MECHANICAL ENGINEERING, B.SC.

Degree Requirements

Mechanical Engineering Departmental Program

Course	Title	Hours
Students must complete the Preliminary Engineering Program requirements for graduation.		37.5
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 3000	Engineering Economics	3
ENG 3020	Technology, Society and the Future	3
ENG 2030	Engineering Communication: Strategies for the Profession	3
or ENG 2040	Engineering Communication: Strategies, Practice and Design	
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MATH 3132	Engineering Mathematical Analysis 3	3
MECH 2112	Fundamentals of Mechanical and Computer Aided Design	5
MECH 2150	Mechanical Engineering Modelling and Numerical Methods	4
MECH 2202	Thermodynamics	4
MECH 2222	Mechanics of Materials	4
MECH 2262	Fundamentals of Fluid Mechanics	4
MECH 2272	Engineering Materials 1	4
MECH 3170	Project Management	4
MECH 3212	Electromechanical System Design	4
MECH 3420	Vibrations and Acoustics	4
MECH 3430	Measurements and Control	4
MECH 3460	Heat Transfer	4
MECH 3482	Kinematics and Dynamics	4
MECH 3492	Fluid Mechanics and Applications	4
MECH 3502	Stress Analysis and Design	4
MECH 3542	Engineering Materials 2	4
MECH 3652	Machine Design	4
MECH 3982	Mechanical Laboratories in Solid Mechanics	2
MECH 3992	Mechanical Laboratories in Thermofluids	2
MECH 4860	Engineering Design	5
PHYS 1070	Physics 2: Waves and Modern Physics	3
STAT 2220	Contemporary Statistics for Engineers	3
Five Technical Electives (TE) [1, 2]		20-22
One Course from the list of Indigenous Knowledge Courses [3]		3
Total Hours		**163-165**

Note: The former CHEM 1310 may be used in lieu of the combination of CHEM 1110 and CHEM 1126.

Indigenous Knowledge Courses[4]

Course	Title	Hours
INDG 1200	Indigenous Peoples in Canada	6
INDG 1220	Indigenous Peoples in Canada, Part 1	3
INDG 1240	Indigenous Peoples in Canada, Part 2	3
INDG 2012	Indigenous History in Canada	6
or HIST 2010	Indigenous History in Canada (C)	
INDG 2020	The Métis in Canada	3
or HIST 2020	The Métis in Canada (C)	
POLS 2802	Introduction to Indigenous Politics	3

1. A minimum of 20 credit hours of technical electives is required with 18 hours required if completing MECH 4162 (5 courses at 4 credit hours each or 3 courses at 4 credit hours each plus MECH 4162 at 6 credit hours).
2. For courses continuing through both terms, credit is given on completion of course
3. Students admitted to Mechanical Engineering in Fall 2021 who have completed two complementary studies elective courses prior to admission to the program, may use on of those courses in place of the Indigenous knowledge course. A complementary studies course is any course from the Faculty of Arts or the Faculty of Management at the 1000 level or above, with the exception of ARTS 1110 Introduction to the University which may not be used for credit in the Price Faculty of Engineering.
4. Student must select one course from the list of Indigenous Knowledge Courses

Concentrations

Aerospace Option

Complete all 3 TEs in List A. Choose the remaining two TEs from List B. Some courses in List B will be offered in alternating years.

List A

Course	Title	Hours
MECH 3520	Aerodynamics	4
MECH 4182	Aerospace Structures: Analysis and Design	4
MECH 4192	Aerospace Materials and Manufacturing Processes	4

List B

Course	Title	Hours
MECH 4200	Gas Turbine Propulsion Systems	4
MECH 4452	Aircraft Performance, Dynamics and Design	4
MECH 3582	Manufacturing Planning and Quality Control	4
MECH 4482	Applied Aerospace Instrumentation	4
MECH 4432	Systems Engineering	4
ENG 4110	Operational Excellence	4

Aerospace Stream

Choose 3 TEs from the following 5 courses. Choose the remaining two TEs from the same stream, other TEs, or thesis. Some courses will be offered in alternating years.

Course	Title	Hours
MECH 3520	Aerodynamics	4
MECH 4182	Aerospace Structures: Analysis and Design	4

MECH 4192	Aerospace Materials and Manufacturing Processes	4
MECH 4200	Gas Turbine Propulsion Systems	4
MECH 4452	Aircraft Performance, Dynamics and Design	4

Manufacturing Stream

Choose three (3) technical electives from the following courses. Some courses may be offered in alternate years.

Course	Title	Hours
MECH 3550	Robotics and Computer Numerical Control	4
MECH 3570	Manufacturing Automation	4
MECH 3582	Manufacturing Planning and Quality Control	4
MECH 3592	Simulation Modeling and Facility Planning	4
MECH 4192	Aerospace Materials and Manufacturing Processes	4
MECH 4330	Contemporary Topics in Manufacturing Engineering 1	4
MECH 4342	Contemporary Topics in Manufacturing Engineering II	4

Materials Stream

Choose 3 from the following 5 courses. Choose the remaining two TEs from the same stream, other TEs, or thesis. Some courses will be offered in alternating years.

Course	Title	Hours
MECH 4192	Aerospace Materials and Manufacturing Processes	4
MECH 4350	Topics in Engineering Material 1	4
MECH 4360	Topics in Engineering Materials 2	4
MECH 4620	Corrosion of Metals and Alloys	4
MECH 4870	Fracture and Failure of Engineering Materials	4

Solid Mechanics Stream

Choose 3 from the following 6 courses. Choose the remaining two TEs from the same stream, other TEs, or thesis. Some courses will be offered in alternating years.

Course	Title	Hours
MECH 4182	Aerospace Structures: Analysis and Design	4
MECH 4472	Mechanical Vibration	4
MECH 4510	Fundamentals of Finite Element Analysis	4
MECH 4532	Advanced Strength of Materials	4
MECH 4550	Noise Control	4
MECH 4672	Advanced Mechanism Design	4

Thermofluids Stream

Choose 3 from the following 8 courses. Choose the remaining two TEs from the same stream, other TEs, or thesis. Some courses will be offered in alternating years.

Course	Title	Hours
MECH 4292	IC Engines	4
MECH 4412	Heating, Ventilation and Air Conditioning	4
MECH 4560	Selected Topics in Fluid Mechanics 4M	4
MECH 4680	Energy Conservation and Utilization	4
MECH 4692	Renewable Energy	4
MECH 4694	Advanced Topics in Heat Transfer	4
MECH 4702	Design of Thermal Systems	4
MECH 4822	Numerical Heat Transfer in Fluid Flow	4

Technical Electives in Mechanical Engineering [1]

Course	Title	Hours
MECH 3520	Aerodynamics	4
MECH 3550	Robotics and Computer Numerical Control	4
MECH 3562	Introduction to Optimization	4
MECH 3570	Manufacturing Automation	4
MECH 3582	Manufacturing Planning and Quality Control	4
MECH 3592	Simulation Modeling and Facility Planning	4
MECH 4162	Thesis [2]	6
MECH 4182	Aerospace Structures: Analysis and Design	4
MECH 4192	Aerospace Materials and Manufacturing Processes	4
MECH 4200	Gas Turbine Propulsion Systems	4
MECH 4240	Course no longer offered	4
MECH 4292	IC Engines	4
MECH 4310	Contemporary Topics in Mechanical Engineering 1	4
MECH 4322	Contemporary Topics in Mechanical Engineering II	4
MECH 4330	Contemporary Topics in Manufacturing Engineering 1	4
MECH 4342	Contemporary Topics in Manufacturing Engineering II	4
MECH 4350	Topics in Engineering Material 1	4
MECH 4360	Topics in Engineering Materials 2	4
MECH 4412	Heating, Ventilation and Air Conditioning	4
MECH 4432	Systems Engineering	4
MECH 4452	Aircraft Performance, Dynamics and Design	4
MECH 4472	Mechanical Vibration	4
MECH 4482	Applied Aerospace Instrumentation	4
MECH 4510	Fundamentals of Finite Element Analysis	4
MECH 4532	Advanced Strength of Materials	4
MECH 4542	Principles of Turbomachinery	4
MECH 4550	Noise Control	4
MECH 4560	Selected Topics in Fluid Mechanics 4M	4
MECH 4582	Vehicle Testing, Condition Monitoring, and Fault Analysis	4
MECH 4620	Corrosion of Metals and Alloys	4
MECH 4672	Advanced Mechanism Design	4
MECH 4680	Energy Conservation and Utilization	4
MECH 4692	Renewable Energy	4
MECH 4694	Advanced Topics in Heat Transfer	4
MECH 4702	Design of Thermal Systems	4
MECH 4812	Automotive Engineering	4
MECH 4822	Numerical Heat Transfer in Fluid Flow	4
MECH 4832	Biomaterials in Biomedical Engineering	4
MECH 4870	Fracture and Failure of Engineering Materials	4
MECH 4900	Mechatronics System Design	4

[1] The Department of Mechanical Engineering may not be able to offer all technical electives listed above. Students are urged to consult the Mechanical Engineering office for a current list of technical electives.
[2] Students must be in their graduating year to register for MECH 4162.
[3] Students may NOT use the same technical elective to count toward multiple streams.

Preliminary Engineering Program

Campus Address/General Office: E2-262 EITC
Telephone: (204) 474 9167
Email Address: eng.info@umanitoba.ca (eng_info@umanitoba.ca)
Website: umanitoba.ca/engineering (https://umanitoba.ca/engineering/)

The Preliminary Engineering Program is common to all programs in engineering. Students must complete a minimum of eight (**excluding CHEM 1122**) to be eligible to apply to one of the five degree granting engineering programs. A student must complete the following list of 13 courses as part of their engineering program in order to graduate with a BSc degree in engineering.

Course	Title	Hours
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics [1]	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1 [1]	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra [2]	3
MATH 1510	Applied Calculus 1 [3]	3
MATH 1710	Applied Calculus 2 [3]	3
PHIL 1290	Critical Thinking [4]	3
PHYS 1050	Physics 1: Mechanics	3
Written English Course [5,6]		3
Total Hours		**37.5**

[1] The former CHEM 1300 may be used in lieu of the combination of CHEM 1100 and CHEM 1122.
[2] MATH 1300 is not an acceptable equivalent to MATH 1210.
[3] Students intending to obtain a degree in Engineering are strongly advised to complete MATH 1510 and MATH 1710. However, MATH 1500 or MATH 1230 may be taken in lieu of MATH 1510; MATH 1700 or MATH 1232 may be taken in lieu of MATH 1710. MATH 1524 is not an acceptable equivalent to MATH 1510.
[4] PHIL 1290 is the recommended complementary studies elective. Students may; however, select any course from the Faculties of Arts or Management (Asper School of Business) at the 1000 level or above, except for ARTS 1110.
[5] Course selected from the list of approved Written English Courses for Engineering students.
[6] Three credit hours are required to satisfy the Written English course requirement. Should a student complete a six credit hour course, the additional three credit hours may be used to satisfy general complementary studies requirements within a student's program.
[7] Equivalent courses offered through Université de Saint-Boniface may be used to satisfy program requirements.

Co-operative Education and Industrial Internship Programs

Contact and Program Information

Director: Carolyn Geddert, P.Eng., Engineer-in-Residence
Tel. 204 474 8948
Email: carolyn.geddert@umanitoba.ca
Cooperative Education Administrator: Megan Johnson
Telephone: 204 480 1069
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The Price Faculty of Engineering offers a Co-operative education and Industrial Internship Program (Co-op/IIP) designed to complement and enrich the academic program with work experience. The work terms provide students with practical experience, assistance in financing their education, and guidance for future career specialization.

Applications are accepted for Co-op/IIP every fall. Co-op/IIP supports the application and participation of all students who meet the requirements and wish to apply. Application to Co-op/IIP is a process. The Co-op/IIP Office will work with you. Please connect with our staff via email: engineeringcoop@umanitoba.ca and refer to the web site (https://umanitoba.ca/engineering/co-operative-education/) for the benefits of Co-op/IIP.

Successful applicants to Co-op/IIP have:

- Attended an information session.
- Been accepted as an undergraduate student into an Engineering Department.
- Completed all 13 Preliminary Engineering Program courses before their first work term.
- Completed 42 credit hours towards your degree by the end of the Fall term. Students must return for at least one academic term following the completion of their final work term placement. (Application early in a student's degree program will support the completion of 3 work terms.)
- Been assessed as in Good Academic standing (GPA above 2.0). I.E. not on Probation or Academic Warning.
- Agree to follow all rules and regulations of the program as detailed in the Rules and Regulations

Work placements must be confirmed to be appropriate by the Co-op/IIP office in order be credited as a Co-op/IIP work term.

Upon securing a job placement, Engineering students enroll in the course ENG 4800 and subsequently the specific work term of employment ENG 4810, ENG 4820, ENG 4830, ENG 4840.

Students who are unable to maintain the standards of the Co-op/IIP will be transferred back into the regular program.

The course and grade requirements for completion of the Co-op/IIP are the same as those required for the regular program. However, in order to satisfy course prerequisite requirements, timetables may differ from the regular program. Co-op/IIP students are evaluated in the same manner

as regular students and all rules and regulations of the Price Faculty of Engineering apply.

Students who are placed on Academic Probation may either be removed from Co-op/IIP or have their acceptance deferred until they have completed two consecutive terms with an Academic Standing of "Satisfactory".

Students who are Required to Withdraw will immediately become ineligible for Co-op/IIP and will remain ineligible after re-instatement to the Price Faculty of Engineering.

Written reports must be completed at the end of each four-month work term. Each successfully completed four-month work term and its corresponding report receives a Pass/Fail grade and is rated at one credit hour. Graduates who successfully complete at least three work terms and the required work term reports will have the Co-operative Education Option acknowledged on their B.Sc. graduation parchment.

For more information regarding the Co-op/IIP rules, benefits, regulations and requirements, please refer to the web site (https://umanitoba.ca/engineering/co-operative-education/).