Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

COURSE AND OPTIONS SELECTION HANDBOOK

MECHANICAL ENGINEERING

4TH YEAR

WHAT IS COURSE & OPTIONS SELECTION ?

Each year the Office of the Registrar asks you to provide them with indicators as to which program option and technical elective courses you plan to take in the coming academic year. **The information that you provide to us through Course and Options Selection (COS) helps us identify the demand for program options and courses. This information is used for the course scheduling process and for uploading your course selections to ROSI.** You do not need to select your core courses in COS, these will be uploaded automatically to ROSI. When selecting your technical electives be sure that your selections meet the program requirements for your program of study.

Please be advised that students who do not participate in COS will not be guaranteed a space in technical elective courses, so it is in your interest to complete the survey. The enrollment caps on technical elective courses are set according to the demand indicated to us via the COS data.

Even though you have made your course selections through COS it is not possible to schedule every technical elective available to a program of study conflict free. The information collected from COS does however help the faculty minimize conflicts between technical electives that students have chosen.

We greatly appreciate your cooperation with this exercise, and we strongly suggest that you to take five minutes of your time to complete the survey. Even if you are returning from, or planning to go on PEY next year, we would still ask that you participate in completing the survey.

The COS website will be activated as of Tuesday, February 18, and will remain active until midnight, Tuesday, March 4.

COS Website Login
http://www.apsc.utoronto.ca/cos

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IMPORTANT DATES

DATE	
February 18 to March 4	**COURSE & OPTION SELECTION OPENS** **www.apsc.utoronto.ca/cos** Students may now login and make their curriculum selections for the upcoming academic year
March 7	**LAST DAY FOR STUDENTS TO APPLY TO RE-ENROL OR SWITCH TO FULL-TIME FOR 2014 FALL SESSION***
Mid-July	**TIMETABLES BECOME AVAILABLE ON ROSI**
July 22	**COURSE SELECTION (ROUND 1) OPENS** **www.rosi.utoronto.ca** For electives offered by the Faculty of Engineering and Enhanced Enrollment Arts & Science electives. Students may now make changes to their timetable
August 6	**COURSE SELECTION (ROUND 2) OPENS** **www.rosi.utoronto.ca** For electives offered by the Faculty of Arts & Science
Mid to Late August	**MIE491 CAPSTONE PROJECT SELECTION**
August 22	**LAST DAY TO PAY OR DEFER TUITION FEES**

*For students who are returning to fourth year from a year off or wanting to switch to full-time for their final year of study.

IMPORTANT DATES

DATE	
September 4	**ENGINEERING FALL (F) LECTURES BEGIN** Last day to receive a 100% tuition refund if you are choosing to withdraw for the 2014-2015 academic year.
September 15	**DEADLINE TO SUBMIT TECHNICAL ELECTIVE SUBSTITUTION REQUESTS FOR 4F** **DEADLINE TO SUBMIT THESIS ENROLLMENT FORMS FOR FALL (F) & FULL-YEAR (Y) PROJECTS** **DEADLINE TO SUBMIT COURSE REQUEST FORMS FOR FALL (F) & FULL-YEAR (Y) COURSES**
September 21	**FALL (F) & FULL-YEAR (Y) COURSE ADD DEADLINE** Last day to add or substitute Fall (F) or Full-Year (Y) Session courses Last day to receive a 100% tuition refund (with a minimum charge of $242) if you are choosing to withdraw for the 2014-2015 academic year.
November 3	**FALL (F) COURSE DROP DEADLINE** Last day to drop Fall (F) Session courses without academic penalty, withdraw from the Fall (F) session without academic penalty, or transfer to part-time studies for the Fall (F) session Last day to receive a 50% tuition refund if you are choosing to withdraw for the 2014-2015 academic year.

IMPORTANT DATES

DATE	
January 5	**ENGINEERING WINTER (S) LECTURES BEGIN**
January 12	**DEADLINE TO SUBMIT TECHNICAL ELECTIVE SUBSTITUTION REQUESTS FOR 4W** **DEADLINE TO SUBMIT THESIS ENROLLMENT FORMS FOR WINTER (S) PROJECTS** **DEADLINE TO SUBMIT COURSE REQUEST FORMS FOR WINTER (S) COURSES**
January 18	**WINTER (S) COURSE ADD DEADLINE** Last day to add or substitute Winter (S) Session courses
January 31	**DEADLINE TO SUBMIT PER HOURS FOR JUNE CONVOCATION**
Early March	**IRON RING CEREMONY**
March 8	**WINTER (S) & FULL YEAR (Y) COURSE DROP DEADLINE** Last day to drop Winter (S) Session and Full-Year (Y) courses without academic penalty, withdraw from the Winter (S) session without academic penalty, or transfer to part-time studies for the Winter (S) session.
March 20	**NAME CHANGE DEADLINE** Deadline to submit any name changes to the Office of Convocation that are to appear on your degree
June	**CONVOCATION** Congratulations!

CURRICULUM

FALL SESSION - YEAR 4		LEC/LAB/TUT/WGT.
CORE REQUIRED COURSES		
Capstone Design	MIE491Y1	-/-/4/1.00
STREAM OPTIONS (TWO OF):		
MANUFACTURING		
Automated Manufacturing	MIE422H1	2/3/-/0.5
MECHATRONICS		
Control Systems I	MIE404H1	3/3/2/0.5
SOLID MECHANICS & DESIGN		
Machine Design	MIE442H1	3/1.5/3/0.5
ENERGY & ENVIRONMENT		
Thermal Energy Conversion	MIE411H1	3/3/-/0.5
BIOENGINEERING		
Biotransport Phenomena	MIE520H1	3/-/1/0.5

CAN I CHANGE MY STREAMS IN FOURTH YEAR?
No. In order to graduate, you must take a course following each of your stream selections in 3W. If you find another 4F stream course interesting, you may take it in place of a technical elective in addition to your two continued stream courses.

TECHNICAL ELECTIVES (ONE OF):		
Aerodynamics	AER307H1	3/-/1/0.5
Robotics	AER525H1	3/1.5/1/0.5
Operating Systems	ECE344H1	3/3/-/0.5
Industrial Ergonomics and the Workplace	MIE343H1	3/3/-/0.5
Systems Modelling and Simulation	MIE360H1	3/2/1/0.5
* Applied Fluid Mechanics	MIE414H1	3/3/1/0.5
* Design of Innovative Products	MIE440H1	2/2/1/0.5

CURRICULUM

TECHNICAL ELECTIVES (ONE OF):		
* Mechatronics Principles	MIE444H1	2/3/-/0.5
Engineering Psychology and Human Performance	MIE448H1	3/3/-/0.5
Research Thesis	MIE498H1	-/-/4/0.5
Research Thesis	MIE498Y1	-/-/4/1.0
Alternative Energy Systems	MIE515H1	3/-/1/0.5
Combustion and Fuels	MIE516H1	3/-/1/0.5
Introduction to Polymer Engineering	MSE330H1	3/-/1/0.5
Materials Selection in Design II	MSE401H1	2/2/1/0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	0.5

WHAT IS A (*) COURSE?
Courses designated with an (*) are courses that have a strong emphasis on design. MIE students are to take one (*) designated course in their fourth year, either in the fall or winter semester.

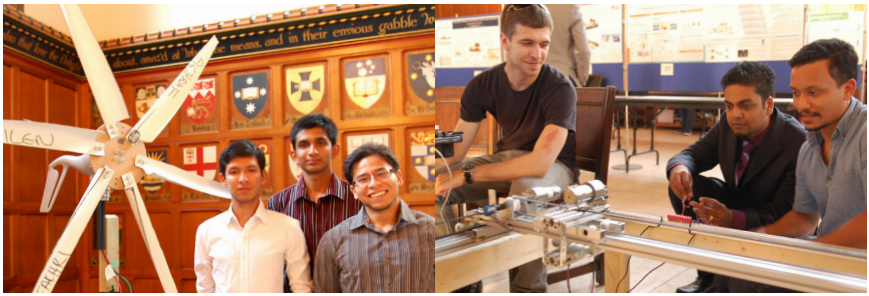
CURRICULUM

WINTER SESSION - YEAR 4		LEC/LAB/TUT/WGT.
CORE REQUIRED COURSES		
Capstone Design	MIE491Y1	-/-/4/1.00
TECHNICAL ELECTIVES (THREE OF):		
Biocomposites: Mechanics and Bioinspiration	CHE475H1	3/-/1/0.5
Environmental Impact and Risk Assessment	CIV440H1	3/-/1/0.5
Operating Systems	ECE344H1	3/3/-/0.5
Innovation and Manufacturing of Sustainable Materials	FOR424H1	3/-/-/0.5
Vibrations	MIE402H1	3/1/2/0.5
Nuclear Reactor Theory and Design	MIE407H1	3/-/2/0.5
* Thermal and Machine Design of Nuclear Power Reactors	MIE408H1	3/-/2/0.5
Microprocessors and Embedded Microcontrollers	MIE438H1	2/3/-/0.5
Biomechanics I	MIE439H1	3/2/-/0.5
* Design Optimization	MIE441H1	3/2/-/0.5
* Mechatronics Systems: Design and Integration	MIE443H1	2/5/-/0.5
* Smart Materials and Structures	MIE464H1	3/2/-/0.5
Reliability and Maintainability Engineering	MIE469H1	3/-/2/0.5
Research Thesis	MIE498H1	-/-/4/0.5
Research Thesis	MIE498Y1	-/-/4/1.0
Applied Computational Fluid Dynamics (CFD)	MIE504H1	3/-/-/0.5
* MEMS Design and Microfabrication	MIE506H1	3/1.5/1/0.5
Fuel Cell Systems	MIE517H1	3/-/1/0.5
* Product Design	MIE540H1	3/-/1/0.5

CURRICULUM

TECHNICAL ELECTIVES (THREE OF):		
Advanced Momentum, Heat and Mass Transfer	MIE550H1	3/0/0/0.5
Engineering Analysis II	MIE562H1	3/2/2/0.5
Surgical and Dental Implant Design	MSE442H1	3/-/1/0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	0.5

MIE491/APS490: CAPSTONE DESIGN



The capstone design course provides an experience in engineering practice through a significant design project. Student teams meet specific client needs through a creative, iterative, and open-ended design process.

Throughout the fourth year of your program, you will work with a faculty Supervisor and an industry Client on a Capstone Design Project. The Capstone Design Project provides you with an opportunity to work on a problem of real value to your Client. You will work with them and your Supervisor to define your project goals (within the scope of the problem identified), to decide how you will go about achieving these goals and to organize yourself to achieve them.

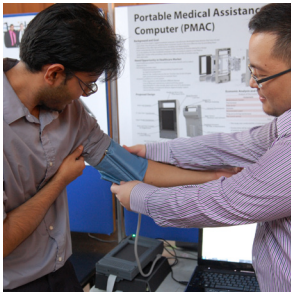
All capstone projects fall into one of the following categories:

STANDARD CAPSTONE PROJECT: These projects are sourced by Capstone Coordinators and each project is supervised by a single MIE Faculty member. Students are matched with projects in early September.

STUDENT-SOURCED CAPSTONE PROJECT: These projects are sourced by students through PEY, eSIP employer or other industry contacts. Students must form a team and find a single MIE faculty member to supervise their project. Students interested in this type of project must submit for approval by mid-June.

CAPSTONE INNOVATION PROJECTS: The projects are sourced by University or MIE faculty members. These projects entail the design of new and patentable technologies, and come along with high risk, high visibility, and high impact potential. Students are supervised by a single MIE faculty member. ***Competitive Selection**

MIE491/APS490: CAPSTONE DESIGN



MULTIDISCIPLINARY PROJECTS (APS490Y): These projects are sourced by capstone coordinators across the Faculty of Applied Science and the Multidisciplinary Capstone course coordinator. These projects require team members from at least two disciplines and are supervised by a single engineering faculty member. ***These projects have an accelerated self-selection and matching process, and require a competitive interview.**

INTERNATIONAL CAPSTONE PROJECTS: These projects are sourced by the International Capstone coordinator. In these projects, students work with University partners from China, Hong Kong and USA. ***Competitive Interview Required**

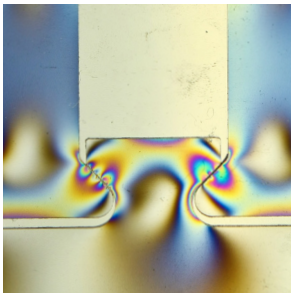
PROJECT SELECTION

For those interested in the **Multidisciplinary** or **International** Capstone Projects, you must submit your name by **February 28, 2014.**

For those interested in the **Student-sourced** projects, you must submit your project for review by **June 13, 2014.**

For those interested in **Standard Capstone Projects** or **Capstone Innovation Projects**, you will be contacted mid-August to initiate the matching process.

MIE498H1/Y1: RESEARCH THESIS



The purpose of MIE498 is two-fold: to let students pursue a technical project of interest, and to improve their communication skills. **It is particularly useful for students thinking about graduate school and who want to learn more about engineering research**. Preparing a Progress Report and a Thesis gives students experience in technical writing, and making oral presentations about their projects helps students improve their oral communication skills. MIE498 is an important course in the curriculum because an engineering graduate should be able to present to prospective employers proficiently.

Formal approval to register for the fourth-year thesis must be obtained from the Undergraduate Office. **Enrollment in our thesis course is restricted to students with an overall average of 75%.** This criterion can be relaxed under exceptional circumstances with the written approval of the supervisor.

At the beginning of the term, students will establish with the supervisor, in writing, which reports are to be submitted, the content of these reports, their due dates, and the grading scheme. **The Thesis Topic Form, however, must be submitted to the undergraduate office by one week before the course add date and is not negotiable.** Notice that your supervisor may choose to follow these guidelines, but modifications may be desirable to best fit the nature of the thesis.

In the event your thesis project is not approved, as part of COS and on course selection day, please select a back-up approved curriculum technical elective. By submitting your thesis form on time, you will receive a decision before the course add deadline.

ENROLLMENT PROCEDURE

1. Find a supervisor and a thesis topic: You can review the available thesis topics at **www.mie.utoronto.ca/undergrad/thesis-projects** or you can independently contact MIE faculty members who you are interested in working with. The website will be updated with project submissions as they become available.

MIE498: THESIS

2. Once you have found a faculty member who will supervise you, complete a thesis enrollment form. Ensure that your supervisor signs the form. This form is available at **www.mie.utoronto.ca/undergrad/thesis-projects**

3. Attach a 1-page outline of the project you plan to undertake:

    » Explain how the research project builds upon one or more aspects of engineering science introduced in the student's academic program

    » Provide an estimate of a level of effort not less than 40 productive hours of work per term

    » Specify a deliverable in each term to be submitted by the last day of lectures

4. Submit your completed thesis enrollment form and 1-page outline to the MIE Undergraduate Office by the following deadlines:

    » **September 15** for a fall-term (MIE498H1F) or full year (MIE498Y1Y) thesis

    » **January 12** for a winter-term (MIE498H1S) thesis

5. If approved, your research thesis will be added to your transcript on ROSI by the MIE Undergraduate Office. If it is not approved, we will notify you by email.

MANUFACTURING

Manufacturing, the transformation of materials and information (technology) into useful products for human beings, is the cornerstone to many economic activities. It is a versatile skill, with employment opportunities existing over a wide range of Canadian industry, including automotive, microelectronics, aeronautics, pharmaceutical, etc.

It is an exciting, creative field, where engineers get to design from cradle-to-grave. You must understand how an idea can be produced, and at what cost. This design may also include the manner the product should be disposed of or recycled. It is a truly international field, with demand around the world. Within Canada , average earnings of all employees in manufacturing are 22% higher than average earnings across all economic occupations in Canada.

STREAM COURSES

Evaluations & Textbook information accurate as of 2013/2014. Please note that this information is subject to change and should be used as a general guide ONLY

4F - MIE422H1S - AUTOMATED MANUFACTURING

Introduction to Computer Integrated Manufactuing. Definitions, terminology. Organization of manufacturing systems. Introduction to NC machines. Introduction to robotics. Types of robot motion. Robot kinematics. Jacobians, singularities. Robot motion trajectories. Interpolation, spline fits. Robot joint control. Flexible manufacturing systems, justification. Robot cell design. Group technology. Design of group technology cell. Programmable logic controllers.

TOPICS: Introduction to Computer Integrated Manufacturing, Introduction to robotics and kinematics, CNC Basics, CNC Programming, Programmable Logic Controllers (PLCs) FMS, Table-top manufacturing, Group technology

EVALUATIONS: Labs - 25%, Midterm - 25%, Final Exam - 50%

TEXTBOOK: N/A

MANUFACTURING

FIELDS OF APPLICATION

Automation, Manufacturing Management (Logistics), Funamental Technology

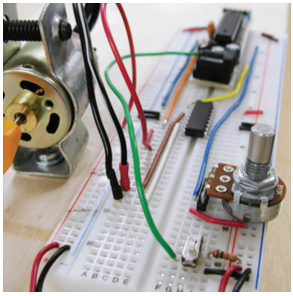
COMPANIES

Bombardier, Celestica, General Electric of Canada, Honda of Canada Manufacturing, Pepsico, Procter and Gamble, Ford Motor Company

LINKS

Canadian Society of Manufacturing Engineers
www.sme.org/smecanada

MECHATRONICS



Ten years ago it was comparably easy to explain the functions of a camera to a young engineer, even though the mechanisms were complex. Today, it is nearly impossible since the design of a camera not only involves mechanics and optics, but also electronics and software. The design of such products and processes requires a synergetic combination of mechanical and electrical engineering and computer science.

As with our mechanical engineering program, mechatronics at UofT emphasizes design. You will learn the skills needed to design and build mechatronic systems and that includes mechanical design (mechanical, hydraulic, pneumatic, thermal), electronic design, programming skills and their integration into functional systems.

As Canada's largest and oldest mechatronics program, you will have access to well-established labs where you put theory into action as well as cutting edge technology provided by our outstanding professors, support engineers and graduate students. Remember, UofT is Canada's best research university! You benefit from our established mechatronics graduate studies. As part of the 4th year Mechatronics Principles course (MIE 444F), students are divided into small groups and asked to develop an autonomous vehicle that will navigate through a maze. The class is concluded with a competition.

STREAM COURSES

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4F - MIE404H1S - CONTROL SYSTEMS I

Analysis of stability, transient and steady state characteristics of dynamic systems. Characteristics of linear feedback systems. Design of control laws using the root locus method, frequency response methods and state space methods. Digital control systems. Application examples.

TOPICS: MATLAB & Simulink, Feedback control and PID, Root Locus Design, Frequency Response Analysis, Magnetic Levitation

MECHATRONICS

EVALUATIONS: Labs - 10%, Midterm - 25%, Term Project - 15%, Final Exam - 50%

TECHNICAL ELECTIVES

AER525: Robotics
ECE344: Operating Systems
*MIE444: Mechatronics Principles
MIE438: Microprocessors and Embedded Controllers
MIE443: Mechatronics Systems: Design & Integration
MIE506: MEMS Design & Microfabrication

FIELDS OF APPLICATION

Robotics, Sensing and Control Systems, Medical imaging, Computer aided and integrated manufacturing systems, Microcontrollers/PLCs, Mobile Apps

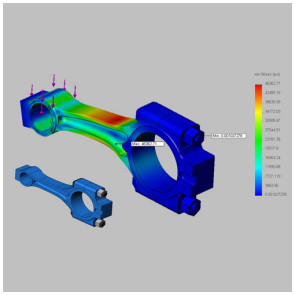
COMPANIES

National Instruments, TESLA, Advanced Micro Devices (AMD)

LINKS

Institute for Robotics and Mechatronics
irm.utoronto.ca

SOLID MECHANICS & DESIGN



Solid mechanics is the analysis of stress, strain and deflection. It is one of the core technical areas of mechanical engineering. Applications of solid mechanics are common in: the design of virtually every product; creating manufacturing processes and equipment; biomechanics as related to medicine and dentistry; many fields of graduate research.

STREAM COURSES

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4F - MIE442H1F - MACHINE DESIGN

Introduction to the fundamental elements of mechanical design including the selection of engineering materials, load determination and failure analysis under static, impact, vibration and cyclic loads. Surface failure and fatigue under contact loads, lubrication and wear. Consideration is given to the characteristics and selection of machine elements such as bearings, shafts, power screws and couplings.

EVALUATIONS: Project - 25%, Quiz 1 - 5%, Midterm Test - 15%, Quiz 2 - 5%, Final Exam - 50%. In place of your project, you may choose to take two machine shop courses at George Brown College. The courses are

FIELDS OF APPLICATION

Geomechanics (Modeling the shape of planets, tectonics, and earthquake prediction), Infrastruction (Designing foundations or structures), Mechanical Design (Desiging load bearing components for vehicles, powertrain design), Manufacturing (Metal and polymer forming processes, machining), Biomedical (Implant design, bone mechanics, modeling stress phenomena controlling cellular and molecular processes), Materials Science (Composite design, allow microstructions, material processing design), Microelectronics (Failure resistant packaging)

SOLID MECHANICS & DESIGN

TECHNICAL ELECTIVES

*MIE464: Smart Materials and Structures
MIE402: Vibrations
*MIE408: Thermal and Machine Design of Nuclear Power Reactors
MIE439: Biomechanics I

COMPANIES

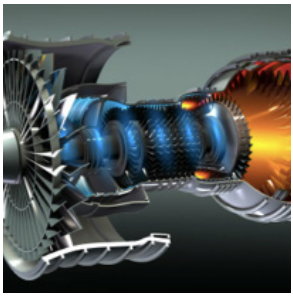
Bombardier, Celestica, General Electric of Canada, General Motors of Canada, Honda of Canada Manufacturing, Procter and Gamble Canada, Toyota Canada

LINKS

The Canadian Society for Mechanical Engineering
www.csme-scgm.ca

The Society of Automotive Engineers
www.sae.org

ENERGY & ENVIRONMENT



The energy industry is one of the biggest in Canada , dominated by oil and gas, nuclear power and electricity. Environmental engineers play a pivotal role in improving polluted environments, designing facilities that directly affect our modern economy, public health and safety, and designing environmentally-responsible products and processes. Their knowledge of physics, chemistry, and biological processes allows them to address problems such as protecting air, water and land quality; providing safe drinking water; treating and disposing of industrial wastes; preventing environmental problems by designing "cleaner" manufacturing processes; and developing alternative energy sources. Mechanical engineers in this field have a strong foundation in thermal dynamics and fluid mechanics. Engineers with a firm knowledge of environmental processes and solutions are widely sought after by employers in both industry and government.

STREAM COURSES

Evaluations & Textbook information accurate as of 2013/2014. Please note that this information is subject to change and should be used as a general guide ONLY

4F - MIE411H1F: THERMAL ENERGY CONVERSION

Engineering applications of thermodynamics in the analysis and design of heat engines and other thermal energy conversion processes within an environmental framework. Steam power plants, gas cycles in internal combustion engines, gas turbines and jet engines. Refrigeration, psychrometry and air conditioning. Fossil fuel combustion and advanced systems includes fuel cells.

TOPICS: Vapor Power Cycles, Gas Power Cycles, Refrigeration and Heat pumps, Psychrometry and ideal Gas Mixture, Efficient Energy Utilization

EVALUATIONS: Assignments - 14%, Laboratory Attendance - 3%, Laboratory Report - 8%, Midterm Exam - 32%, Final Exam - 43%

TEXTBOOK: Fundamentals of Engineering Thermodynamics, 7th Ed. (Moran & Shapiro)

ENERGY & ENVIRONMENT

TECHNICAL ELECTIVES

AER307: Aerodynamics
MIE414: Applied Fluid Mechanics
MIE515: Alternative Energy Systems
MIE516: Combustion and Fuels
MIE407: Nuclear Reactor Theory and Design
MIE408: Thermal and Machine Design of Nuclear Reactors
MIE504: Applied Computational Fluid Dynamics (CFD)
MIE550: Advanced Momentum, Heat and Mass Transfer

FIELDS OF APPLICATION

Power generation, Automotive (engine design, intake, exhaust, and cooling system design), Aerodynamics (Wind power systems, car body design), Fluid pumping systems (Oil and gas pipelines), Manufacturing (Die-casting, metal processing), Electronics (electronics cooling, ink-jet printing), MEMS systems (microfluidics), Environmental assessment (pollution control).

COMPANIES

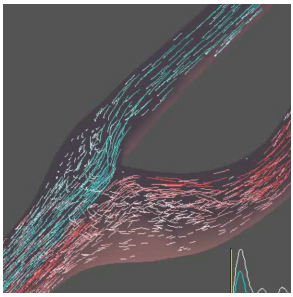
Ontario Power Generation, Hatch, General Motors, Bombardier, HydroOne

LINKS

Association of Energy Engineers
www.aeecenter.org

Institute for Sustainable Energy
energy.utoronto.ca

BIOENGINEERING



Biomedical engineers design and develop products for the most complex system on earth – the human body. Artificial organs, medical imaging devices, drug delivery systems are innovative and lifesaving solutions that arise from applying engineering principles to medical problems. Biomedical engineering jobs are expected to increase by 31.4% over the next seven years, more than double the average predicted rate in other fields.

STREAM COURSES

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4F - MIE520H1F - BIOTRANSPORT PHENOMENA

Prerequisite: MIE312H1F

Application of conservation relations and momentum balances, dimensional analysis and scaling, mass transfer, heat transfer, and fluid flow to biological systems, including: transport in the circulation, transport in porous media and tissues, transvascular transport, transport of gases between blood and tissues, and transport in organs and organisms.

TOPICS: Control Volume Approach (Reynold's Transport Theorem - mass and momentum), Differential Approach (Fluid Statics, Rheology, Navier-Stokes, Euler, Bernoulli), Dimenional Analusis, Real Flows, Mass Transfer, Heat Transfer

EVALUATIONS: Assignments - 10%, Project - 15%, Midterm - 25%, Final Exam - 50%

TEXTBOOK: Transport Phenomena in Biological Systems, 2nd Edition, by G.A. Truskey, F. Yuan and D.F. Katz

TECHNICAL ELECTIVES

MIE448: Engineering Psychology and Human Performance
CHE475: Biocomposites: Mechanics and Bioinspiration
MIE349: Biomechanics I
MSE442: Surgical and Dental Implant Design

BIOENGINEERING

FIELDS OF APPLICATION

Bioinformatics (software for bio modelling), Biotechnology (products related to agriculture & environment), Instrumentation and Diagnostics (tools for research, hospital diagnostic equipment), Medical Devices (prosthetics, pace makers), Therapeutics (Pharmaceuticals), Biomedical Suppliers (development of lab and medical equipment)

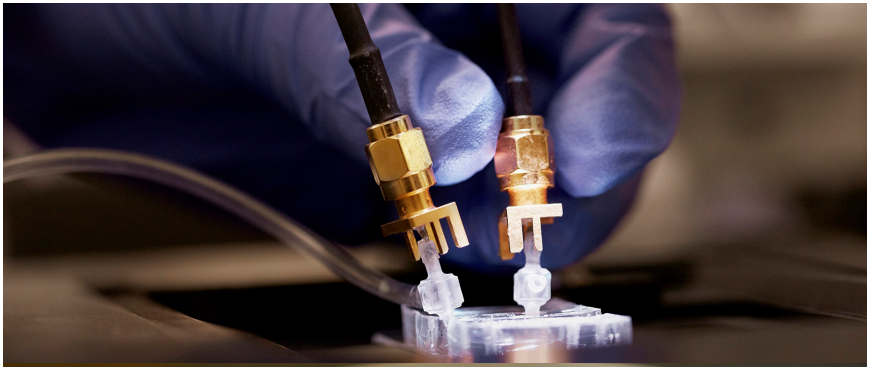
COMPANIES

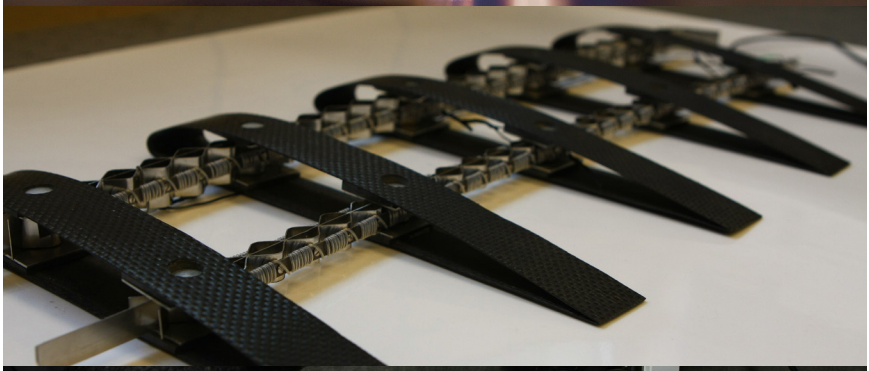
Thornhill Research Inc., Colibri Technologies, Baylis Medical Company, Apotex, The Hospital for Sick Children

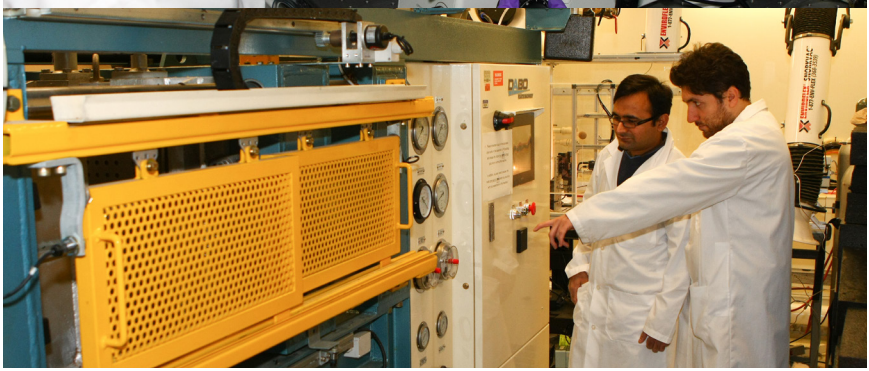
LINKS

Institute of Biomaterials and Biomedical Engineering (IBBME)
ibbme.utoronto.ca

Club for Undergraduate Biomedical Engineering (CUBE)
cube.skule.ca







DEGREE REQUIRMENTS

DEGREE EXPLORER

degreeexplorer.utoronto.ca

Degree Explorer is a tool designed to help students and advisors evaluate academic progress towards completion of requirements for graduation. Your assessment will be considered official only if confirmed by your department/division.

There is a planner tool that allows you to map out your degree and can help you determine if you are on track. Just because you are eble to enrol in a course on ROSI does not mean it will fullfill your degree requirements. To make sure the electives you plan to chose fullfill your degree requirements, consider using the "Planner" tool within degree explorer.

SUMMARY OF DEGREE REQUIREMENTS - AEMECBASC

CORE COURSES

Students must complete all core courses.

FIRST YEAR: APS111H1F, CIV100H1F, MAT186H1F, MAT188H1F, MSE101H1F, APS106H1S, APS112H1S, ECE110H1S, MAT187H1S, MIE100H1S

SECOND YEAR: MIE230H1F, MIE231H1F, MIE258H1F, MSE270H1F, MAT234H1S, MIE210H1S, MIE221H1S,MIE222H1S

THIRD YEAR: MIE301H1F, MIE312H1F, MIE334H1F, MIE342H1F, MIE315H1S, MIE333H1S, MIE341H1S

FOURTH YEAR: MIE491H1F

SEMINAR COURSES

Students must complete APS150H1F, MIE191H1S, MIE297H1S and MIE397Y1Y in order to graduate.

NATURAL SCIENCE (NS)

To graduate, you must take a 0.5 credit natural science course. 0.5 credits = 1 half-year course. This is typically taken in 3F.

DEGREE REQUIRMENTS

COMPLEMENTARY STUDIES (CS) AND HUMANITIES & SOCIAL STUDIES (HSS)

To graduate, you must take 2.0 credits in complementary studies, of which at least 1.0 credits are HSS courses. 1.0 credits = 1 full year course or 2 half-year courses. These are typically taken in second and fourth year.

STREAM COURSES

Students must select two different streams in 3W. In 4F, students must take one required course from each of the same two streams followed in 3W.

TECHNICAL ELECTIVES

Students take one technical elective in 4F, and three technical electives in 4W. Students are required to include at least one of the engineering design courses marked with a star (*) during the fourth year (See Page 7). It may be taken in either 4F or 4W. In 4F, students may select an additional course from the Stream Courses list to substitute for the technical elective. Students are permitted to take at most two technical elective substitutes in their fourth-year, but are required to obtain formal Departmental approval from the Undergraduate Office. Students may take only one of MIE422H1 (Automated Manufacturing) or AER525H1 (Robotics).

PRACTICAL EXPERIENCE REQUIREMENT (PER)

Every student must complete a minimum of 600 hours of practical work before graduation. The nature of the work should form an integral part of a student's education and career development. It therefore must contain a good measure of responsibility (e.g., management of programs, systems, equipment, personnel, or finances), sound judgment and effective communication, and be supportive of the professional career of the student after graduation. Work in many facets of industry, government or public service would be acceptable for this requirement. This PER requirement can be obtained through summer internships. To add PER hours, please complete the **Practical Experience Form** (www.mie.utoronto.ca/undergrad/forms) and submit it to the MIE Undergraduate Office. If you have completed PEY (12-16 month internship), you have fullfilled the PER requirement and do not need to submit a PER form to the MIE Undergraduate Office.

ENGINEERING MINORS & CERTIFICATES

ENGINEERING MINORS & CERTIFICATES

In addition to academic programs in Core 8 subjects/TrackOne and Engineering Science, undergraduate Engineering students may pursue a number of minors and certificates that add breadth and depth to their academic careers.

To obtain a minor, students must take six (6) courses in a particular field. Currently, the faculty offers minors in the following: Bioengineering, Environmental Engineering, Sustainable Energy, Robotics and Mechatronics, Engineering Business. To obtain a certificate, students must take three (3) courses in particular field. Currently, the faculty offers certificates in the following: Engineering Business, Global Engineering, Entrepreneurship, Preventative Engineering and Social Development, Mineral Resources, Nuclear Engineering. Students complete their minor using their electives in Second, Third and Fourth Year and therefore should consider these minors while selecting their courses

HOW DO I ENROL IN A MINOR?

Each minor has a specific enrolment form for you to complete and submit to the Cross-Disciplinary Programs Office. Please visit **uoft.me/engminors Please note that enrolling in a minor does not guarantee you a spot in any of the engineering minor electives (for example, JRE300), as they are open to everyone.** To avoid dissappointment, plan ahead and select courses early (6 AM) on course selection days. You are responsible for making sure you fullfill your degree and minor requirements.

WHEN CAN I ENROL IN A MINOR?

Students can enrol in an Engineering Minor at any time in their program.

WHAT'S THE DIFFERENCE BETWEEN A MINOR AND A STREAM?

A minor appears on your Bachelor of Applied Science (BASc) degree upon graduation, unlike your stream choices which do not.

I DIDN'T GET INTO THE COURSES I WANTED TO, AND I'M WORRIED I WONT FINISH MY MINOR BEFORE GRADUATION. WHAT DO I DO?

Due to popularity, many engineering minor courses are offered in the summer. You are also welcome to complete those courses following graduation, it just may not appear on your degree until later. You can also visit the Cross-Displinary Programs Office to de-enrol you in a minor.

ENROLLMENT AND REGISTRATION

HSS/CS ELECTIVES

Complementary Studies (CS) can be broadly defined as studies in humanities, social sciences, arts, management, engineering economics and communication that complements technical curriculum. **Engineering, math or science courses—including astronomy and psychology—may not be used to fulfill your CS elective requirements.** Humanities & Social Studies (HSS) courses are a subset of CS courses, so you may take HSS-designated courses to fulfill your CS elective requirements. In general, MechE students take their HSS/CS electives in 2nd and 4th year.

To graduate, you must take 2.0 credits in complementary studies, of which at least 1.0 credits are HSS courses. 1.0 credits = 1 full year course or 2 half-year courses.

The University of Toronto's Faculty of Arts & Science teaches a large number of courses that cover topics in complementary studies, though not all are suitable to fulfill your CS/HSS elective requirements. For a list of faculty approved elective lists, please consult the following links:

HSS Courses http://uoft.me/hss
CS Courses http://uoft.me/cselectives

If an elective you are interested in taking is not on those lists and you feel it meets the criteria described above, you may submit a proposal to the faculty to approve an HSS/CS course **http://uoft.me/proposecs**

I'M NOT SURE IF THE COURSES I'D LIKE TO TAKE ARE APPROVED HSS OR CS COURSES. WHERE CAN I CHECK?

You can enter them into the Degree Explorer Planner (degreeexplorer.utoronto.ca) to see if they work to fullfil your HSS/CS requirements. You may also check if the course code appears on either of these lists: **http://uoft.me/hss** or **http://uoft.me/cselectives.**

CAN I TAKE EXTRA ENGINEERING COURSES TO FULLFILL MY HSS/CS REQUIREMENTS?

No. Engineering, math or science courses—including astronomy and psychology—may not be used to fulfill your CS elective requirements.

ENROLLMENT AND REGISTRATION

WILL MY HSS/CS ELECTIVES BE ADDED TO MY TIMETABLE AUTOMATICALLY? WHAT IF I AM ENROLLED IN A MINOR THAT REQUIRES THAT COURSE?
No, you must add them yourself on course selection days. Enrolling in a minor does not guarantee you a spot in the required courses for your minor, as they are open to everyone on course selection day. Plan ahead and act early (6 AM) to avoid dissappointment.

WHAT ARE ENHANCED ENROLMENT ARTS & SCIENCE ELECTIVES?
Based on student feedback indicating that it can be difficult to enrol in desired elective courses due to the priority given to Arts & Science students, the Engineering Registrar's Office has worked with the Faculty of Arts & Science to allow Engineering students to have early access and reserved spaces in some popular CS/HSS elective courses. As a result, Engineering students will be able to add select Arts & Science course sections starting on July 22 at 6 AM. For a list of these courses, consult the Enrolment and Registration Guide available on the faculty website.

I'M NOT SURE WHICH ELECTIVES TO TAKE.
The Arts & Science Student's Union puts together a publication called the Anti-Calender, which provides honest student feedback about many arts & science elective courses offered. **http://assu.ca/anti-calendar** You may also wish to consult upper-year students in regards to your elective choices.

NATURAL SCIENCE ELECTIVES

Natural Sciences (NS) are defined by the Canadian Engineering Accreditation Board as a component of the curriculum that includes elements of physics, chemistry, life sciences, or earth sciences. In general, MechE students take their Natural Science elective in 3rd year.

To graduate, you must take a 0.5 credit natural science course. 0.5 credits = 1 half-year course.

MIE offers CHE353, CIV220, and CIV300 as natural science electives. The faculty has since extended the list of approved natural science electives. Consult this link **http://uoft.me/nse** for the extended list. You do not need formal MIE approval to take courses from this list. If the course has prerequisites you have not taken, please meet with the specific department offering the course to discuss your eligibility.

ENROLLMENT AND REGISTRATION

OVERLOADS

Students that wish to take extra courses in addition to a full course load (to fullfil a minor for example), must obtain formal approval from the Undergraduate Office. **In general, a student wishing to overload must have obtained an overall 75% average or above in the previous academic semester.** If you have failed a course and must overload in order to graduate on time, this requirement may be waived. If you do not obtain formal approval to overload during the year, please consider that many engineering minor courses are also offered in the summer. To apply to overload, submit an **Overload Request Form** (www.mie.utoronto.ca/undergrad/forms) to the Undergraduate Office by the course add deadline. If you are unsure, add the courses on the course selection dates to secure a spot in the event your overload request is approved.

"EXT" OR EXTRA COURSES

Students who are overloading with an extra course that is beyond their degree requirements, may wish to make this course "EXT". EXT-designated courses do not get factored into GPA. To qualify for the Dean's List and many academic scholarships, GPA minimum requirements are calculated based on a full course load. If you feel that this extra course mark may bring down your average, it may be advantageous to make this course EXT. The deadline to make a course EXT is the same as the drop course deadline in each semester. Once your final grades are To make a course EXT, submit an **EXT Request Form** (www.mie.utoronto.ca/undergrad/forms) to the Undergraduate Office by the course drop deadline.

FAILED COURSES

If you have failed a core curriculum course, you can re-take it any time before graduation. Many first year engineering courses are offered during the summer, and we strongly advise you to take it during this time and not as an overloaded course during the year. If you were unsuccessful in a second or third year course that is a prequisite for an upper level course, you must retake the prequisite course first. To add a core curriculum course, submit a **Course Request Form** (www.mie.utoronto.ca/undergrad/forms) to the Undergraduate Office by one week before the add course deadline. To add a failed stream course, HSS/CS elective, or natural science elective, you may do so yourself on the course selection dates.

ENROLLMENT AND REGISTRATION

TECHNICAL ELECTIVE SUBSTITUTIONS (FOURTH YEAR ONLY)

If you are interested in taking a course that does not appear on the approved technical elective curriculum list as part of your degree requirments, you may apply for a technical elective substitution. **Students are permitted to take at most two technical elective substitutes in their fourth-year (one per semester), but are required to obtain formal Departmental approval from the Undergraduate Office**. If you believe taking this course is critical to your success, we strongly suggest you submit a technical elective substitution form early to avoid dissappointment in the case it is not approved. If your course is not approved as a technical elective substitute, you may consider taking is as an extra or overload course. To apply for a technical elective subsition, submit a **Techical Elective Substition Form** (www.mie.utoronto.ca/undergrad/forms) to the Undergraduate Office by one week before the add course deadline.


Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO
OMEGA

MECHANICAL ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

FEBRUARY - MARCH

COURSE & OPTIONS SELECTION
February 18 - March 4

- ☐ Read through this handbook
- ☐ Attend curriculum talks of interest, research, and consult upper year students to help inform your fourth year course selections
- ☐ Use **degreeexplorer.utoronto.ca** to map out your fourth year courses and determine if you are on track to graduate
- ☐ **Make your stream course and technical elective selections through the COS portal (www.apsc.utoronto.ca/cos) by March 4.**

MULTIDISCIPLINARY OR INTERNATIONAL CAPSTONE
February 28

- ☐ If you are interested in a **Multidisciplinary** or **International Capstone** Projects, please contact capstone@mie.utoronto.ca at this time.

RE-ENROLMENT & TRANSFERS:

- ☐ If you are returning to fourth year from a year off, make sure to apply to re-enrol (www.apsc.utoronto.ca) for the Fall session by March 7.
- ☐ If you are returning from a year of part-time studies but wish to finish fourth year full-time, please apply to transfer from part-time to full-time for the Fall 2014 session (uoft.me/reenroltrans)**. If you do not have the correct registration status come July, it may impact your ability to select courses on the course selection days.**

MAY-JUNE

STUDENT-SOURCED CAPSTONE
June 13

- ☐ If you are interested in a **Student-sourced Capstone** project, submit your project for review to capstone@mie.utoronto by this date.

MECHANICAL
ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

TECHNICAL ELECTIVE SUBSTITUTIONS

- ☐ If there is a technical elective offered by another Department that you'd like to take in your fourth year, please complete a technical elective substitution request form and submit it to the MIE Undergraduate Office. Please also contact the administering department of that course to ask for permission to enrol in the course. It is good practice to select a back-up approved MIE technical elective in the event your course is not approved. Submit early to recieve an approval/denial by the course selection dates.

JULY - AUGUST

REVIEW YOUR TIMETABLE ON ROSI

Mid-July

- ☐ **Check that you have the correct registration status** (e.g. Part-time or Full-time) and that you are "INVIT" (Invited) for the fall session. If your registration status is incorrect, please contact the MIE Undergraduate Office at this time.
- ☐ **Review your timetamble to ensure you are enrolled in the correct core curriculum courses (Page 7).** If you are missing core curriculum courses, would like to make changes to your core course lecture/tutorial/practical sections, or need a failed core course added, you will not be able to do so yourself. Please complete a Course Request Form and submit it to the Undergradute Office.
- ☐ **Review your timetable to view your stream and technical elective selections.** If you participated in COS, your stream and technical elective selections will appear at this time. **Please note that only lecture sections are automatically added for fourth year students. You must add tutorial and practical sections yourself on the first course selection day.** If you did not participate in COS, your stream courses & technical electives are missing, or you would like to make changes to the lecture/tutorial/practical sections of these courses, you will able to do so yourself on the course selection days.

MECHANICAL ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

- ☐ **If you have changed your mind about your technical elective selections, now is the time to plan.** Review page 33 for a list of resources that will help you determine which lecture/tutorial/practical sections fit your timetable so you are prepared for action on course selection day.
- ☐ **Make a plan as to which HSS/CS electives you would like to take in your fourth year.** Record the lecture/prac/tutorial sections so that you are ready to act quickly on course selection day. Please visit page 29 and page 40 for additional resources on selecting HSS/CS electives.

THESIS PROJECTS:

- ☐ If you plan on doing a fourth year thesis project, it may be in your interest to now contact professors you are interested in working with. Please visit Page 13 for more information about thesis projects and the enrollment procedure.

COURSE SELECTION (ROUND 1) OPENS 6 AM
July 22

- ☐ **You may now make changes to your timetable in terms of stream & technical elective selections.** Log in early to avoid dissappointment. If you submited a Course Request Form, changes may begin to appear at this time.
- ☐ **You may now select HSS/CS electives offered by the Faculty of Engineering.**

COURSE SELECTION (ROUND 2) OPENS 6 AM
August 6

- ☐ **You may now select or make changes to HSS/CS electives offered by the Faculty of Arts & Science at this time.** Log in early to avoid dissappointment.

MECHANICAL
ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

CAPSTONE
Late-August

- ☐ Student & project matching is to begin in late-August for **Standard Capstone** Projects & **Capstone Innovation** Projects.

PAY OR DEFER TUITION FEES
August 22

- ☐ The deadline to pay or defer the minimum tuition payment to register occurs late-August. Visit www.fees.utoronto.ca for a detailed schedule. Once you pay or defer your tuition, your status will update from "INVIT" to "REG".

FALL 2014

ENGINEERING FALL (F) SESSION LECTURES BEGIN
September 4

- ☐ First day of class!
- ☐ This is also the last day to receive a 100% tuition refund if you are choosing to withdraw for the 2014-2015 academic year.

COURSES REMOVED FOR NON-REGISTERED STUDENTS
September 8

- ☐ If you have not paid/deferred your minimum tuition payment, you will be removed from your courses as this time.

FALL (F) & FULL- YEAR (Y) TECHNICAL ELECTIVE SUBSTITUTIONS, COURSE REQUEST FORMS & THESIS DEADLINE
September 15

- ☐ If you were interested in a fall (or full-year) thesis project, a fall technical elective substitution, or need a core course added or removed please make sure to submit your form to the MIE Undergraduate Office by this date.

MECHANICAL
ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

COURSE ADD DEADLINE FOR FALL (F) & FULL-YEAR (Y) COURSES
September 21

- ☐ Once classes begin, if you still want to make changes to any fall (F) session courses you can do so up until this date.
- ☐ This is the last day to receive a 100% tuition refund (with a minimum charge of $242) if you are choosing to withdraw for the 2014-2015 academic year.

COURSE DROP DEADLINE FOR FALL (F) COURSES
November 3

- ☐ This date is the deadline drop courses, switch to part-time studies, or withdraw from this session without academic penalty.
- ☐ This is the last day to receive a 50% tuition refund if you are choosing to withdraw for the 2014-2015 academic year.

WINTER 2015

ENGINEERING WINTER (S) SESSION LECTURES BEGIN
January 5

- ☐ You're halfway there!

WINTER (S) TECHNICAL ELECTIVE SUBSTITUTION, COURSE REQUEST FORM & THESIS DEADLINE
January 12

- ☐ If you were interested in a winter thesis project, a winter technical elective substitution, or need a core course added or removed please make sure to submit your form to the MIE Undergraduate Office by this date.

MECHANICAL
ENGINEERING
4TH YEAR

ENROLLMENT & REGISTRATION CHECKLIST

COURSE ADD DEADLINE FOR WINTER (S) COURSES
January 19

☐ Once classes begin, if you still want to make changes to any winter (S) session courses you can do so up until this date.

PER DEADLINE
January 31

☐ If you haven't submited your PER hours yet, this day is the last day you can submit PER hours for June Convocation. For more information about PER hours, see page 27.

EARLY MARCH

☐ Attend Iron Ring Ceremony 

COURSE DROP DEADLINE FOR WINTER (S) & FULL-YEAR (Y) COURSES
March

☐ This date is the deadline drop courses, switch to part-time studies, or withdraw from this session without academic penalty.

NAME CHANGE DEADLINE
March 20

☐ Make sure to submit any name changes that are to appear on your degree to the Office of Convocation by this date

SPRING 2015

JUNE CONVOCATION - CONGRATULATIONS!

ENROLLMENT & REGISTRATION QUICKLINKS

COURSE FINDER
coursefinder.utoronto.ca

- » Allows you to sort courses by times they are available (e.g. Thursdays at 12pm)
- » Allows you to sort courses by faculty and by requirements (e.g. Faculty of Engineering, Engineering HSS/CS Requirement)
- » Contains timetable information, the current enrollment, and wait-list information

DEGREE EXPLORER
degreeexplorer.utoronto.ca

- » Allows you to determine whether you are on track for graduation
- » Highlights which graduation requirements you are missing
- » Allows you to create and save course selection plans and determines whether your plan will fullfill graduation requirements

ENGSOC TIMETABLE BUILDER
schedule.skule.ca

- » A more visual timetable builder
- » Allows you to exercise different lec/pra/tut section options for your electives to determine which will work best for your schedule

ARTS & SCIENCE ANTI-CALENDAR
assu.ca/anti-calendar

- » A collection of student evaluations of over 1700 courses and instructors in the Faculty of Arts & Science
- » Can help guide your Arts & Science elective selections

ENROLLMENT & REGISTRATION QUICKLINKS

MIE UNDERGRADUATE FORMS

www.mie.utoronto.ca/undergrad/forms

» **Course Request Form:** For adding/removing CORE curriculum courses

All technical electives, HSS/CS electives, natural science electives, and stream courses you will be able to manage yourself on ROSI.

» **Overload Request Form:** For requesting permission to overload

» **EXT Request Form:** For indicating a course as EXT

» **Technical Elective Substitution Form:** For requesting a course to be counted as a technical elective substitution in fourth year

» **Practical Experience Form:** For adding any hours obtained for the Practical Experience Requirement (PEY students excepted)

» **Thesis Enrollment Form:** Form required for enrolling in a MIE undergraduate half-year or full-year thesis

WHAT FORM DO I USE IF I WANT A COURSE TO BE CONSIDERED FOR AN HSS/CS ELECTIVE THAT'S NOT ON THE APPROVED LISTS?

If an elective you are interested in taking is not on those lists and you feel it meets the criteria described on page 29, you may submit a proposal to the faculty to approve an HSS/CS course **http://uoft.me/proposecs**
It is good practice to select an approved HSS/CS elective as back-up, in the event your proposed course is not approved.

I'M PLANNING TO OVERLOAD BUT I CAN'T ADD THE COURSE ON ROSI, WHAT DO I DO?

Complete an Overload Request Form and submit it to the MIE Undergraduate Office. If it's an MIE course, we can manually add you to the course provided that there is space after course selection dates. If it's not an MIE course (JRE300 for example) please contact the administering department of that course for help adding it to your timetable.

ENGINEERING EMPLOYMENT RESOURCES

JOB SEARCH SUPPORT

University of Toronto Engineering Career Centre
engineeringcareers.utoronto.ca

University of Toronto Career Centre
www.careers.utoronto.ca

WEBSITES

EngineeringJobs.com
www.engineerjobs.com/jobs/canada/ontario/toronto.php

EngineeringCareers
www.engineeringcareers.ca/engineering-jobs/index.htm

Careerbuilder
www.careerbuilder.ca/Jobs/Toronto/Keyword/Engineering

UofT Career Centre Graduating Students Employment Service
www.careers.utoronto.ca/gradBeyond/gses.aspx

LinkedIn
www.linkedin.com/job/guest

Talent Egg
talentegg.ca/career-guides/engineering

Internships for New Grads
(monthly stipend of $2,016.67 before required deductions)
www.careeredge.ca

RECRUITING AGENCIES FOR ENGINEERS

Randstad
www.randstad.ca/engineering

Hays
www.hays.ca/enhance-your-career

NOTES

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