanics of Materials I	3

Humanities/Social Sciences Elective

<sup>2</sup> 2 Program Specific Courses

<sup>6</sup> Total Credits 36 <sup>7</sup> Students pursuing the Manufacturing Program will take MANF 230 Manufacturing Engineering Laboratory, MANF 270 Production Systems Management I and COSC 210 Software Construction in place of APSC 256 and 258. <sup>8</sup> In general, scientific geography courses, statistical courses, and studio/performance courses in fine arts, music, and theatre will not satisfy this requirement. Courses that teach language skills are not acceptable. See Complementary Studies Courses (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,317,989,1187#13653>). Students in the Manufacturing Program will normally take their humanities elective in their 4th year. <sup>9</sup> Students pursuing the Civil Program will take APSC 253 Fluid Mechanics I and APSC 261 Theory of Structures. Students pursuing the Electrical Program will take APSC 255 Electric Circuits and Power and APSC 262 Digital Systems Design. Students Pursuing the Mechanical Program will take APSC 253 Fluid Mechanics I and APSC 255 Electric Circuits and Power.

Bachelor of Applied Science Program > Civil Engineering

In the third year and fourth years, students will follow a program in Civil Engineering, Electrical Engineering, Manufacturing Engineering, or Mechanical Engineering.

ENGR 303	Engineering Project Management	3
ENGR 305	Engineering Economic Analysis	3
ENGR 325	Civil Engineering Materials	3
ENGR 327	Reinforced Concrete Design I	3
ENGR 330	Optimization and Decision Analysis for Civil Engineering	3
ENGR 331	Infrastructure Management I	3
ENGR 332	Surveying and GIS Analysis	3
ENGR 335	Transportation Engineering	3
ENGR 340	Soil Mechanics	3
ENGR 341	Engineering Hydrology	3
ENGR 342	Open Channel Flow	3
ENGR 347	Environmental Engineering	3
Total Credits		36

ENGR 413	Law and Ethics for Engineers	3
ENGR 440	Foundation Engineering	3
ENGR 447	Design of Processes for Water and Wastewater Treatment	3
ENGR 499	Engineering Capstone Design Project	6

Design Electives

<sup>3</sup> Technical Electives

<sup>12</sup> Total Credits 36 <sup>1</sup> To be chosen from a list of Civil Engineering design elective courses provided by the School of Engineering. <sup>2</sup> To be chosen from a list of technical elective courses provided by the School of Engineering. Up to two third- or fourth-year courses offered outside the School of Engineering may qualify as technical electives with permission from Civil Program Chair. Resilient Infrastructure Management Option Available to Civil students, the Resilient Infrastructure Management Option (RIM) will equip engineering students with the state-of-the-art skills, theories, and design methodologies they need to work in different capacities with municipalities, consultants and governments. Application to the RIM Option is open to students in year 3 and above in the Bachelor of Applied Science program specializing in Civil Engineering. Applications for admission must be made through the Engineering Advising Office by May 31st. Enrollment in this option is limited so admission is competitive based on GPA. The RIM Option under Civil Engineering requires the following courses:

- Required 4th year courses (as listed above) and Elective requirements:
  - ENGR 424 Smart Cities
  - ENGR 432 Infrastructure Management II
  - 6 credits of Design Electives and 3 credits of Technical Electives from a list of RIM Elective choices.

Note that it is the student's responsibility to ensure that the electives chosen meet the program requirements for design and technical elective graduation requirements. The option consists of a typical third year, followed by a set of prescribed fourth year courses. Entry into and continuation in the Option requires that the student remains in Good Standing. Upon successful completion of the option, the notation "Resilient Infrastructure Management Option" will be added on the student's transcript. Electives to be chosen from a list of approved RIM Option courses provided by the School of Engineering.

Bachelor of Applied Science Program > Electrical Engineering



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In the third year and fourth years, students will follow a program in Civil Engineering, Electrical Engineering, Manufacturing Engineering, Mechanical Engineering.

ENGR 303	Engineering Project Management	3
ENGR 305	Engineering Economic Analysis	3
ENGR 315	Systems and Control / MANF 386 <sup>1</sup> Industrial Automation	3
ENGR 320	Electromechanical Devices	3
ENGR 350	Linear Circuit Theory	3
ENGR 351	Microelectronics I	3
ENGR 353	Semiconductor Devices	3
ENGR 359	Microcomputer Engineering	3
ENGR 360	Engineering Probability and Statistics	3
ENGR 361	Signals and Communication Systems	3
ENGR 362	Digital Signal Processing I	3
ENGR 365	Engineering Electromagnetics	3
<b>Total Credits</b>		<b>36</b>

ENGR 413	Law and Ethics for Engineers	3
ENGR 451	Microelectronics II	3
ENGR 499	Engineering Capstone Design Project	6

**Design Electives**

12 Technical Electives

12 Total Credits 36<sup>2</sup> Seats available in MANF 386 are limited, with priority given to Manufacturing Engineering students and students in the Mechatronics Option. Students in the Mechatronics Option must take MANF 386. <sup>2</sup> To be chosen from a list of Electrical Engineering design elective courses provided by the School of Engineering. <sup>3</sup> To be chosen from a list of technical elective courses provided by the School of Engineering. Up to two third- or fourth-year courses offered outside the School of Engineering may qualify as technical electives with permission from the Electrical Program Chair. Biomedical Option Available to Mechanical and Electrical students, the Biomedical Option allows students interested in biomedical Engineering and wearable technology to have courses focused in these areas. Application to the Biomedical Option is open to students who have completed the first or second year of the Bachelor of Applied Science program and are starting year 2 or year 3 in the next academic year specializing in Mechanical or Electrical Engineering. Applications for admission must be submitted to the Engineering Advising Office by May 31st. Enrollment in this option is limited and admission will be competitive based on GPA. The Biomedical Option under Electrical Engineering requires the following courses:

- APSC 193 Anatomy and Physiology for Engineers
- Required 4th year courses (as listed above) and:
  - ENGR 401 Biinstrumentation
  - ENGR 402 Biotechnology: Fundamentals and Applications
  - ENGR 406 Microelectromechanical Systems
  - ENGR 423 Wearables
  - ENGR 450 Clinical Engineering
  - ENGR 482 Biomedical Engineering I
  - ENGR 499 Engineering Capstone Project – Biomedical Project

Note that it is the student's responsibility to ensure that the electives chosen meet the program graduation requirements for design and technical electives. The option consists of typical years one to three, followed by a set of prescribed fourth year courses with one additional required course (APSC 193) beyond the Bachelor of Applied Science degree. Students may encounter difficulty fitting these courses into their schedule. Careful planning is essential and completion of the Option may require a summer session or an additional term of study. Entry into and continuation in the Option require that the student remain in Good Standing. Upon successful completion of the option, the notation "Biomedical Option" will be added to the student's transcript. Mechatronics Option Available to Mechanical, Manufacturing, and Electrical students, the Mechatronics Option allows students interested in electromechanical systems integrated with embedded electronics, sensors, actuators, and related systems to have a course focus in these areas. Application to the Mechatronics Option is open to students who have completed the first or second year of the Bachelor of Applied Science program and are starting year 2 or year 3 in the next academic year specializing in Mechanical or Electrical Engineering. Applications for admission must be made through the Engineering Advising Office by May 31st. Admission will be competitive based on GPA and enrollment in this option is limited. The Mechatronics Option under Electrical Engineering requires the following courses:

- COSC 121 and COSC 222
- MANF 386
- Required 3rd and 4th year courses (as listed above) and Elective requirements:
  - 12 credits of Design Electives & 12 credits of Technical Electives from a list Mechatronics Elective choices, including mandatory courses ENGR 480, MANF 486.<sup>3</sup>

Note that it is the student's responsibility to ensure that the electives chosen meet the program requirements for design and technical elective graduation requirements.

Students may encounter difficulty fitting these 2 Computer Science (COSC) courses into their schedule. Careful planning is essential and completion of the Option may require a summer session or additional term of study beyond that required to complete the Bachelor of Applied Sciences degree alone.

Entry into and continuation in the Option requires that the student remains in Good Standing. Upon successful completion of the option, the notation "Mechatronics Option" will be added on the student's transcript.

**Bachelor of Applied Science Program > Manufacturing Engineering**

*Manufacturing Engineering*

Program Overview

In the second, third and fourth years, students will follow a program in Manufacturing Engineering.

The mission of the MANF program is to provide engineers with the technical and managerial skills required for sought-after careers in the domain of advanced design and manufacturing.

Program Requirements

APSC 201 Technical Communication	3
APSC 246 System Dynamics	3
APSC 248 Engineering Analysis III	3
APSC 252 Thermodynamics	3
APSC 253 Fluid Mechanics I	3
APSC 254 Instrumentation and Data Analysis	3
APSC 255 Electric Circuits and Power	3
APSC 259 Materials Science I	3
APSC 260 Mechanics of Materials I	3
COSC 210 Software Construction or COSC 222 Data Structures <sup>1</sup>	4
MANF 230 Manufacturing Engineering Laboratory	4
MANF 270 Production Systems Management I	3
<b>Total Credits:</b>	<b>38</b>



ENGR 305 Engineering Economic Analysis	3
ENGR 320 – Electromechanical Devices	3
ENGR 376 Materials Science II	3
ENGR 381 Kinematics and Dynamics of Machinery	3
ENGR 387 Vibration of Mechanical Systems	3
ENGR 439 Manufacturing Processes II	3
ENGR 476 Mechanics of Materials II	3
COSC 310 Software Engineering	3
MANF 330 Manufacturing Engineering Project I	6
MANF 368 Engineering Measurements and Instrumentation	3
MANF 370 Production Systems Management II	3
MANF 386 Industrial Automation	3
<b>Total Credits:</b>	<b>39</b>

ENGR 413 Law and Ethics for Engineers	3
MANF 430 Manufacturing Capstone Design Project	6
MANF 450 Life Cycle Analysis and Sustainability	3
MANF 455 Factory Planning	3
MANF 460 Supply Chain Tactics and Strategies	3
MANF 465 Digital Enterprise	3
MANF 470 Production Systems Management III	3
Technical Electives <sup>2</sup>	9
Humanities/Social Sciences Elective <sup>3</sup>	3
<b>Total Credits:</b>	<b>36</b>

<sup>1</sup> COSC 222 is accepted in lieu of COSC 210 but requires other prerequisites.

<sup>2</sup> To be chosen from a list of Manufacturing Engineering elective courses provided by the School of Engineering.

<sup>3</sup> In general, scientific geography courses, statistical courses, and studio/performance courses in fine arts, music, and theatre will not satisfy this requirement. Courses that teach language skills are not acceptable. See [Complementary Studies Courses](#)

Contact Information

School of Engineering  
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(250)-807-8723  
Engineering.okanagan@ubc.ca

Bachelor of Applied Science Program > Mechanical Engineering

In the third year and fourth years, students will follow a program in Civil Engineering, Electrical Engineering, Manufacturing Engineering, or Mechanical Engineering.

ENGR 303	Engineering Project Management	3
ENGR 305	Engineering Economic Analysis	3
ENGR 310	Fluid Mechanics II	3
ENGR 315	Systems and Control; OR MANF 386 <sup>1</sup> Industrial Automation	3
ENGR 320	Electromechanical Devices	3
ENGR 375	Energy System Design	3
ENGR 376	Materials Science II	3
ENGR 377	Manufacturing Processes	3
ENGR 380	Design of Machine Elements	3
ENGR 381	Kinematics and Dynamics of Machinery	3
ENGR 385	Heat Transfer Applications	3
ENGR 387	Vibration of Mechanical Systems	3
Total Credits		36

ENGR 413	Law and Ethics for Engineers	3
ENGR 476	Mechanics of Materials II	3
ENGR 499	Engineering Capstone Design Project	6

<sup>1</sup> Technical Electives<sup>2</sup>: 12 Total Credits 36 - Seats available in MANF 386 are limited, with priority given to Manufacturing Engineering students and students in the Mechanical Engineering design elective courses provided by the School of Engineering. <sup>2</sup> To be chosen from a list of Mechanical Engineering design elective courses provided by the School of Engineering. <sup>3</sup> To be chosen from a list of technical elective courses provided by the School of Engineering. Up to two third- or fourth-year courses offered outside the School of Engineering may qualify as technical electives with permission from the Mechanical Program Chair. <sup>4</sup> To meet graduation requirements, students must take at least one of ENGR 491: Computational Fluid Dynamics or ENGR 492: Finite Element Methods as part of the 4th year elective requirements. Bio Biomedical Option Available to Mechanical and Electrical students, the Biomedical Option allows students interested in biomedical Engineering and wearable technology to have courses focused in these areas. Application to the Biomedical Option is open to students who have completed the first or second year of the Bachelor of Applied Science program and are starting year 2 or year 3 in the next academic year specializing in Mechanical or Electrical Engineering. Applications for admission must be submitted to the Engineering Advising Office by May 31st. Enrolment in this option is limited and admission will be competitive based on GPA. The Biomedical Option under Mechanical Engineering requires the following courses:

- AFSC 193 Anatomy and Physiology for Engineers
- Required 4th year courses (as listed above) and:
  - ENGR 351 Microelectronics I
  - ENGR 401 Bioinstrumentation
  - ENGR 402 Biotechnology: Fundamentals and Applications
  - ENGR 406 Microelectromechanical Systems
  - ENGR 423 Wearables
  - ENGR 450 Clinical Engineering



- ENGR 482 Biomedical Engineering I
- ENGR 499 Engineering Capstone Project – Biomedical Project

Note that it is the student's responsibility to ensure that the electives chosen meet the program graduation requirements for design and technical electives. The option consists of typical years one to three, followed by a set of prescribed fourth year courses with one additional required course (APSC 193) beyond the Bachelor of Applied Science degree. Students may encounter difficulty fitting these courses into their schedule. Careful planning is essential and completion of the Option may require a summer session or an additional term of study. Entry into and continuation in the Option require that the student remain in Good Standing. Upon successful completion of the option, the notation "Biomedical Option" will be added to the student's transcript. The Mechanical/Electrical Option Available to Mechanical and Electrical students, the Mechatronics Option allows students interested in electromechanical systems integrated with embedded electronics, sensors, actuators, and related systems to have a course focus in these areas. Application to the Mechatronics Option is open to students who have completed the first or second year of the Bachelor of Applied Science program and are starting year 2 or year 3 in the next academic year specializing in Mechanical or Electrical Engineering. Applications for admission must be made through the Engineering Advising Office by May 31st. Admission will be competitive based on GPA and enrollment in this option is limited. The Mechatronics Option under Mechanical Engineering requires the following courses:

- COSC 121 and COSC 222
- MANF 386
- Required 3rd and 4th year courses (as listed above) and Elective requirements:
  - 12 credits of Design Electives and 12 credits of Technical Electives from a Mechatronics Elective choices, including mandatory courses ENGR 359, 480, MANF 486.

Note that it is the student's responsibility to ensure that the electives chosen meet the program requirements for design and technical elective graduation requirements. Students may encounter difficulty fitting these 2 Computer Science (COSC) courses into their schedule. Careful planning is essential and completion of the Option may require a summer session or additional term of study beyond that required to complete the Bachelor of Applied Sciences degree alone. Entry into and continuation in the Option requires that the student remains in Good Standing. Upon successful completion of the option, the notation "Mechatronics Option" will be added on the student's transcript. Electives to be chosen from a list of approved Mechatronics Option courses provided by the School of Engineering.

### Bachelor of Applied Science Program > Minor in Arts

This minor consists of courses in the Faculty of Arts and Social Sciences and the Faculty of Creative and Critical Studies that are for credit toward a B.A. degree and must consist of 18 upper-level credits. The School of Engineering will provide a list of eligible course codes with some exemptions outlined. All courses must be acceptable for a B.A. Students should design a coherent and academically sound plan of studies for the proposed minor based on their interests and goals, considering desired upper level courses and their prerequisites when choosing lower-level courses. Students will likely need to take additional lower-level courses to complete the Minor. Minor in Arts courses may be used to fulfill the Humanities/Social Sciences Elective program requirement. Application to the Minor in Arts is open to all students eligible for admission to the Bachelor of Applied Science program. Admission will be based on sessional average in conjunction with a statement of intent to be submitted at the time of application. Enrollment in the program is limited. Applications for admission must be made through Engineering Academic Services by May 31. Students might encounter difficulty fitting the courses for the Minor into their program timetable; careful planning is essential, and completion of the Minor program will likely require an additional term or terms beyond that required to complete the B.A.Sc. degree alone. Space in many courses is limited. Admission to the minor does not guarantee access to courses required for the minor. To accommodate scheduling conflicts students may take courses in the Summer Session. Entry into and continuation in the Minor requires that the student remains in Good Standing. Upon successful completion of the Minor program, the notation "Minor in Arts" will be added on the student's transcript.

### Bachelor of Applied Science Program > Minor in Computer Science

Application to the Minor in Computer Science is open to all students eligible for at least second-year standing in the Bachelor of Applied Science program. Admission will be competitive based on sessional average. Enrollment in the program is limited. Applications for admission must be made through the Engineering Advising Office by May 31st. Students might encounter difficulty fitting the courses for the Minor into their program timetable; careful planning is essential, and completion of the Minor program will likely require an additional term or terms beyond that required to complete the B.A.Sc. degree alone. To accommodate scheduling conflicts students are encouraged to consider taking COSC courses in the Summer Session. The minor consists of 30 credits: 12 lower-level and 18 upper-level COSC credits, with any necessary prerequisites.

- The 12 lower level credits will consist of the following foundation courses: COSC 111, COSC 121, and two other COSC courses of the student's choosing.
- No more than six COSC upper-level credits may be counted toward the technical elective requirements for the B.A.Sc.

Course planning as early as first year may be advisable in order to complete the Minor in a timely fashion. Entry into and continuation in the Minor requires that the student remains in Good Standing. Upon successful completion of the Minor program, the notation "Minor in Computer Science" will be added on the student's transcript. Note: Space in many courses is limited. Admission to a computer science minor does not guarantee access to courses agreed upon for the minor.

### Bachelor of Applied Science Program > Minor in Management

Students desiring a stronger foundation in management and/or entrepreneurship are encouraged to consider the Minor in Management. Upon successful completion of this minor program, the notation "Minor in Management" will be placed on the student's transcript. Enrollment in this program is limited. Applications for admission must be made to the Engineering Advising Office by May 31. For an application to be considered, the student must be eligible for at least second year standing in the School of Engineering with a sessional average of at least 75% in the previous academic year. Meeting the stated minimum requirements does not guarantee admission into the minor. Admission will be based on GPA in conjunction with a statement of intent to be submitted at the time of application. The minor consists of 21 credits:

- 3 credits: MGMT 100
- 18 credits: 400-level MGMT Courses (Prerequisite Courses may be required but will not count toward the 18 credits)
- Up to one MGMT course MAY be counted toward the B.A.Sc. technical elective requirement upon approval from the program coordinator.

Entry into and continuation in the Minor requires that the student remains in Good Standing. Students might encounter difficulty fitting the courses for the Minor into their program timetable; careful planning is essential, and completion of the Minor program will likely require an additional term beyond that required to complete the B.A.Sc. degree alone. Note: Space in many courses is limited. Admission to the minor does not guarantee access to courses agreed upon for the minor.

### Bachelor of Applied Science Program > Co-operative Education Program

The Engineering Co-operative Education program provides motivated and qualified students workshops, coaching and support, including the employer job posting system, to search and secure paid, program monitored work experience, which is directly related to their academic program. Through participation in the job search and work term co-op students gain valuable skills that can assist them in their academic program and their future employment. Total enrollment is limited. The Engineering Co-op program is an optional, year-round program that normally requires completion of a minimum of four work terms including one work term in either of Term 1 or Term 2 of a Winter session. To remain in the Co-op program students must continue to meet the co-op requirements, including academic, and be eligible for advancement in their academic program. Students must end their degree program on an academic term. The Co-op Program requires an additional year to complete the Bachelor of Applied Science requirements. Students intending to enter the Co-op program normally apply between the end of first year, May, and beginning of second year, September. Application at the beginning of third year may also be possible. Specific application process and deadlines are available from the Co-op Program. Co-op coordinators conduct student-employer visits during each work term, assist in workplace learning, and provide advice on the written or oral assignments that are a requirement of the program for each work term. Students who wish to be considered for the Engineering Co-op program must meet all requirements of the School and will be selected on the basis of academic performance, written and oral communication skills, and general suitability for the work environment. Total enrollment is limited. Subject to the current state of the market as well as the resourcing to support coaching and job development. Acceptance into the program does not guarantee students employment in each work term. Students who are accepted to the Engineering Co-op Program are required to accept and comply with the Program's Terms & Conditions (refer to [coop.engineering.ubc.ca](http://coop.engineering.ubc.ca)) and are required to pay the co-op administration and workshop fees (see Program and Course Fees) upon admission. For each work term, students securing a confirmed position will be registered in the appropriate 6-credit co-op course and will be required to pay the co-op course (see Program and Course Fees) and related fees. Students are unable to withdraw from the co-op work term course without permission of the Co-op Program. In order to graduate with the Co-operative Education designation, a student must have satisfactorily completed the required number of work terms, in addition to the normal academic requirements of their discipline. Co-operative education course credits cannot be used in lieu of or to complement academic course credits required. Transfer Students: Normally, students transferring from other institutions may be given credit for work terms completed at their former institution, if they meet the following requirements:

- they have been accepted into the Engineering Co-op program;
- the program in which the work term was undertaken is accredited;
- the work term is officially recognized (i.e., noted on the transcript) by the institution where the work term originated; and
- the work term was granted for experience in the same or similar discipline into which they are transferring.

Regardless of the number of work terms accepted, students will be required to complete at least 50% of the required work terms in the new program into which they are transferring. Acceptance into a co-op program at one institution does not guarantee acceptance into UBC's Co-op Program. Application for transfer of work terms must be made in writing to the Co-operative Education program prior to undertaking any additional work terms at UBC. For more information please visit <http://coop.engineering.ubc.ca/>.

### Bachelor of Applied Science Program > Dual Degree Program Option: Bachelor of Applied Science and Master of Management

This dual degree program option offers qualified students the opportunity to earn, in one program of study, an undergraduate B.A.Sc. degree from the School of Engineering and a M.M. degree from the Faculty of Management. This dual degree program option can be completed in four and one half years through intensive study and scheduling that includes one summer of study following the completion of their undergraduate program requirements. During the period of undergraduate study, admitted students are required to complete MGMT 110 Introduction to Business and MGMT 111 Introduction to Management Thought and Social Responsibility and at least two intensive, week-long workshops. The workshops are offered over summer terms, are self-contained, and can be completed in any order. Workshops will focus on personal development, and enable critical thinking on equity, inclusion, diversity, enculturation, emotional intelligence, social interaction, metacognition, research, inquiry, sensibility, sustainability, well-being, communication, and presentation. These workshops will emphasize social and economic issues in ways that link theory and practice. Additional fees are required for the dual degree program option. Further information is available in Faculty of Management (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,287,1108,0>) section of the Academic Calendar.

### Bachelor of Applied Science Program > Undergraduate Certificate in Communications and Rhetoric

Available to all students in the Bachelor of Applied Science program offered by the Faculty of Applied Science. Consult the Faculty of Creative and Critical Studies for information on the Undergraduate Certificate in Communications and Rhetoric (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,283,1107,0>).

### Master of Engineering Leadership in Resource Engineering Management (M.E.L. in R.E.M.)

The objective of this program is to meet an identified need to educate engineers with a unique combination of leadership and strong technical, multi-disciplinary knowledge applicable to the resource engineering sector. This program is suited to students who wish to pursue their education in Resource Engineering Management beyond the undergraduate level, but who do not wish to pursue a thesis research program. This is not the appropriate program to pursue for applicants who are considering taking a Doctor of Philosophy (Ph.D.) in the future. The completion time for this program is 12 months. Note: Completion of this degree alone does not form an acceptable basis for application to associations of professional engineers in Canada or other associated professional organizations. Admission Requirements: The program is governed by the general graduate guidelines of the College of Graduate Studies' standards for admission of students. Students admitted to the M.E.L. degree will normally possess a bachelor's degree in engineering or



a related area, with a minimum GPA of B+ (76%). Minimum English language requirements for the M.E.L. program include a TOEFL score of 580 (PBT) or 92 (BT) (higher than the College of Graduate Studies minima) or an IELTS minimum overall band of 6.5 (with nothing less than 6.0 per individual test). Relevant professional experience is considered a significant asset and should be normally a minimum of 3 years. Applicants holding a four-year bachelor's degree who do not meet the admissions minima, but who have had sufficient formal training and relevant professional experience to offset the academic deficiency, may be granted admission on the recommendation of the Associate Director of Graduate Studies in the School of Engineering Program. Requirements for this program require the completion of 30 credits. This includes 12 credits of Professional Platform Courses, 12 credits of Technical Pillar Compulsory Courses and 6 credits of Technical Pillar Electives. Platform refers to foundational coursework focused on the professional skills required for an experienced graduate to be an effective professional leader. These courses are common across many of the Applied Science Professional Master's programs. The Pillar contains the relevant technical material and is equivalent to a specialization. For further information on the program, please see Master of Engineering Leadership in Resource Engineering Management. (<http://apsccp.ubc.ca/programs/mel/resource-engineering-management>)

**Other Graduate Programs (M.A.Sc., M.Eng., M.Des., Ph.D.)**

Information on the Master of Applied Science (M.A.Sc.) (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,285,981,1163>), the Master of Engineering (M.Eng.) (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,285,981,1164>), the Master of Design (M.Des.) (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,285,1112,0>) and the Doctor of Philosophy (Ph.D.) (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=18,285,981,1166>) programs can be found under the College of Graduate Studies.

**Professional Associations**

The right to practice engineering and accept professional responsibility in Canada is limited to those who are registered Professional Engineers. Registration is overseen by the 12 provincial and territorial engineering regulatory bodies that regulate the engineering professions in Canada. During the period between graduation and registration, the graduate who intends to practice in BC should be enrolled with Engineers and Geoscientists British Columbia as an "Engineer in Training."

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