

Faculty of Engineering

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Summary of Degree Programs

Undergraduate

BSc Programs

The Faculty of Engineering administers regular four year programs leading to the BSc degree in Chemical, Civil, Computer, Electrical, Geomatics, Manufacturing, Mechanical, Oil & Gas, and Software Engineering.

Specialization

The Departments of Chemical and Petroleum Engineering, Civil Engineering, Electrical and Computer Engineering, Mechanical and Manufacturing Engineering and Geomatics Engineering offer a specialization in Biomedical Engineering which can be combined with the regular four year programs leading to the BSc degree in Chemical, Civil, Electrical, Geomatics, Manufacturing and Mechanical Engineering.

Minors

In addition, the Department of Chemical and Petroleum Engineering offers a minor in Petroleum Engineering, the Department of Civil Engineering offers minors in Environmental, in Structural, and in Transportation Engineering, the Department of Mechanical and Manufacturing Engineering offers a Mechanical Engineering degree with minors in Mechatronics or in Petroleum Engineering (offered in conjunction with the Department of Chemical and Petroleum Engineering), and a Manufacturing Engineering degree with a minor in Mechatronics. The Faculty of

Engineering in conjunction with the Haskayne School of Business offers a Minor in Entrepreneurship and Enterprise Development.

Engineering Internship Program

The Faculty of Engineering also provides the option of an Internship Program. The Engineering Internship Program is a five-year program which includes, in addition to the regular four-year academic program, an internship year (a minimum of twelve and a maximum of sixteen consecutive months) of supervised work experience in industry.

Combined Programs

The Faculty of Engineering in conjunction with the Faculties of Humanities and Social Sciences offers combined degree programs. Program details are given in the section "Program Details – Combined Programs" below.

Graduate

Graduate work leading to the MSc, MEng and PhD degrees is offered by all engineering departments under the administration of the Faculty of Graduate Studies. Details of these programs appear in the Faculty of Graduate Studies Calendar.

Diplomas or Certificates

Diplomas of the Faculty of Engineering, which provide special qualifications in designated areas, are also offered. For additional details see the section "Program Details – Diplomas" below.

Diploma of the Faculty of Engineering

The Faculty of Engineering sponsors a diploma program providing additional special qualifications in designated departments which lead to the Diploma of the Faculty of Engineering. This program is intended primarily for professional engineers engaged in practice who are not interested in submitting to the discipline of a true graduate degree including a thesis, or who are unable to meet the residence requirements of the MSc degree.

The Faculty of Engineering also sponsors a diploma program providing additional specialization in Environmental Engineering. This diploma is intended for professional engineers or holders of equivalent approved degrees and leads to the Diploma of the Faculty of Engineering in Environmental Engineering.

Degrees Offered

	Chemical	Civil	Computer	Electrical	Geomatics	Manufacturing	Mechanical	Oil & Gas	Software
BSc	BSc	BSc	BSc	BSc	BSc	BSc	BSc	BSc	BSc
BSc (Eng)	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*	BSc (Eng)/BSc*
BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*	BSc (Eng)/BA*
BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)	BSc (INTE)
Humanities and Social Sciences									
MEng	MEng		MEng	MEng	MEng	MEng	MEng		
MSc	MSc		MSc	MSc		MSc			
PhD			PhD	PhD		PhD			

Diploma of the Faculty of Engineering and the Haskayne School of Business in Project Management Specialization

The Faculty of Engineering and the Haskayne School of Business jointly sponsor a diploma program providing additional special qualifications in the area of Project Management which leads to the Diploma of the Faculty of Engineering and of the Haskayne School of Business in Project Management. This program is intended primarily for professionals engaged in practice who are not interested in the MSc or MEng degrees.

Faculty Information

Contact Information

Location: Engineering Block C204

Student Information: (403) 220-5732

Web page URL: <http://www.eng.ucalgary.ca>

disciplines, but also courses specific to their chosen discipline.

In the third year students take specialized courses in their chosen discipline. At the end of third year students at their option may enroll in the Engineering Internship Program (EIP); this program consists of 12 to 16 months of work in an industry setting where students gain valuable practical engineering experience (see Engineering Internship Program, later in the Engineering section of this Calendar). This academic program is available to all students.

In some disciplines during the fourth year of study (fifth year for Internship enrollees) students have the option to take a minor specialization in one of several areas. In addition to the technical requirements, students take complementary studies courses in non-Engineering and non-Science subjects as an integral component of an Engineering education. This pattern is somewhat different for students who enroll in

Introduction

Faculty of Engineering

The Faculty of Engineering at the University of Calgary was established in 1965. The degrees awarded by the Faculty since its inception have been recognized by the Canadian Engineering Accreditation Board. The engineering curriculum in Calgary consists of a well-balanced mixture of traditional topics in engineering sciences and specialization in subjects relevant to current industrial practice. The academic staff, as well as the students, of the Faculty of Engineering come from all parts of the world, giving the Faculty its uniquely friendly and international atmosphere.

Enquiries

Enquiries regarding admission, registration, interpretation of regulations, or any matter regarding undergraduate studies in Engineering should be directed to the Office of Undergraduate Studies, Faculty of Engineering, Room EN-C204, Telephone 220-5732. Students and prospective students are invited to view pertinent information available through the engineering website, www.eng.ucalgary.ca.

Pattern

Normal admission to the Faculty of Engineering takes one of two forms: (1) students are admitted to the first year of the program directly from high school; (2) students are admitted to the first year or second year of the program after having received advanced credits from another University of Calgary faculty or from another post-secondary institution.

The first year of the Engineering program is common to all students. In April of the first year of study, students apply for admission to a discipline: Chemical, Civil, Computer, Electrical, Geomatics, Manufacturing, Mechanical, Oil & Gas, or Software Engineering. During second year, students not only complete courses common for all

Students coming directly from high school must present English 30, Mathematics 30 (or Pure Mathematics 30), Mathematics 31, Physics 30 and Chemistry 30 as specified in

Registration

Accuracy of Registration

All students are responsible for the completeness and accuracy of their registration and for arranging course selections to satisfy graduation requirements.

Course Work

Equivalent Courses

Approval may be given by the Associate Dean (Academic) or by the relevant Department Head for a student to replace one or more courses in the Engineering program by registering in equivalent courses in other faculties. To receive credit, the student must normally obtain a grade of "C" or higher.

Final Year Technical Options

A student in the final year of the Engineering undergraduate program, who has a high academic standing, may be permitted to substitute a graduate course(s) for a fourth year departmental course(s) with the approval of the department. The undergraduate grading scheme will apply to this student.

Part-Time Studies

The academic regulations allow eight years for successful completion of the program, with no stipulation for full-time study. Students wishing to pursue their education with a reduced course load or through studies coordinated with industrial experience are encouraged to contact the Office of Undergraduate Studies, Faculty of Engineering, at the start of their studies so that a suitable program may be planned. As many required courses are not offered in the evenings or during the Spring and Summer Sessions, students should anticipate that it will not be possible to complete their degree without a significant time commitment on weekdays during several academic sessions.

Permission to Take Courses for Credit at Another Institution

Normally students are expected to complete their programs through courses taken at the University of Calgary. Students who wish to take a course elsewhere should obtain written permission from the Faculty of Engineering before registering in the course, to ensure that it is acceptable for credit.

It is the responsibility of the student to ensure that an official transcript of grades is forwarded directly to the Registrar of the University of Calgary in order that the appropriate credit may be officially recorded. To receive transfer credit, a minimum grade of "C" or equivalent (60 per cent or above) must be obtained in each transfer course. (Under some circumstances students may also receive credit for courses with grades of "D" or "D+.") The grades obtained in such courses are not used in the computation of grade point averages for graduation purposes.

Complementary Studies

The following complementary studies courses are required for all students in the Faculty:

- (a) Engineering 209 (Economics 209)* — not open to first-year students
- (b) Engineering 481 or equivalent
Current approved equivalent courses are as follows:
General Studies (GNST) 341, Information Technology and Society
Science, Technology and Society (STAS) 325, Technology within Contemporary Society
Science, Technology and Society (STAS) 327, Science and Society
Science, Technology and Society (STAS) 343, Science Policy and Technology Development
- (c) Communications Studies 363
- (d) Engineering 513, The Role and Responsibilities of the Professional Engineer in Society
- (e) For all degrees, two general complementary studies courses are required.

**Students entering Chemical Engineering, Chemical Engineering with a Petroleum Engineering Minor, or Oil & Gas Engineering may choose a general complementary studies course instead of Engineering Economics (Engineering 209).*

General complementary studies courses must be selected from acceptable courses offered by the Faculties of Communication and Culture, Fine Arts, Humanities, or Social Sciences. A list of acceptable courses may be obtained from the Office of Undergraduate Studies, Faculty of Engineering. Students are responsible for ensuring that any prerequisite conditions are satisfied. Students who have credit for Communications Studies 361 gained prior to the 2003/04 academic year are not required to take Communications Studies 363.

Student Standing

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Faculty. Such students will not be permitted to register in any course specified as part of the degree requirements in Engineering for a period of 12 months from the date of withdrawal.

9. A student who has been required to withdraw may apply for readmission after an interval of 12 months. Readmission is not automatic and will be considered on an individual basis in competition with all other admission applications received. On readmission, students' records will be reviewed to determine credits to be awarded.
10. A student who, after eight calendar years from initial registration in the Engineering program, has not completed degree requirements, will be denied further registration in Engineering. (The eight years does not include time spent in the Internship Program, if any, or the extra time spent by those students in the combined degree programs.) For a transfer student, the permissible number of years (properly rounded) will be prorated according to the number of credits in the program. Clarification of specific cases may be obtained from the Office of Undergraduate Studies, Faculty of Engineering.

Notes:

1. *The above regulations are stated in terms of grades in half courses. A grade in a full course will be considered to be equivalent to two such grades.*
2. *The method used to determine the grade point average is described under Academic Standing in the Academic Regulations section of this Calendar.*
3. *Grades obtained in courses in the Spring and Summer Sessions are not used to alter retroactively the ruling made on a student's performance at the end of the previous review period.*

Dean's List

To be included in the Dean's List, a student must achieve a grade point average of 3.60 or higher during the review period, with at least 10 half courses taken over the immediately preceding 12 month period of May 1 to April 30.

Examinations

Supplemental Examinations

At the discretion of the Engineering Faculty Council, supplemental privileges may be granted to fourth-year students. If these privileges are granted, the student will be informed in writing and must then make application to write the examinations prescribed. Supplemental examinations may be granted in Engineering courses required in the final year program to those students who, at the time of the May, October or January meeting of the Engineering Faculty Council, will be eligible to graduate if one or two "D," "D+" or "F" grades are raised by up to one full grade. A grade of at least "C-" is required to obtain credit for a course through a supplemental examination.

Where courses other than Engineering courses are involved, the successful completion of another approved course may be accepted as clearing the deficiency.

A student may be granted supplemental privileges only once and to a maximum of two supplemental examinations in the courses taken since the last review. Supplemental examinations granted at the January or October meeting of the Engineering Faculty Council will be written in the following April, and those granted at the May meeting of the Council will be written in the following August.

Graduation

Graduation Requirements

Students are required to obtain credit for the full set of courses listed in the Calendar for any particular program.

For graduation in all branches of Engineering, a student must have an overall grade point average of at least 2.00 with no uncleared "F" grades. The average will be calculated by using the numerical equivalent of the best grade in each course taken. A full-year course will be counted as two half courses for this purpose.

Note: *An "F" grade in any technical elective course or complementary studies elective course may be cleared by a passing grade in another acceptable technical elective or complementary studies elective, respectively.*

Degrees with Distinction

The notation With Distinction will be inscribed on the permanent record and graduation parchment of students who obtain a grade point average of at least 3.60 over the last 10 full-course equivalents taken at the University of Calgary, with no more than one "D" or "D+" grade and no failures. The notation With Distinction will not be granted if a student obtains an "F" grade in a CR/F course (including Internship) which has been completed during the time period in which the last 10 full-course equivalents have been taken. For cases in which the last 10 full-course equivalents must include some, but not all, of a group of courses taken concurrently, the selection will be made in the manner most advantageous to the student. Students who have taken part of their work at another university or who have transferred into this Faculty may be granted a degree With Distinction at the discretion of the Faculty.

Program Details

First Year, Curriculum Requirements Common to All Programs

1. AMAT 217 Calculus for Engineers and Scientists
2. AMAT 219 Multivariable Calculus for Engineers
3. CHEM 209 General Chemistry for Engineers

4. ENGG 201 Behaviour of Liquids, Gases and Solids
5. ENGG 205 Engineering Mechanics I
6. ENGG 233 Computing for Engineers I
7. ENGG 251 Design and Communications I
8. ENGG 253 Design and Communications II
9. MATH 221 Linear Algebra for Scientists and Engineers
10. PHYS 259 Electricity and Magnetism
11. Complementary Studies Course

Admission

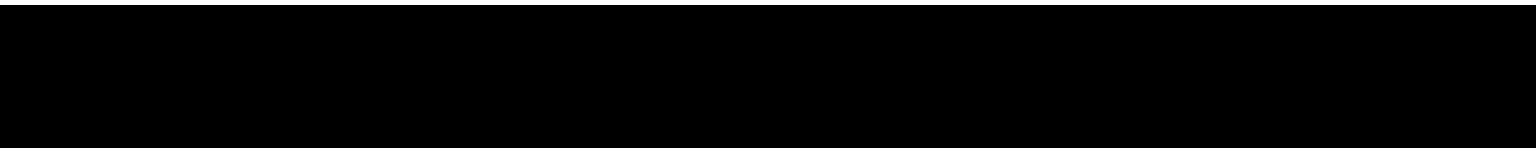
Refer to "Faculty Regulations – Admissions" above.

Requirements

See also "First Year Curriculum Requirements Common to All Programs" above.

2nd Year

Chemical Engineering, regular program and Minor in Petroleum Engineering



7. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
8. One of ENCI 513 Properties of Concrete and Masonry, or ENCI 523 Soil Mechanics and Foundation Engineering
9. One of (a) EVDA 511 Building Science and Technology I – a minimum GPA of 2.70 is required to register, (b) EVDA 719 Structures for Architects III – a minimum GPA of 3.00 is required to register, (c) ENCI 525 Applied Geotechnical Engineering, (d) an approved course on the Design of Wood, (e) ENCI 553 Structural Masonry Design, (f) an approved course on Structural Biomechanics
- 10., 11. Technical Electives (two half-course equivalents not otherwise taken)
12. Complementary Studies Course (one half-course equivalent)

Civil Engineering with a Minor in Transportation Engineering

- 1., 2. ENCI 570 Group Design Project (two half-course equivalents)
3. ENCI 573 Highway Engineering
4. ENCI 575 Operation of Transportation Systems
5. ENCI 577 Modelling of Transportation Systems
6. ENCI 579 Asphalt Pavement Design and Management
7. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
8. TRAN 599 Independent Research in Transportation Issues
9. — 11. Technical Electives (three half-course equivalents)
12. Complementary Studies Course (one half-course equivalent)

Civil Engineering Approved Technical Electives

Regular program.

Select eight half-course equivalents.

ENCI 513 Properties of Concrete and Masonry
 ENCI 523 Soil Mechanics and Foundation Engineering
 ENCI 525 Applied Geotechnical Engineering
 ENCI 533 Engineering Hydrology
 ENCI 535 Open Channel Hydraulics
 ENCI 545 Theory of Structures I
 ENCI 547 Theory of Structures II
 ENCI 553 Structural Masonry Design
 ENCI 555 Structural Concrete Design
 ENCI 557 Structural Steel Design
 ENCI 573 Highway Engineering
 ENCI 575 Traffic Engineering and Operations
 ENCI 577 Modelling of Transportation Systems
 ENCI 579 Asphalt Pavement Design and Management
 ENCI 581 Water and Wastewater Engineering
 ENCI 587 Site Assessment and Remediation

ENCI 589 Air and Water Pollution
 ENCI 591 Solid and Hazardous Waste Engineering
 ENCI 595 Special Topics
 ENCI 597 Civil Engineering Project I
 ENCI 599 Civil Engineering Project II

Environmental Engineering Minor.

Five half-course equivalents in Group A and select three half-course equivalents from Group B.

Group A Technical Electives

ENCI 581 Water and Wastewater Engineering
 ENCI 587 Site Assessment and Remediation
 ENCI 589 Air and Water Pollution
 ENCI 595 Special Topics
 ENCI 597 Civil Engineering Project I
 ENCI 599 Civil Engineering Project II

ENCI 589 Air and Water Pollution

ENCI 591 Solid and Hazardous Waste Engineering

ENCI 595 Special Topics

ENCI 597 Civil Engineering Project I

ENCI 599 Civil Engineering Project II

10., 11. Complementary Studies Courses
(two half-course equivalents)

4th Year

1. CPSC 411 Compiler Construction
 2. ENCM 501 Principles of Computer Architecture
 3. ENCM 583 Fourth Year Computer Engineering Team Design Project, Part A
 4. ENCM 589 Fourth Year Computer Engineering Team Design Project, Part B
 5. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
 6. — 10. Technical Electives (five half-course equivalents)
- 11., 12. Complementary Studies Courses
(two half-course equivalents)
Block Course – ENCM 007 Introduction to the Fourth Year Computer Engineering Team Design Project (20 hours)

Computer Engineering Approved
Technical Electives

Select five half-course equivalents

- CPSC 453 Introduction to Computer Graphics
- CPSC 471 Data Base Management Systems
- ENCM 503 Digital Video Processing
- ENCM 505 Parallel Computer Architectures
- ENCM 515 Digital Signal Processors
- ENCM 519 Special Topics in Computer Engineering
- ENCM 591 Individual Computer Engineering Project, Part II (1 session)
- ENCM 598 Individual Computer Engineering Research Project (2 sessions, two half-course equivalents)
- ENCM 599 Individual Computer Engineering Project (1 session)
- ENEL 525 Neuro-Fuzzy and Soft Computing
- ENEL 527 Design and Implementation of FPGA-Based DSP Systems
- ENEL 529 Wireless Communications Systems
- ENEL 541 Control Systems II
- ENEL 563 Biomedical Signal Analysis
- ENEL 567 CMOS VLSI Engineering
- ENEL 571 Digital Communications
- ENEL 573 Telecommunications and Computer Communications
- ENEL 579 Optical Fibre Communications
- ENEL 593 Digital Filters

Note: Selection of a course not on this list requires department approval. Elective courses are offered, in any calendar year, at the discretion of the department.

Note: Students may not take CPSC 471 as a technical elective if they have already completed ENSF 519.31 or ENCM 519.31.

Admission

Refer to “Faculty Regulations – Admissions” above.

Requirements

See also “First Year Curriculum Requirements Common to All Programs” above.

2nd Year

1. AMAT 307 Differential Equations
2. AMAT 309 Vector Calculus for Engineers
3. ENCM 339 Programming Fundamentals
4. ENCM 369 Computer Organization
5. ENEL 327 Signals and Transforms
6. ENEL 341 Circuits I
7. ENEL 343 Circuits II
8. ENEL 353 Digital Circuits
9. ENEL 361 Electronic Materials
10. ENGG 319 Probability and Statistics for Engineers
11. PHYS 369 Acoustics, Optics and Radiation for Engineers

3rd Year

1. ENCM 415 Assembly Language Programming and Interfacing
 2. ENEL 409 Principles of Software Development
 3. ENEL 441 Control Systems I
 4. ENEL 453 Digital Systems Design
 5. ENEL 463 Electronic Devices and Circuits
 6. ENEL 465 Analog Integrated Electronics
 7. ENEL 471 Analog Communications
 8. ENEL 475 Fundamentals of Electromagnetic Fields
 9. ENEL 489 Electric Machines: Steady-State
- 10., 11. Complementary Studies Courses
(two half-course equivalents)

4th Year

1. ENEL 583 Fourth Year Electrical Engineering Team Design Project, Part A
 2. ENEL 589 Fourth Year Electrical Engineering Team Design Project, Part B
 3. ENEL 587 Power Systems: Steady State
 4. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
 5. — 10. Technical Electives (six half-course equivalents)
- 11., 12. Complementary Studies Courses
(two half-course equivalents)
- Block Course — ENEL 007 Introduction to the Fourth Year Electrical Engineering Team Design Project (20 hours)

3rd Year

1. ENCI 471 Introduction to Project Management
2. ENGG 407 Numerical Methods in Engineering
3. ENGO 419 Geomatics Networks
4. ENGO 421 Coordinate Systems and Map Projections
5. ENGO 423 Geodetic Positioning
6. ENGO 427 Physical Geodesy
7. ENGO 431 Analytical Photogrammetry
8. ENGO 435 Remote Sensing
9. ENGO 455 Cadastral Surveys and Land Registration Systems
- 10., 11. Complementary Studies Courses (two half-course equivalents)

4th Year

1. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
- 2., 3. ENGO 500 Geomatics Engineering Project (two half-course equivalents)
4. ENGO 501 Field Surveys
5. — 10. Technical Electives (six half-course equivalents)
- 11., 12. Complementary Studies Courses (two half-course equivalents)

Geomatics Engineering Approved Technical Electives

Select six half-course equivalents.

BSEN 395 Legal Environment
 ENGO 545 Hydrography
 ENGO 557 Design and Implementation of Geospatial Information Systems
 ENGO 559 Digital Imaging and Applications
 ENGO 561 Satellite Positioning
 ENGO 563 Data Analysis in Engineering
 ENGO 567 High-Precision Surveys
 ENGO 573 Digital Terrain Modelling
 ENGO 579 Survey Law
 ENGO 581 Land Use Planning
 ENGO 583 Environmental Modelling

Notes:

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ENMF 509 Integrated Manufacturing Systems II
 ENMF 513 Artificial Intelligence in Manufacturing
 ENMF 515 Computer-Based Control for Manufacturing
 ENMF 517 Experimental Design and Analysis
 ENMF 519 Special Topics in Manufacturing Engineering
 ENMF 527 Production and Project Engineering
 ENMF 529 Introduction to Microelectromechanical Systems
 ENMF 577 Product and Process Development

Minor in Mechatronics. Select two half-course equivalents.

ENME 547 Finite Element Method
 ENME 599 Vibrations and Machine Dynamics
 ENMF 505 Robotics
 ENMF 513 Artificial Intelligence in Manufacturing
 ENMF 515 Computer-Based Control for Manufacturing
 ENMF 529 Introduction to Microelectromechanical Systems

Admission

Refer to "Faculty Regulations – Admissions" above.

Requirements

See also "First Year Curriculum Requirements Common to All Programs" above.

2nd Year

Mechanical Engineering, regular program and Minors in Mechatronics and Petroleum Engineering

1. AMAT 307 Differential Equations
2. CHEM 357 Industrial Inorganic Chemistry for Engineers
3. ENGG 311 Engineering Thermodynamics
4. ENGG 319 Probability and Statistics for Engineers
5. ENGG 317 Mechanics of Solids
6. ENGG 325 Electric Circuits and Systems
7. ENGG 335 Computing for Engineers II
8. ENGG 349 Engineering Mechanics II
9. ENGG 407 Numerical Methods in Engineering
10. ENME 341 Fundamentals of Fluid Mechanics
11. PHYS 369 Acoustics, Optics and Radiation for Engineers

Block Course – ENME 001 Mechanical and Manufacturing Engineering Block Course (32 hours)

3rd Year

Mechanical Engineering, regular program and Minors in Mechatronics and Petroleum Engineering

1. ENME 421 Materials I
2. ENME 461 Mechatronics
3. ENME 471 Heat Transfer
4. ENME 473 Fundamentals of Kinematics and Dynamics of Machines
5. ENME 479 Mechanics of Materials I
6. ENME 485 Mechanical Engineering Thermodynamics
7. ENME 493 Machine Component Design
8. ENME 495 Fluid Mechanics
9. ENMF 417 Manufacturing and Production Processes
- 10., 11. Complementary Studies Courses (two half-course equivalents)

4th Year

Mechanical Engineering, regular program

1. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
- 2., 3. ENME 538 Mechanical Engineering Design Methodology and Application (two half-course equivalents)
4. ENME 585 Control Systems
5. ENME 599 Vibrations and Machine Dynamics
6. — 9. Technical Electives (four half-course equivalents)
- 10., 11. Complementary Studies Courses (two half-course equivalents)

Mechanical Engineering with a Minor in Mechatronics

1. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
- 2., 3. ENME 538 Mechanical Engineering Design Methodology and Application (two half-course equivalents)
- 4., 5. ENME 560 Mechatronics Design Laboratory (two half-course equivalents)
6. ENME 585 Control Systems
7. ENME 599 Vibrations and Machine Dynamics
8. ENMF 533 Elements of Automation
- 9., 10. Technical Electives (two half-course equivalents)
- 11., 12. Complementary Studies Courses (two half-course equivalents)

Mechanical Engineering with a Minor in Petroleum Engineering

1. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
- 2., 3. ENME 538 Mechanical Engineering Design Methodology and Application (two half-course equivalents)
4. ENPE 523 Introduction to Reservoir Engineering

5. — 9. Technical Electives (five half-course equivalents)
- 10., 11. Complementary Studies Courses (two half-course equivalents)

Mechanical Engineering Approved Technical Electives

Regular program. Select four half-course equivalents.

ENME 519 Special Topics
 ENME 521 Materials II
 ENME 547 Finite Element Method
 ENME 583 Mechanical Systems in Buildings
 ENME 587 Mechanics of Materials II
 ENME 593 Energy Systems
 ENME 595 Gas Dynamics
 ENME 597 Turbomachinery
 ENMF 401 Computer-Aided Design and Graphics
 ENMF 415 Integrated Manufacturing Systems I
 ENMF 503 Computer Numerically Controlled Machines
 ENMF 505 Robotics
 ENMF 515 Computer-Based Control for Manufacturing
 ENMF 517 Experimental Design and Analysis
 ENMF 527 Production and Project Engineering
 ENMF 529 Introduction to Microelectromechanical Systems
 ENPE 555 Oil & Gas Field Safety and Environment
 ENPE 561 Fuel Science and Technology
 ENPE 563 Materials Aspects of Oil & Gas Production
 ENPE 565 Mechanics of Oil & Gas Production
 ENPE 567 Offshore Mechanical Engineering

Minor in Mechatronics. Select two half-course equivalents.

ENME 547 Finite Element Method
 ENMF 505 Robotics
 ENMF 513 Artificial Intelligence in Manufacturing
 ENMF 515 Computer-Based Control for Manufacturing
 ENMF 529 Introduction to Microelectromechanical Systems

Minor in Petroleum Engineering. Select five half-course equivalents.

ENME 595 Gas Dynamics
 ENME 597 Turbomachinery
 ENPE 525 Waterflooding
 ENPE 533 Petroleum Production Engineering
 ENPE 555 Oil & Gas Field Safety and Environment
 ENPE 561 Fuel Science and Technology
 ENPE 563 Materials Aspects of Oil & Gas Production
 ENPE 565 Mechanics of Oil & Gas Production
 ENPE 567 Offshore Mechanical Engineering
 GLGY 377 Petroleum Engineering Geology

Admission

Refer to "Faculty Regulations – Admissions" above.

Requirements

See also "First Year Curriculum Requirements Common to All Programs" above.

2nd Year

1. AMAT 307 Differential Equations for Engineers
2. CHEM 357 Industrial Organic Chemistry for Engineers
3. ENCH 315 Chemical Engineering Process Calculation
4. ENCH 331 Process Fluid Dynamics
5. ENGG 319 Probability and Statistics for Engineers
6. ENGG 325 Electric Circuits and Systems
7. ENGG 335 Computing for Engineers II
8. ENGG 311 Engineering Thermodynamics
9. ENGG 317 Mechanics of Solids
10. ENGG 349 Engineering Mechanics II
11. GLGY 377 Petroleum Engineering Geology

3rd Year

1. ENCH 401 Analyses in Chemical, Oil & Gas Engineering
2. ENCH 403 Heat and Mass Transfer
3. ENCH 405 Separation Processes I
4. ENCH 427 Chemical Engineering Thermodynamics
5. ENPE 423 Oil & Gas Engineering Process Development
6. ENPE 507 Well Logging and Formation Evaluation
7. ENPE 515 Drilling and Well Completions
8. ENPE 523 Introduction to Reservoir Engineering
9. ENPE 525 Waterflooding
10. ENPE 533 Petroleum Production Engineering
11. Complementary Studies Course (one half-course equivalent)

4th Year

1. ENGG 407 Numerical Methods in Engineering
2. ENGG 513 The Role and Responsibilities of the Professional Engineer in Society
3. ENCH 501 Transport Processes
4. ENPE 511 Design for Oil & Gas Engineering I
5. ENPE 513 Flow in Porous Media
6. ENPE 531 Design for Oil & Gas Engineering II
7. ENPE 551 Petroleum Engineering Laboratory



Admission

Admission to the diploma program may be granted to holders of an approved degree or its equivalent. Engineers, without a degree, who are registered as Professional Engineers with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, or an equivalent association, may also be eligible for admission to the diploma program.

Each work experience is supervised by a Professional Engineer in the host company. Normally the entire internship year is spent with the same employer. Students are required to present letter reports to the Engineering Internship Office at the end of each four month period during the internship year. In addition, a comprehensive report on the student's work experience is required at the end of the internship assignment. This comprehensive report must be approved by the student's work supervisor and is marked and graded by members of the Faculty.

Minor in Entrepreneurship and Enterprise Development in the Faculty of Engineering

Introduction

The Faculty of Engineering in partnership with the Haskayne School of Business offers a Minor in Entrepreneurship and Enterprise Development (MEED) open to all engineering students. MEED typically commences in year two of the engineering program and consists of five Entrepreneurship and Innovation (ENTI) courses, all of which are currently offered by the Haskayne School of Business plus any five fourth-year engineering courses that are taken as part of the normal requirements for the engineering degree. Thus, to satisfy MEED requirements, students must receive credit for five half courses over and above the engineering degree requirements.

Admission

Students apply for admission to MEED at the same time as they apply for their choice of engineering program specialization, in April of their first year. Admission to the MEED program is limited to 50 students. In the event that the number of applicants exceeds

the number of spaces available, admission will be decided on the basis of academic performance, using the same process as is used for admission to the engineering program specialization. If students apply later in their program than second year, they will be admitted in order of academic performance according to the number of spaces available. Students are encouraged to apply as soon as possible in order that the Haskayne School of Business may plan for the required number of places in the ENTI courses. Application forms are available from and should be submitted to the Undergraduate Studies Office, Faculty of Engineering. Admission to the program depends upon the availability of space in the required ENTI courses.

Requirements

Students must receive credit for five half courses in addition to five fourth-year engineering courses that are part of the undergraduate engineering degree requirements. The five courses that are done in addition to the engineering degree requirements are:

1. ENTI 201 Introduction to Business Venturing
2. ENTI 381 Introduction to Entrepreneurship
3. ENTI 401 Opportunity Identification
4. ENTI 405 New Venture Start-Up
5. One of the following options:
 - BSEN 395 Business Law for Strategic Decision-Makers'
 - ENTI 403 New Venture Planning
 - ENTI 499 Family Business Management
 - FNCE 341 Canadian Business Finance
 - FNCE 343 Personal Financial Management

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