FACULTY OF APPLIED SCIENCE
SCHOOL OF ENGINEERING

Mechanical Engineering
Advising Sheet 2025W

All courses required for the Bachelor of Applied Science in Mechanical Engineering are below. Students are advised to take 6 courses per term to complete their degree in 4 years or 5 courses per term to complete in 5 years. Full course descriptions can be found here. Course vectors, prerequisites (in red), and corequisites (in orange) are included. Review this document thoroughly annually, particularly the 4th year electives starting on Page 2 & 3, which change year to year.

4-year plan | **5-year plan**

	Term 1	Term 2	
Year 1 of 4	**APSC_O 169** Fundamentals of Sustain. Eng. Design [3-2-0]	**APSC_O 173** Engineering Analysis II [3-0-1] *APSC_O 172*	Year 1 of 5
	APSC_O 172 Engineering Analysis I [3-0-1]	**APSC_O 177** Engineering Computation and Instrumentation [3-2*-0][1]	
	APSC_O 179 Linear Algebra for Engineers [3-0-0]	**APSC_O 178** Electricity, Magnetism, and Waves [3-0-1] *APSC_O 172, 173*	
	APSC_O 180 Statics [3-0-2] *APSC_O 179*	**APSC_O 181** Dynamics [3-0-2] *APSC_O 172, 180, 173*	
	APSC_O 182 Matter and Energy I [2-2*-2*]	**APSC_O 183** Matter and Energy II [2-2*-2*]	
	APSC_O 176 Engineering Communication [3-0-0]	**APSC_O 171** Engineering Drawing and CAD/CAM [3-0-2]	
Year 2 of 4	**APSC_O 246** System Dynamics [3-0-1] *APSC_O 173, 179, 181*	**APSC_O 201** Technical Communication [3-0-0] *APSC_O 176*	Year 2 of 5
	APSC_O 248 Engineering Analysis III [3-0-1] *APSC_O 173*	**APSC_O 253** Fluid Mechanics I [3-2*-1] *APSC_O 180, 181, 248*	
	APSC_O 252 Thermodynamics [3-0-1] *APSC_O 173, 182*	**APSC_O 255** Electric Circuits and Power [3-2*-1] *APSC_O 178*	
	APSC_O 259 Materials Science I [3-2*-0] *APSC_O 182, 183*	**APSC_O 260** Mechanics of Materials I *[3-0-1] APSC_O 173, 180*	
	APSC_O 254 Instrumentation and Data Analysis [3-2*-1] *APSC_O 173, 178*	**APSC_O 258** Applications of Eng. Design [3-1-0] *APSC_O 169, 177, 179, 254*	
	APSC_O 256 Numerical Methods for Analysis [3-1-0] *APSC_O 173, 177, 179*	*Humanities Elective*	
Year 3 of 4	**ENGR_O 310** Fluid Mechanics II [3-2*-1] *APSC_O 253*	**ENGR_O 315** Systems and Control [3-2*-1] *APSC_O 246*	Year 3 of 5
	ENGR_O 376 Materials Science II [3-0-0] *APSC_O 259*	**ENGR_O 320** Electromechanical Devices [3-2*-1] *APSC_O 255*	
	MANF_O 377 Manufacturing Processes [2-3*-1] *APSC_O 259, 260*	**ENGR_O 305** Engineering Economic Analysis [3-0-0] *2nd yr. standing*	
	ENGR_O 303 Engineering Project Management [3-0-0] *APSC_O 169, 201*	**ENGR_O 385** Heat Transfer Applications [3-2*-1] *APSC_O 248, 252*	Year 4 of 5
	ENGR_O 381 Kinematics and Dynamics of Machinery [3-0-1] *APSC_O 181*	**ENGR_O 375** Energy System Design [3-0-1] *APSC_O 252, 253*	
	ENGR_O 387 Vibration of Mechanical Systems [3-0-1] *APSC_O 246*	**ENGR_O 380** Design of Machine Elements [3-0-1] *APSC_O 260*	
Year 4 of 4	**ENGR_O 476** Mechanics of Materials II [3-0-0] *APSC_O 260*	*Design / Technical Elective*	Year 5 of 5
	Design / Technical Elective (see next page)	*Design / Technical Elective*	
	Design / Technical Elective	**ENGR_O 413** Law and Ethics for Engineers [3-0-0] *Fourth-year standing*	
	Design / Technical Elective	*Design / Technical Elective*	
	ENGR_O_O 492 Finite Element Methods [2, 3] [3-0-0] *Fourth-year standing*	**ENGR_O_O 491** Computational Fluid Dynamics [2, 3] [3-0-0] *ENGR_O 310*	
	ENGR_O 499 Engineering Capstone Design Project [2-3-0; 0-6-0] *Fourth-year standing*		

Edited June 12, 2025

[1] COSC_O 111 can be substituted for APSC_O 177 for students planning to pursue the Minor of Computer Science. COSC_O 111 will count towards the Minor requirements and the program requirements.
[2] One of ENGR_O 491 or ENGR_O 492 must be completed to meet degree requirements.
[3] If *both* are taken in 2025W, ENGR_O 491 will count towards the technical elective program requirement. If ENGR_O 491 and/or ENGR_O 492 were completed prior to 2025W, refer to the corresponding advising sheet.

Fourth Year Guide 2025W

Mechanical Engineering Fourth Year Curriculum:

ENGR_O 413 Law and Ethics for Engineers (Term 2) *Fourth-year standing*	3 credits
ENGR_O 476 Mechanics of Materials II (Term 1) *APSC_O 260*	3 credits
One of:[2, 3] ENGR_O 491 Computational Fluid Dynamics (Term 2) *ENGR_O_O 310* OR ENGR_O 492 Finite Element Methods (Term 1) *Fourth-year standing*	3 credits
ENGR_O 499 Engineering Capstone Design Project (Terms 1&2) *Fourth-year standing*	6 credits
Electives[4]	21 credits

[4] See full elective criteria below.

Design Electives (DE)

Mechanical students must choose **at least 9 credits (3 courses)** of the design electives listed below.

Design electives all must have 50% engineering design content, as defined by the Canadian Engineering Accreditation Board (CEAB) and are taught by specific faculty who are licensed as Professional Engineers (P.Eng) in Canada. These courses can only be taken at UBC Okanagan.

Term 1

ENGR_O 401 Bioinstrumentation [3-2*-0] *APSC_O 254*
ENGR_O 458 Power Electronics [3-2*-0] *ENGR_O 320*
ENGR_O 480 Modern Control [3-0-0] *ENGR_O 315*
ENGR_O 485 Heating, Ventilating, and Air Conditioning [3-0-0] *APSC_O 253, 258, ENGR_O 385*

Term 2

ENGR_O 406 Microelectromechanical Systems [3-2*-0] *Fourth-year B.A.Sc. standing*
ENGR_O 456 Electrochemical Energy Storage Systems [3-0-0] *APSC_O 252, 259*
ENGR_O 467 Real-Time and Embedded System Design [3-2*-0] *ENGR_O 359*
ENGR_O 469 Polymer Engineering [3-0-0] *APSC_O 259, 260*
ENGR_O 479 Measurement Principles in Thermal-Fluids [3-0-0] *ENGR_O 310, 385*
ENGR_O 481 Mechatronics [3-2*-0] *ENGR_O 315, 320*
ENGR_O 482 Biomedical Engineering I [3-0-0] *Fourth-year standing*
ENGR_O 497 Combustion Processes [3-0-0] *ENGR_O 310, 375*
MANF_O 465 Digital Enterprise [3-2-0] *MANF_O 386 or CMPE_O 386*

ENGR_O 407 Inclusive Design [3-2-0] Third-year standing* ***Offered Summer 2025*** *as a* ***Design Elective***

Technical Electives (TE)

Mechanical students may choose **up to 12 credits (4 courses)** of the technical electives below, ensuring a total of 21 credits (7 courses) of design electives (at least 3 courses), technical electives, and alternative electives.

Technical electives must be relevant to mechanical engineering and contain at least 50% engineering science content, as defined by the Canadian Engineering Accreditation Board (CEAB). These courses can only be taken at UBC Okanagan, UBC Vancouver (via Cross-campus Registration with approval), or internationally via Go Global (with approval).

Term 1

ENGR_O 402 Biotechnology: Fundamentals and Applications [3-0-0] *Third-year standing*
ENGR_O 408 Energy System Transition [3-2*-0] *ENGR_O 320*
ENGR_O 409 Construction Digitalization and Informatics [3-0-0] *ENGR_O 303 or MANF_O 470*
ENGR_O 418 Applied Machine Learning for Eng. [3-0-0] *Fourth-year standing*
ENGR_O 475 Materials Selection and Design [3-0-1*] *ENGR_O 376*
ENGR_O 478 Alternative Energy Systems [3-0-0] *ENGR_O 375, 385*
ENGR_O 484 Heat and Mass Transfer [3-0-0] *ENGR_O 310, 385*
ENGR_O 489 Multicriteria Optimization & Design of Exp. [3-2*-0] *Fourth-year standing*
ENGR_O 493 Intro. to Aerodynamics and Aircraft Design [3-0-0] *ENGR_O 310*
CMPE_O 386 Industrial Automation [3-2-0] *APSC_O 177* [5]
MANF_O 460 Supply Chain Tactics and Strategies [3-0-0] *Fourth-year standing*

Term 2

ENGR_O 400 Applied Machine Vision for Engineers [3-0-0] *Fourth-year standing*
ENGR_O 450 Clinical Engineering [3-2*-0] *ENGR_O 401*
ENGR_O 454 Motor Drive Systems [3-2*-0] *ENGR_O 320*
ENGR_O 477 Aircraft Propulsion [3-0-0] *ENGR_O 310*
ENGR_O 486 Robot Modelling and Control [3-0-0] *ENGR_O 315*
ENGR_O 487 Digital Control [3-0-0] *ENGR_O 315*
ENGR_O 494 Autonomous Vehicle Technology [3-1-0] *ENGR_O 480*
ENGR_O 495 Tissue Engineering [3-0-0] *Fourth-year standing*
MANF_O 378 Advanced Manufacturing [3-0-0] *MANF_O 377*
MANF_O 450 Lifecycle Analysis and Sustainability [3-0-0] *Fourth-year standing*

ENGR_O 498A Global Seminar: China [3-0-0] ***Offered Summer 2025*** *as a* ***Technical Elective***

[5] Students who took MANF_O 386 before 2023W do not need to take ENGR_O 315 to fulfill program or previous Mechatronics Concentration requirements and these students cannot count MANF_O 386 as a technical elective. Students who took MANF_O 386 or CMPE_O 386 in 2023W or later are required to take ENGR_O 315 to fulfill program requirements and MANF_O/CMPE_O 386 will be counted as a technical elective. Students cannot receive credit for both CMPE 386 and MANF 386.

Alternative Electives

Mechanical students may choose **up to 6 credits (2 courses)** of the below, ensuring a total of 24 credits (8 courses) of design electives (at least 4 courses), technical electives, and alternative electives.

Alternative electives must be complementary to mechanical engineering and must be advanced level (3rd or 4th year courses). These courses can only be taken at UBC Okanagan, UBC Vancouver (via Cross-campus Registration with approval) or internationally via Go Global (with approval).

Other APSC_O, CMPE_O, ENGR_O, or MANF_O 3XX or 4XX courses.[6] In particular, the following courses are valid alternative electives:

ENGR_O 351 Microelectronics I *(Biomedical Concentration elective choice)*
ENGR_O 359 Microcomputer Engineering *(Mechatronics Concentration elective choice)*
ENGR_O 405 Engineering Leadership ***Offered Summer 2025***
ENGR_O 453 Internet of Things *(Mechatronics Concentration elective choice)*
ENGR_O 411 Technology Entrepreneurship for Engineers

Graduate courses (APSC_O 5XX, ENGR_O 5XX):[7]

Courses outside of SOE (non-APSC_O/CMPE_O/ENGR_O/MANF_O courses):[8]

[6] Registration in such courses is subject to prerequisite requirements (or prerequisite waiver approval if the prerequisite requirements are not met).
[7] For courses cross-listed as undergraduate (400 level) and graduate (500 level) courses, you must register in the undergraduate version. To be considered for registration in a graduate course, you must have completed at least half of required 300- and 400- level courses (at least 36 credits) with a minimum average of 80% in those courses, completed all prerequisites, and obtained permission from the course instructor. If you meet the criteria, you must complete the Registration Waiver Request to be registered in a graduate course.

[8] If you are missing the course's prerequisite(s), you need to complete the registration waiver process for the external course's instructor/department. The School of Engineering cannot register you in external courses. If you would like to request permission to take a course outside of SOE as an alternative elective, please contact soe.academicservices@ubc.ca and include a course syllabus. It will be reviewed by the Mechanical Engineering Program Chair.

Aerospace Concentration students, please review pg. 4 of this document carefully.
Biomedical Concentration students, please review pg. 5 of this document carefully.
Mechatronics Concentration students, please review pg. 5 of this document carefully.

***Notes**

- **Graduation: In your final year, you are required to apply for graduation, even if you don't plan on attending the ceremony.** If you intend to graduate, you must apply to graduate by the deadline. Students are responsible for taking the correct courses to fulfill degree requirements and to apply for graduation before the deadline.
    - Once you are registered in the final courses for your degree, you are strongly encouraged to request an update to your Academic Progress Report by the Engineering Academic Services team so you can see whether you are fulfilling all requirements by filling out the APR Update Request.
- Courses:
    - The 4th year advising sheet changes annually. Courses offered this year may not be offered in subsequent years. If a course switches between design and technical elective designations between years, the student should refer to the sheet from the year the course was taken to know how it will be used to fulfill their degree requirements.
    - Courses are subject to minimum and maximum enrolments. The School of Engineering reserves the right to cancel a course if the minimum enrolment is not met. If a course is cancelled, you will be notified via e-mail. Check the UBC Student Service Centre to see the course availability.
    - Depending on the level of engineering design and the assigned instructor, the classification of a course as either a design elective or a technical elective is subject to change.
    - Course descriptions, with prerequisites, can be found on the Academic Calendar. In case of conflict between the information in this sheet and the calendar, the calendar takes precedence: https://okanagan.calendar.ubc.ca/course-descriptions-0

For inquiries regarding registration or academic advising, contact an Academic and Career Advisor
Mechanical Engineering Program Chair: Dr. Dean Richert: dean.richert@ubc.ca

Aerospace Concentration

The Aerospace Concentration is available for mechanical engineering students interested in aerospace engineering. There is information on Concentrations on the Academic Calendar and the School of Engineering website. Concentrations do not have enrolment caps and students must declare their Concentration themselves in Workday before submitting their application for graduation.

The Aerospace Concentration requires completion of 12 credits of the following electives. These electives will be counted towards the requirements of the Bachelor of Applied Science in Mechanical Engineering AND the Aerospace Concentration if completed before graduation.

Take
ENGR_O 493 Introduction to Aerodynamics and Aircraft Design **(TE)**
AND
Choose 3 of the below:
ENGR_O 449 Aircraft Structures **Not offered in 2025W**
ENGR_O 477 Aircraft Propulsion **(TE)**
ENGR_O 479 Measurement Principles in Thermal-Fluids **(DE)**
ENGR_O 480 Modern Control **(DE)**
ENGR_O 491 Computational Fluid Dynamics
ENGR_O 492 Finite Element Methods

ENGR_O 497 Combustion Processes **(DE)**
MANF_O 496 Aerospace Materials and Manuf. Processes **Not offered in 2025W**

The student is responsible for ensuring that electives chosen meet the Mechanical Engineering program requirements for design (9 credits) and technical courses (12 credits). Note also the restriction on no more than 6 credits of alternative electives. If the student opts into the concentration before submitting the application to graduate and successfully completes the concentration requirements, the notation "Aerospace Concentration" will be included on the student's transcript.

Biomedical Concentration

The Biomedical Concentration is available for mechanical engineering students interested in biomedical engineering and wearable technology. There is information on Concentrations on the Academic Calendar and the School of Engineering website. Concentrations do not have enrolment caps and students must declare their Concentration themselves in Workday before submitting their application for graduation.

The Biomedical Concentration requires completion of 12 credits of the following electives. These electives will be counted towards the requirements of the Bachelor of Applied Science in Mechanical Engineering AND the Biomedical Concentration if completed before graduation.

Choose 4 of the below:
ENGR_O 351 Microelectronics I (Alternative Elective)[9]
ENGR_O 401 Bioinstrumentation **(DE)**
ENGR_O 402 Biotechnology: Fundamentals and Applications **(TE)**
ENGR_O 406 Microelectromechanical Systems **(DE)**
ENGR_O 407 Inclusive Design (DE) ***Offered 25S Only***
ENGR_O 423 Wearable Devices **Not offered in 2025W**
ENGR_O 450 Clinical Engineering **(TE)**
ENGR_O 482 Biomedical Engineering I **(DE)**
ENGR_O 495 Tissue Engineering **(TE)**
ENGR_O 498P Biophotonic Engineering **Not offered in 2025W**

[9] *ENGR_O 351 (if selected) will count as an Alternative Elective (see Page 3) Students are limited to no more than 6 credits of these courses (see Page 3)*

The student is responsible for ensuring that electives chosen meet the Mechanical Engineering program requirements for design (9 credits) and technical courses (12 credits). Note also the restriction on no more than 6 credits of alternative electives. If the student opts into the concentration before graduation and upon successful completion of the concentration requirements, the notation "Biomedical Concentration" will be included on the student's transcript.

Mechatronics Concentration

The Mechatronics Concentration is available for mechanical engineering students interested in electromechanical systems integrated with embedded electronics, sensors, actuators, and related systems. There is information on Concentrations on the Academic Calendar and the School of Engineering website. Concentrations do not have enrolment caps and students must declare their Concentration themselves in Workday before submitting their application for graduation.

The Mechatronics Concentration requires completion of 15 credits of the following credits. COSC_O 121, COSC_O 222 (required in addition your degree requirements) must be taken and 9 credits from the electives below. The electives will be counted towards the requirements of the Bachelor of Applied Science in Mechanical Engineering AND the Mechatronics Concentration if completed before graduation.

Take:
COSC_O 121 Computer Programming II
COSC_O 222 Data Structures

AND

Choose 3 of the below:

ENGR_O 359 Microcomputer Engineering (Alternative Elective)[10]
ENGR_O 406 Microelectromechanical Systems **(DE)**
ENGR_O 418 Applied Machine Learning for Engineers **(TE)**
ENGR_O 453 Internet of Things (Alternative Elective)[10]
ENGR_O 454 Motor Drive Systems **(TE)**
ENGR_O 456 Electrochemical Energy Storage **(DE)**
ENGR_O 458 Power Electronics **(DE)**
ENGR_O 467 Real-Time and Embedded System Design **(DE)**
ENGR_O 480 Modern Control **(DE)**
ENGR_O 481 Mechatronics **(DE)**
ENGR_O 486 Robot Modelling and Control **(TE)**
ENGR_O 487 Digital Control **(TE)**
ENGR_O 494 Autonomous Vehicle Technology **(TE)**
CMPE_O 386 Industrial Automation[11] **(TE)**
MANF_O 465 Digital Enterprise **(DE)**
MANF_O 486 Mechatronic Systems Laboratory[12] **Not offered in 2025W**

[10] ENGR_O 359 and 453 will count as an Alternative Elective (see Page 3) Students are limited to no more than 6 credits of these courses (see Page 3)

[11] Students who take MANF_O 386 or CMPE_O 386 in 2023W or later may count it as one of their Mechatronics Electives. If taken prior to that, it is being counted towards the ENGR_O 315 requirement and cannot be used towards the Mechatronics Concentration or towards the Technical Elective degree requirements. Students cannot receive credit for both CMPE 386 and MANF 386.

The student is responsible for ensuring that electives chosen meet the Mechanical Engineering program requirements for design (9 credits) and technical courses (12 credits). Note also the restriction on no more than 6 credits of alternative electives. If the student opts into the concentration before graduation and upon successful completion of the concentration requirements, the notation “Mechatronics Concentration” will be included on the student’s transcript.