

SECTION 12: FACULTY OF ENGINEERING AND APPLIED SCIENCE

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12.1 Degrees offered

Bachelor of Engineering (Honours) in Automotive Engineering - BEng (Hons)

Bachelor of Engineering (Honours) in Electrical Engineering - BEng (Hons)

Bachelor of Engineering (Honours) in Manufacturing Engineering - BEng (Hons)

Bachelor of Engineering (Honours) in Mechanical Engineering - BEng (Hons)

- Comprehensive Mechanical Engineering program
- Energy Engineering option
- Mechatronics Engineering option

Bachelor of Engineering (Honours) in Software Engineering - BEng (Hons)

Bachelor of Engineering and Management (Honours) in Automotive Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Electrical Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Manufacturing Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management - BEng and Mgt (Hons)

- Comprehensive Mechanical Engineering program
- Energy Engineering option
- Mechatronics Engineering option

Bachelor of Engineering and Management (Honours) in Software Engineering and Management - BEng and Mgt (Hons)

The Faculty of Engineering and Applied Science offers a wide array of engineering programs. Designed to meet the needs of industry, UOIT's engineering programs offer a solid grounding in basic sciences and mathematics, as well as applied courses such as robotics, mechatronics, solid mechanics, controls, computer-aided design, telecommunications, power systems, software design, electronics, and artificial intelligence.

Students have the opportunity to participate in an internship program to allow them to gain experiential learning by spending 12 to 16 months working in industry following third year. Students can also participate in two to four month co-op placements.

Each student benefits from the university's mobile learning environment (section 1.2) on a campus equipped with state-of-the-art laboratories and fully networked classrooms.

Our campus is home to the Integrated Manufacturing Centre, an extensive 930 square metre, fully functional, industrial grade, flexible manufacturing facility with advanced manufacturing and automation technologies that is capable of manufacturing a variety of products.

To help meet industry's need for engineers with strong business skills, the Faculty of Engineering and Applied Science has developed several combination Engineering and Management programs. See section 12.7 for more information.

A First-Year Engineering Transition Program provides first-year engineering students, who need extra time to adapt to university, with an opportunity, before the start of second year, to complete first-year courses for which they have not obtained credit, to upgrade their grade point average and academic standing, and to improve their preparation for studies in subsequent years. See section 12.9 for more information.

The faculty's research focuses on flexible and high-performance manufacturing, automotive engineering, energy, active control of vibration and sound, nonlinear dynamics and chaos, efficient and environmentally conscious engineering, robotics, mechatronics, computer-integrated manufacturing, micro-electromechanical systems, electronics, communication, and software engineering.

Master of Applied Science (MASc) and Master of Engineering (MEng) programs in Mechanical Engineering launched in the 2006-2007 academic year. Graduate programs in Automotive Engineering and Electrical and Computer Engineering are planned to start in the 2007-2008 academic year. Section 17 of this calendar provides information about the graduate programs offered at UOIT.

12.2 Program information - Bachelor of Engineering (Honours) in Automotive Engineering

12.2.1 General information

UOIT's Automotive Engineering program is unique in Canada. The automotive engineering curriculum provides an understanding of the principles and application of automotive engineering, while strengthening each student's ability to think independently and take a systematic approach to problem solving. Courses such as automotive systems design, vehicle dynamics and control, and automotive materials selection, prepare graduates for employment directly within the automotive industry, or within the many related automotive fields.

12.2.2 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 percent on six 4U or 4M credits including English (ENG4U) with a minimum grade of 60 percent, calculus (MCB4U), chemistry (SCH4U), physics (SPH4U) and one of the following: geometry and discrete mathematics (MGA4U), mathematics of data management (MDM4U), earth and space science (SES4U) or biology (SBI4U). Geometry and discrete mathematics (MGA4U) is the preferred course. In addition, a combined minimum 70 percent average in math and science courses is required. Students missing one prerequisite are eligible for consideration. All other applicants should refer to section 4.5 of this calendar for the requirements for their specific category of admission.

12.2.3 Work placement/internship/co-op opportunities

The university's proximity to some of the largest automotive and manufacturing companies in Canada provides many opportunities for work placements. In addition, a 12 to 16 month optional Engineering Internship Program is available for students completing third year, and students may participate in two to four month work placements through the Engineering Co-op Program. See course descriptions for ENGR 0998U Engineering Internship Program and ENGR 0999U Engineering Co-op Program for details (section 16).

12.2.4 Careers

Graduates are prepared to work in automotive companies, as well as in many other industries that service the automotive sector and require specialized mechanical, electrical, automotive, software and manufacturing engineering skills. Automotive

engineers may find employment at major automobile, truck, bus and motorcycle companies, as well as within racing teams, parts manufacturers and research and development organizations. Maintenance and repair are additional areas of employment for graduates. In addition, the program's mechanical engineering foundation provides graduates access to companies seeking mechanical engineers. Graduates may also choose to pursue further studies for higher degrees or start their own business.

12.2.5 Professional designation

All UOIT undergraduate engineering programs are designed to meet the requirements of the Canadian Engineering Accreditation Board. Each graduate is eligible to apply for licensing as a professional engineer (PEng) in any province or territory in Canada.

12.2.6 Degree requirements

To be eligible for the BEng (Hons) degree in Automotive Engineering, students must successfully complete 138 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
ENGR 2220U Structure and Properties of Materials
ENGR 2260U Statics and Solid Mechanics
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

ENGR 2430U Dynamics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (18 credit hours)

ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
ENGR 4260U Automotive Engineering
Liberal studies elective*

Semester 2 (18 credit hours)

ENGR 3000U Automotive Component Design
ENGR 3210U Mechanical Vibrations
ENGR 3220U Machine Design
ENGR 3320U Fluid Power Systems
ENGR 3360U Engineering Economics**
ENGR 3450U Combustion and Engines

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360 Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (18 credit hours)

ENGR 4010U Vehicle Dynamics and Control
ENGR 4060U Automotive Structural Design and Materials Selection
ENGR 4080U Automotive Systems Design
ENGR 4210U Advanced Solid Mechanics and Stress Analysis
Engineering elective*
Liberal studies elective*

Semester 2 (18 credit hours)

ENGR 3390U Mechatronics
ENGR 3460U Industrial Ergonomics
ENGR 4045U Quality Control
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4999U Design Thesis
Liberal studies elective*

*ELECTIVES

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

The following are approved courses as engineering electives:

ENGR 4160U Artificial Intelligence in Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.2.7 Automotive Engineering and Management

See section 12.7.

12.3 Program information - Bachelor of Engineering (Honours) in Electrical Engineering

12.3.1 General information

Electrical engineering is a broad field with many engineering applications and has been proven to be among the most popular of all engineering disciplines. UOIT's Electrical Engineering program teaches students to apply knowledge through analysis, design and implementation of electrical, power, control, electronic, biomedical, photonic, and wireless systems.

The program of study includes courses in the areas of electronics, telecommunications, computers, control, and power systems. The curriculum assists students in understanding and applying the principles of electrical engineering and of the Canadian electrical engineering industry.

12.3.2 Admission requirements

See section 12.2.2.

12.3.3 Work placement/internship/co-op opportunities

See section 12.2.3.

12.3.4 Careers

Electrical engineering graduates are prepared for employment in the analysis, design, development, testing and manufacturing of electrical equipment, systems, and networks. Power utilities, consumer appliance manufacturers, industrial equipment manufacturers, telecommunications and computer industries, resource companies, biomedical engineering firms and government agencies all employ electrical engineers. With the rapid advances in technology and growing demand for electrical engineers, electrical engineering will remain one of the most sought-after disciplines in engineering. Graduates may also choose to pursue further studies for higher degrees or start their own business.

12.3.5 Professional designation

See section 12.2.5.

12.3.6 Degree requirements

To be eligible for the BEng (Hons) degree in Electrical Engineering, students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 1400U Information Technology for Engineers
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

BUSI 2000U Collaborative Leadership
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

ENGR 2110U Discrete Mathematics for Engineers
ENGR 2200U Electrical Engineering Fundamentals
ENGR 2710U Software Design I
MATH 2860U Differential Equations for Engineers
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 2250U Introductory Electronics
ENGR 2450U Digital Systems
ENGR 2520U Fundamentals of Electromagnetics
ENGR 2530U Complex Analysis for Engineers
Liberal studies elective*

YEAR 3

Semester 1 (15 credit hours)

ENGR 2640U Thermodynamics and Heat Transfer
ENGR 3110U Signals and Systems
ENGR 3140U Computer Architecture
ENGR 3240U Applications for Electromagnetics
Liberal studies elective*

Semester 2 (18 credit hours)

ENGR 3070U Probability and Random Signals
ENGR 3130U Communication Systems
ENGR 3230U Electronic Circuit Design
ENGR 3250U Electric Machines
ENGR 3360U Engineering Economics**
ENGR 3490U Microprocessor Systems Design

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 4420U DSP Theory and Design
ENGR 4650U Computer Networks
ENGR 4750U Microwave and RF Circuits
ENGR 4920U Electrical Engineering Systems Design
Engineering elective*

Semester 2 (15 credit hours)

ENGR 4100U Modern Control Systems
ENGR 4110U Power Systems
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4500U Wireless Communications
ENGR 4999U Design Thesis

*ELECTIVES

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

The following are approved courses as engineering electives:

ENGR 4190U Multimedia Systems
ENGR 4860U Computer Graphics Design
ENGR 4930U Optical Communications

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.3.7 Electrical Engineering and Management

See section 12.7.

12.4 Program information - Bachelor of Engineering (Honours) in Manufacturing Engineering

12.4.1 General information

The Faculty of Engineering and Applied Science is one of only three in Canada offering a dedicated program in manufacturing engineering. The program provides graduates with the knowledge and skills required for work in all areas of advanced manufacturing, including product design, automation and control, and production.

Developed in consultation with industry the manufacturing engineering curriculum provides a solid grounding in the fundamentals of mathematics, computing and science, with significant content in engineering sciences and design. In addition to classroom lectures, students participate in tutorials, laboratories, computer simulations, field visits, independent research and design tasks, individual and group projects, as well as presentations to both technical and non-technical audiences.

Complementary studies including liberal studies electives, collaborative leadership, economics, and ethics and law for professionals, promote a broader understanding of the needs of society and technology's impact on it. Students gain technical expertise along with the understanding of business and humanities required for an integrated approach to advanced manufacturing.

12.4.2 Admission requirements

See section 12.2.2.

12.4.3 Work placement/internship/co-op opportunities

See section 12.2.3.

12.4.4 Careers

Manufacturing is a \$300 billion business in Ontario, employing over 1,000,000 people directly and another 1,000,000 people indirectly. It plays a vital role in the Ontario economy, accounting for about 20 percent of all jobs in the province and 25 percent of Ontario's gross domestic product. Manufacturing engineering provides job opportunities in sectors ranging from aerospace and biotechnology to telecommunications, automotive, chemical, industrial and commercial product manufacturing. The types of functions that program graduates may perform in organizations are numerous and include design and development of products and processes, production planning and control, system and facility design and analysis, operations management and plant maintenance, engineering marketing and sales, economic analysis and accounting, and research and development.

Growing industrial development in Ontario coupled with current retirement rates is increasing the need for manufacturing engineers over the next decade. Graduates may also choose to pursue further studies towards higher degrees or start their own business.

12.4.5 Professional designation

See section 12.2.5

12.4.6 Degree requirements

To be eligible for the BEng (Hons) degree in Manufacturing Engineering, students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1**Semester 1 (15 credit hours)**

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
 ENGR 2220U Structure and Properties of Materials
 ENGR 2260U Statics and Solid Mechanics
 ENGR 2310U Concurrent Engineering and Design
 ENGR 2640U Thermodynamics and Heat Transfer
 MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

ENGR 2430U Dynamics
 ENGR 2790U Electric Circuits
 ENGR 2860U Fluid Mechanics
 MATH 2070U Numerical Methods
 STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)

ENGR 3030U Computer-Aided Design
 ENGR 3190U Manufacturing and Production Processes
 ENGR 3270U Kinematics and Dynamics of Machines
 ENGR 3350U Control Systems
 Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3360U Engineering Economics**
 ENGR 3300U Integrated Manufacturing Systems
 ENGR 3390U Mechatronics
 ENGR 3460U Industrial Ergonomics
 ENGR 4045U Quality Control

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 3395U Manufacturing Systems Design
 ENGR 4280U Robotics and Automation
 ENGR 4390U Modelling Manufacturing Systems or
 ENGR 4380U Life Cycle Engineering***
 Engineering elective*
 Liberal studies elective*

***Not all listed choices will necessarily be offered each year.

Semester 2 (15 credit hours)

ENGR 4015U Reliability and Maintenance
 ENGR 4250U Advanced Engineering Materials
 ENGR 4760U Ethics, Law and Professionalism for Engineers
 ENGR 4999U Design Thesis
 Liberal studies elective*

***ELECTIVES**

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field. The following are approved courses as engineering electives:

ENGR 4160U Artificial Intelligence in Engineering

ENGR 4260U Automotive Engineering

ENGR 4380U Life Cycle Engineering

ENGR 4540U Energy Efficiency, Management and Simulation

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.4.7 Manufacturing Engineering and Management

See section 12.7.

12.5 Program information - Bachelor of Engineering (Honours) in Mechanical Engineering

- Comprehensive Mechanical Engineering program - BEng (Hons)
- Energy Engineering option - BEng (Hons)
- Mechatronics Engineering option - BEng (Hons)

12.5.1 General information

UOIT's four-year Mechanical Engineering program offers a Comprehensive Mechanical Engineering program, as well as Mechanical Engineering with an option in Energy Engineering or Mechatronics Engineering. These unique areas of mechanical engineering are in high demand by various industries and employers.

In the first two years, students take fundamental courses in math, sciences, and computing, as well as introductory engineering courses. Many courses in the first two years are common to many engineering programs offered at UOIT. In the last two years of study, students focus on their area of option either in traditional Mechanical Engineering (Comprehensive program) or Mechanical Engineering with an option in Energy Engineering or Mechatronics Engineering.

12.5.2 Admission requirements

See section 12.2.2.

12.5.3 Work placement/internship/co-op opportunities

See section 12.2.3.

12.5.4 Careers

Graduates of the Mechanical Engineering program will have the expertise to work and manage the work of others in areas of research, development, design, analysis, maintenance, and operations. These opportunities arise in a variety of industries and services including automotive, heavy and precision machinery, heating, ventilation and air conditioning, machines and mechanisms, transportation, dynamics and vibrations, prime movers, robotics and automation, information/telecommunications, and energy

and environment. Careers are available in private enterprise as well as government and non-government organizations. Graduates may also choose to pursue further studies for higher degrees or start their own business.

12.5.5 Professional designation

See section 12.2.5

12.5.6 Degree requirements - Mechanical Engineering: Comprehensive program

To be eligible for the BEng (Hons) degree in Mechanical Engineering (Comprehensive program), students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
ENGR 2220U Structure and Properties of Materials
ENGR 2260U Statics and Solid Mechanics
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

ENGR 2430U Dynamics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)

ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3210U Mechanical Vibrations
ENGR 3220U Machine Design
ENGR 3360U Engineering Economics**
ENGR 3390U Mechatronics
ENGR 3930U Heat Transfer

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 4210U Advanced Solid Mechanics and Stress Analysis
ENGR 4220U Mechanical Systems Design
ENGR 4280U Robotics and Automation
Engineering elective*
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 4240U Applied Thermal and Fluids Engineering
ENGR 4250U Advanced Materials Engineering
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4999U Design Thesis
Liberal studies elective*
*ELECTIVES

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

The following are approved courses as engineering electives:

- ENGR 4160U Artificial Intelligence in Engineering
- ENGR 4260U Automotive Engineering
- ENGR 4380U Life Cycle Engineering
- ENGR 4540U Energy Efficiency, Management and Simulation

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.5.7 Degree requirements - Mechanical Engineering: Energy Engineering option

To be eligible for the BEng (Hons) degree in Mechanical Engineering (Energy Engineering option), students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
ENGR 2220U Structure and Properties of Materials
ENGR 2260U Statics and Solid Mechanics
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

ENGR 2430U Dynamics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)

ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3260U Introduction to Energy Systems
ENGR 3350U Control Systems
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3320U Fluid Power Systems
ENGR 3360U Engineering Economics**
ENGR 3450U Combustion and Engines
ENGR 3930U Heat Transfer
ENGR 4240U Applied Thermal and Fluids Engineering

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 4230U Thermofluids and Energy Systems Design
ENGR 4430U Sustainable and Alternative Energy Technologies or
ENGR 4380U Life Cycle Engineering***
ENGR 4410U Fossil Fuel Energy Conversion
Engineering elective*
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3410U Electromechanical Energy Conversion or
ENGR 4440U Advanced Power Generation***
ENGR 4450U Thermal Environmental Engineering
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4999U Design Thesis
Liberal studies elective*

***Not all listed choices will necessarily be offered each year.

***ELECTIVES**

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

- ENGR 4160U Artificial Intelligence in Engineering
- ENGR 4260U Automotive Engineering
- ENGR 4380U Life Cycle Engineering
- ENGR 4540U Energy Efficiency, Management and Simulation

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.5.8 Degree requirements - Mechanical Engineering: Mechatronics Engineering option

To be eligible for the BEng (Hons) degree in Mechanical Engineering (Mechatronics Engineering option), students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming for Engineers
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
ENGR 2220U Structure and Properties of Materials
ENGR 2260U Statics and Solid Mechanics
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

ENGR 2430U Dynamics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)

ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3320U Fluid Power Systems
ENGR 3330U Circuit Design
ENGR 3360U Engineering Economics**
ENGR 3390U Mechatronics
Liberal studies elective*

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 4280U Robotics and Automation
ENGR 4310U Electronics
ENGR 4330U Mechatronic Systems Design
ENGR 4350U Microprocessors
Engineering elective*

Semester 2 (15 credit hours)

ENGR 3410U Electromechanical Energy Conversion
ENGR 4320U Advanced Mechatronics
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4999U Design Thesis
Liberal studies elective*

*ELECTIVES

Engineering electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

The following are approved courses as engineering electives:

- ENGR 4160U Artificial Intelligence in Engineering
- ENGR 4260U Automotive Engineering
- ENGR 4380U Life Cycle Engineering
- ENGR 4540U Energy Efficiency, Management and Simulation

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.5.9 Mechanical Engineering and Management

See Section 12.7.

12.6 Program information - Bachelor of Engineering (Honours) in Software Engineering

12.6.1 General information

With growing market demand, software engineering is one of Canada's newest engineering disciplines; however, there are few software engineering programs in Canada. UOIT's Software Engineering program focuses on the design of computer software and are exposed to software design for robotics, embedded systems, computer networks, real-time control systems, multi-media, and man-machine interfaces. Courses including software design, user interface, advanced networks, design and analysis of algorithms, and software project management prepare graduates for successful careers in the software engineering field.

12.6.2 Admission requirements

See section 12.2.2.

12.6.3 Work placement/internship/co-op opportunities

See section 12.2.3.

12.6.4 Careers

The software industry has grown dramatically and has significantly impacted the global economy. Mechanical and electronic devices in automobiles, airplanes, communication equipment and manufacturing systems are being replaced by software components to provide more adaptability and enhanced functionality. Software components are more easily adapted, integrated, and upgraded to meet future needs and are less expensive to implement. Graduates will find employment in both the private and public sectors. With the emerging need for more powerful and higher-quality software systems, the demand for software engineers continues to grow. Graduates may also choose to pursue further studies for higher degrees or start their own business.

12.6.5 Professional designation

See section 12.2.5.

12.6.6 Degree requirements

To be eligible for the BEng (Hons) degree in software engineering, students must successfully complete 126 credit hours, including all courses outlined below. For elective options, see the list below. For course descriptions, see section 16.

All courses in year one, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year three.

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

Approved students may undertake a co-op work term at any time before completing the program, and do so by registering in the course ENGR 0999U Engineering Co-op Program.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
 ENGR 1400U Information Technology for Engineers
 MATH 1010U Calculus I
 MATH 1850U Linear Algebra for Engineers
 PHY 1010U Physics I

Semester 2 (18 credit hours)

BUSI 2000U Collaborative Leadership
 CHEM 1800U Chemistry for Engineers
 EDUC 1470U Impact of Science and Technology on Society
 ENGR 1200U Introduction to Programming for Engineers
 MATH 1020U Calculus II
 PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

ENGR 2110U Discrete Mathematics for Engineers
ENGR 2200U Electrical Engineering Fundamentals
ENGR 2710U Software Design I
MATH 2860U Differential Equations for Engineers
Liberal studies elective*

Semester 2 (18 credit hours)

ENGR 2250U Introductory Electronics
ENGR 2450U Digital Systems
ENGR 2490U Software Project Management
ENGR 2720U Software Design II
STAT 2800U Statistics and Probability for Engineers
Liberal studies elective*

YEAR 3

Semester 1 (15 credit hours)

ENGR 3140U Computer Architecture
ENGR 3650U Software Design III - Methodology and Emerging Topics in Design
ENGR 3770U Design and Analysis of Algorithms
ENGR 3950U Operating Systems
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3360U Engineering Economics**
ENGR 3700U Data Management Systems
ENGR 3720U Software Design IV- Software Design and Artificial Intelligence
ENGR 3960U Programming Languages and Compilers
ENGR 3980U Software Quality

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the Faculty of Engineering and Applied Science, in place of ENGR 3360U Engineering Economics.

Approved students may opt to spend 12 to 16 months as an intern in an engineering setting in industry or elsewhere after year three, and do so by registering in the course ENGR 0998U Engineering Internship Program.

YEAR 4

Semester 1 (15 credit hours)

ENGR 4650U Computer Networks
ENGR 4790U Distributed Systems
ENGR 4850U User Interfaces
ENGR 4900U Software Engineering Systems Design
Engineering elective

Semester 2 (15 credit hours)

ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4830U Real Time Systems and Control
ENGR 4840U Software and Computer Security
ENGR 4890U Advanced Computer Networks
ENGR 4999U Design Thesis

ELECTIVES*Engineering electives**

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the prerequisites and the courses extend the students' knowledge through greater depth in an advanced area, or greater breadth in a complementary field.

The following are approved courses as engineering electives:

- ENGR 4800U Advanced Operating Systems
- ENGR 4860U Computer Graphics Design

Note: Not all of the listed engineering electives will necessarily be offered each year.

Liberal studies electives

See section 12.8.

12.6.7 Software Engineering and Management

See section 12.7.

12.7 Program information - Engineering and Management programs**12.7.1 General information**

The Engineering and Management combination programs meet the rapidly increasing need for engineers with the leadership skills to succeed in business and management. UOIT offers Engineering and Management programs in

- Automotive Engineering,
- Electrical Engineering,
- Manufacturing Engineering,
- Mechanical Engineering (Comprehensive program, or options in Energy Engineering or Mechatronics Engineering), and
- Software Engineering.

Students study the complete engineering program, and also gain critical management skills in key areas of business including accounting, finance, operations, human resources and marketing.

Students in these programs take two semesters of business and management courses for 30 credit hours after successfully completing third year. The regular fourth year of the engineering program is then taken in year five of the program. The two semesters of business and management courses may be taken at other years in the program with permission.

12.7.2 Admission requirements

See section 12.2.2.

12.7.3 Work placement/internship/co-op opportunities

See section 12.2.3.

12.7.4 Careers

Graduates of the engineering and management programs will be in high demand among employers in Ontario and beyond, working in areas of research, development, design, maintenance and operations in a variety of industries and services including transportation (especially automotive and aerospace), heavy and precision machinery, robotics, information/telecommunications, electronics, computer, energy, chemical, construction and other sectors.

With additional expertise in business and management, graduates of these programs will have a broader understanding of the business and management aspects of companies, allowing them to readily take on managerial roles or start their own businesses. Graduates may also choose to pursue further studies toward higher degrees. The courses in the business and management year may be creditable towards the course requirements of advanced degrees such as an MBA.

12.7.5 Professional designation

See section 12.2.5.

12.7.6 Program details and degree requirements

Bachelor of Engineering and Management (Honours) in Automotive Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Electrical Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Manufacturing Engineering and Management - BEng and Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management - BEng and Mgt (Hons)

- Comprehensive Mechanical Engineering program
- Energy Engineering option
- Mechatronics Engineering option

Bachelor of Engineering and Management (Honours) in Software Engineering and Management - BEng and Mgt (Hons)

The Engineering and Management programs follow the same program map as the four-year degree program for each option with two differences. First, in Year three, Semester two, students substitute ENGR 3360U Engineering Economics with BUSI 1700U Introduction to Entrepreneurship, or a similar business/management course approved by the Faculty of Engineering and Applied Science. Second, the program includes the addition of the following 10 courses in fourth year.

YEAR 4

Semester 1 (15 credit hours)

BUSI 1101U Financial Accounting

BUSI 2201U Marketing I

BUSI 2311U Organizational Behaviour

BUSI 2401U Finance I

ENGR 2340U Engineering Operations and Project Management I**

Semester 2 (15 credit hours)

BUSI 2170U Managerial Accounting

BUSI 2202U Marketing II

BUSI 2312U Introduction to Human Resources Management

BUSI 2402U Finance II

ENGR 2350U Engineering Operations and Project Management II**

Students take the fourth year of the appropriate engineering program in year five.

**In 2007-08, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may not run and instead may be replaced by BUSI 2603U and BUSI 2604U, respectively. Students should consult the Faculty of Engineering and Applied Science to determine which courses are running.

12.8 Liberal studies electives

Complementary studies, including courses in humanities, social sciences, arts, management, engineering economics, ethics and communication, are included in engineering programs to complement the technical content of the curriculum and thereby provide graduates with a broader perspective of their role in society. Inclusion of complementary studies also satisfies several accreditation criteria of the Canadian Engineering Accreditation Board. Courses or parts of courses covering engineering economics, ethics, and the impact of technology on society, as well as courses that develop the student's capability to communicate orally, visually and in writing, are essential to the education of an engineer and therefore are included in all engineering programs at UOIT.

Liberal studies electives are included in each engineering program to ensure adequate coverage of subject matter that deals with central issues, methodologies and thought processes of the humanities and social sciences. Such material is required in the education of an engineer. Liberal studies electives can include, but are not limited to, courses dealing with cultural analysis; historical analysis; literature and the arts; knowledge, cognition, and moral reasoning; and social and behavioural analysis. Foreign language and business courses may not be used as liberal studies. Courses can be approved as liberal studies electives for students in engineering programs at UOIT by the dean of the Faculty of Engineering and Applied Science (or designate), in accordance with these principles.

Courses selected for the liberal studies elective must be approved by the Faculty of Engineering and Applied Science. The following are approved as liberal studies electives:

- ANTH 0100T Introductory Anthropology*
- ANTH 0200T Sociocultural Anthropology*
- ANTH 0203T Technologies across Time and Cultures*
- ANTH 0204T Law and Justice across Time and Cultures*
- ANTH 0253T Aboriginal Art in North America*
- CANN 255T History of the Indians of Canada*
- CLLI 0100T Greek Drama in Translation*
- CLST 0100T Introduction to the Study of Modern Culture*
- EDUC 1200U History of Science and Technology
- ENGL 0212T Early Romantics*
- ENGL 0220T Studies in Shakespeare*
- ENGL 0253T The Age of Elizabeth*
- ENGL 1000T Introduction to English Literature*
- ENGL 1005T Introduction to English Literature II*
- ENGL 2400T Foundations in World Literature: British to Postcolonial*
- ENGL 3303T Studies in American Literature: Identities*
- ENGL 3501T Studies in Canadian Literature: Landscapes*
- GEOG 0103T Human Geographies in Global Context*
- HIST 0102T Nation and Citizenship: Interpreting Canada*
- HIST 0120T Western European History from the Middle Ages to the Present*
- HIST 0208T The Social History of Europe*
- HIST 0211T The United States from 1775-1880*
- HIST 0221T "Empire Ontario" 1867-1945*
- HIST 0222T Ontario Since 1945: From the "Common Good" to "Common Sense"*
- HIST 1001T Themes in Canadian History I*
- HIST 1002T Themes in Canadian History II*
- HIST 2402T Emergence of Modern Africa Since 1880*

- MLAL 1001T Introduction to Linguistics I*
- MLAL 1002T Introduction to Linguistics II*
- NAST 0100T Introduction to Native Studies*
- PHIL 0102T Introduction to Philosophical Inquiry*
- PHIL 0103T Introduction to Philosophical Inquiry*
- PHIL 0104T Informal Logic*
- PHIL 0214T Introduction to Existential Philosophy*
- PHIL 0275T Philosophy of Religion*
- PHIL 0279T Philosophy of Art*
- PHIL 1000U Philosophy: Social and Political Issues
- PHIL 1010U Ethical Reasoning and Critical Thinking
- PHIL 282T East Asian Philosophy: China and Japan*
- POSC 0100T Governance and Globalization - Politics in the 21st Century*
- POSC 1000U Political Science
- PSYC 0101T Introduction to Psychology*
- PSYC 0102T Introduction to Psychology I*
- PSYC 0103T Introduction to Psychology II*
- PSYC 1000U Introductory Psychology
- PSYC 2010U Developmental Psychology
- SOCI 0100T Introduction to Sociology*
- SOCI 1000U Introductory Sociology
- SSCI 1000U Introduction to Criminal Justice
- SSCI 1200U Introduction to Social Policy
- SSCI 2010U Criminal Law
- SSCI 2011U Customs and Immigration Law
- SSCI 2020U Issues in Diversity
- SSCI 2021U Issues in the Family
- SSCI 2050U Rights and Freedoms in the Justice System
- SSCI 2280U The Information Society
- SSCI 2800U Social Theory Foundations
- SSCI 2810U Sociological Theories of Crime
- SSCI 2820U Psychological Explanations of Criminal Behaviour
- WMST 0237T Women and the Law*
- WMST 0238T Women and the Criminal Justice System*
- WMST 212T Women and Health*

*Offered through Trent University at the University of Ontario Institute of Technology.
Other liberal studies electives will be identified in the future.

12.9 First-year Engineering Transition Program

The objective of the First-year Engineering Transition Program is to provide first-year engineering students with an opportunity, before the start of second year, to complete first-year courses for which they have not obtained credit, to upgrade their grade point average and academic standing, and to improve their preparation for studies in subsequent years.