Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

COURSE AND OPTIONS SELECTION HANDBOOK

MECHANICAL ENGINEERING

3RD 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

CONTENTS

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
Mid-July	**TIMETABLES BECOME AVAILABLE ON ROSI**
July 22	**COURSE SELECTION (ROUND 1) OPENS** **www.rosi.utoronto.ca** For courses offered by the Faculty of Engineering. Students may now make changes to their timetable.
August 6	**COURSE SELECTION (ROUND 2) OPENS** **www.rosi.utoronto.ca** For courses offered by the Faculty of Arts & Science
August 22	**LAST DAY TO PAY OR DEFER TUITION FEES**
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 11	**ESIP & PEY REGISTRATION BEGINS** **www.engineeringcareers.utoronto.ca**
September 15	**DEADLINE TO SUBMIT COURSE REQUEST FORMS FOR FALL (F) & FULL-YEAR (Y) COURSES**

IMPORTANT DATES

DATE	
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.
January 5	**ENGINEERING WINTER (S) LECTURES BEGIN**
January 12	**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
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.

CURRICULUM

FALL SESSION - YEAR 3		LEC/LAB/TUT/WGT.
CORE REQUIRED COURSES		
Kinematics and Dynamics of Machines	MIE301H1	3/3/2/0.5
Fluid Mechanics I	MIE312H1	3/1/1/0.5
Numerical Methods I	MIE334H1	3/-/1.5/0.5
Circuits with Applications to Mechanical Systems	MIE342H1	3/1.5/1/0.5
Design Portfolio	MIE397Y1	-/-/-/0
NATURAL SCIENCE ELECTIVE (CHOOSE ONE):		
Engineering Biology	CHE353H1	3/-/1/0.5
Urban Engineering Ecology	CIV220H1	3/-/1/0.5
Terrestrial Energy Systems	CIV300H1	3/-/2/0.5

CAN I TAKE A NATURAL SCIENCE ELECTIVE OTHER THAN THOSE ON THIS LIST?
Yes. The extended list of approved natural science electives is available at **http://uoft.me/nse (See Page 25 for more details)**. For many of these courses, the pre-requisites are waived for engineering students although you should check with the administering department (e.g. Department of Physics for PHY224H1) your eligibility. You should also consult the administering department whether or not you will be able to add the course yourself on ROSI's course selection days.

CAN I TAKE MY NATURAL SCIENCE ELECTIVE IN THE WINTER OR SUMMER TERM?
If the natural science elective you are interested in taking is only offered in the winter semester, you must first obtain formal approval from the MIE Undergraduate Office to overload. (See Page 26 for more details) Many natural science electives on the extended list are also available in the summer. You will not need to apply to overload in this case.

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.

CURRICULUM

WINTER SESSION - YEAR 3		LEC/LAB/TUT/WGT.
CORE REQUIRED COURSES		
Design for the Environment	MIE315H1	3/-/1/0.5
Engineering Physics	MIE333H1	3/-/1.5/0.5
Mechanical Engineering Design	MIE341H1	3/3/1/0.5
Design Portfolio	MIE397Y1	-/-/-/0
STREAM OPTIONS (CHOOSE TWO):		
MANUFACTURING		
Quality Control and Improvement	MIE364H1	3/1/2/0.5
MECHATRONICS		
Analog and Digital Electronics for Mechatronics	MIE346H1	3/1.5/1/0.5
SOLID MECHANICS & DESIGN		
Mechanics of Solids II	MIE320H1	3/1.5/1/0.5
ENERGY & ENVIRONMENT		
Heat and Mass Transfer	MIE313H1	3/1.5/2/0.5
BIOENGINEERING (CHOOSE ONE):		
Cellular and Molecular Biology	CHE354H1	3/-/2/0.5
Physiological Control Systems	MIE331H1	3/1/1/0.5

CAN I TAKE THREE STREAMS?

It is strongly advised that mechanical engineering students do not overload in third year. Only under exceptional circumstances are overloads granted in third year. If you are interested in taking three streams, you must first obtain formal approval from the MIE Undergraduate Office to overload.

WHAT IF I WANT TO CHANGE MY STREAM CHOICES FROM WHAT I SELECTED ON COS?

Please see the Enrollment and Registration Checklist for more details on opportunities to change your stream selections. Please try to make an informed decision for your COS selections to ensure you have a spot.

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

3W - MIE364H1S - METHODS OF QUALITY CONTROL AND IMPROVEMENT

In manufacturing and service industries alike, quality is viewed as an important strategic tool for increasing competitiveness. Continuous quality improvement is a key factor leading to a company's success. With more emphasis on quality, the cost and the product cycle time are reduced and the communication between producer and customer is improved.

TOPICS: Introduction to quality engineering, non-statistical methods in quality assurance, quality standards and certification, TQM, six sigma methodology, supplier-producer relations, costs of quality, introduction to acceptance sampling, statistical process control, process capability analysis, quality improvement using designed experiments, an overview of the Taguchi Methods, and the robust design. Lab topics include MINITAB – SPC, process capability analysis, quality improvement using designed experiments

EVALUATIONS: 2 Assignments - 20%, Midterm - 30%, Quiz - 5%, Final Exam - 45%

MANUFACTURING

TEXTBOOK: Introduction to Statistical Quality Control (D.C. Montgomery) Seventh Edition, Wiley 2013.

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

FIELDS OF APPLICATION

Automation, Manufacturing Management (Logistics), Funamental Technology

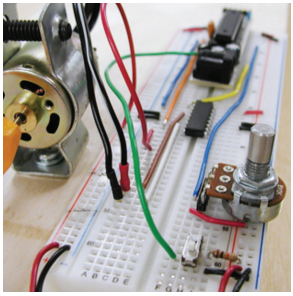
COMPANIES

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

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

3W - MIE346H1S - ANALOG AND DIGITAL ELECTRONICS FOR MECHATRONICS

A study of the fundamental behaviour of the major semiconductor devices (diodes, bipolar junction transistors and field effect transistors). Development of analysis and design methods for basic analog and digital electronic circuits and devices using analytical, computer and laboratory tools.

TOPICS: Laplace Transform for Circuit Analysis, Operational Amplifiers,

MECHATRONICS

Filters and Tuned Amplifiers, Diodes, Signal Generators and Waveform-Shaping Circuits, MOSFETs, BJTs, OpAmps and Data Converters, Digital Logic Circuits. Lab topics include Voltage Controlled Oscillator, Diode Circuits, Transistors and Relays, Analog Pulse Width Modulations Motor Driver, Digital Logic and Stepper Motor Driver.

EVALUATIONS: Labs - 20%, Midterm - 25%, Quizzes - 20%, Final Exam - 35%

TEXTBOOK: "Microelectronic Circuits", 5th Edition or newer, A. S. Sedra and K. C. Smith,

4F - MIE404H1F - 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

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

TEXTBOOK: N/A

TECHNICAL ELECTIVES (FOURTH YEAR)

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

MECHATRONICS

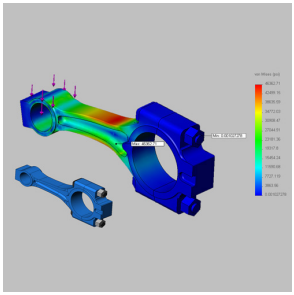
COMPANIES

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

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

3W - MIE320H1S - MECHANICS OF SOLIDS II

Three-dimensional stress transformation, strain energy, energy methods, finite element method, asymmetric and curved beams, superposition of beam solutions, beams on elastic foundations, buckling, fracture mechanics, yield criteria, stress concentration, plane stress and strain. Finite Element Method.

EVALUATIONS: Labs - 25%, Quiz 1 - 5%, Term Test - 15%, Quiz 2 - 5%, Final Exam - 50%

TEXTBOOK: “Advanced Strength and Applied Elasticity”, 5th edition, A.C. Ugural and S. K. Fenster. For labs, “Finite Element Simulations with ANSYS Workbench 13, H.Lee

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

SOLID MECHANICS & DESIGN

Basic Machine Operation plus one of the two advanced courses: Advanced Machining or Basic Welding Operations.

TEXTBOOK: "Machine Design - An Integrated Approach", 4th Edition, R.L. Norton

TECHNICAL ELECTIVES (FOURTH YEAR)

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

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)

COMPANIES

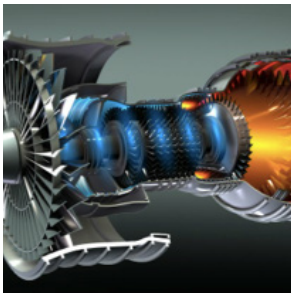
Bombardier, Celestica, General Electric of Canada, General Motors of Canada, Honda of Canada Manufacturing, Procter and Gamble Canada, Toyota Canada

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

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3W - MIE313H1S - HEAT AND MASS TRANSFER

Exact and numerical analysis of steady and transient conduction in solids. Solutions of one-dimensional and multidimensional systems. Principles of convection and solutions under laminar and turbulent flow over flat plates and inside and over pipes. Free convection. Thermal radiation between multiple black and grey surfaces.

TOPICS: Heat conduction equation, steady heat conduction, transient heat conduction, numerical methods in heat conduction, Fundamentals of convection, external forced convection, internal forced convection, natural convection, fundamentals of thermal radiation, radiation heat transfer, mass transfer

EVALUATIONS: Labs - 10%, Design Project - 10%, Assignments - 5%, Midterm - 25%, Final Exam - 50%

TEXTBOOK: "Heat and Mass Transfer: Fundamentals & Applications", 4th Edition, Cengel and Ghajar

ENERGY & ENVIRONMENT

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)

TECHNICAL ELECTIVES (FOURTH YEAR)

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).

ENERGY & ENVIRONMENT

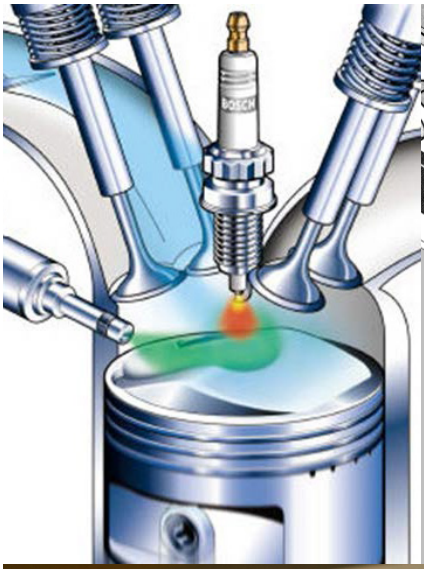
COMPANIES

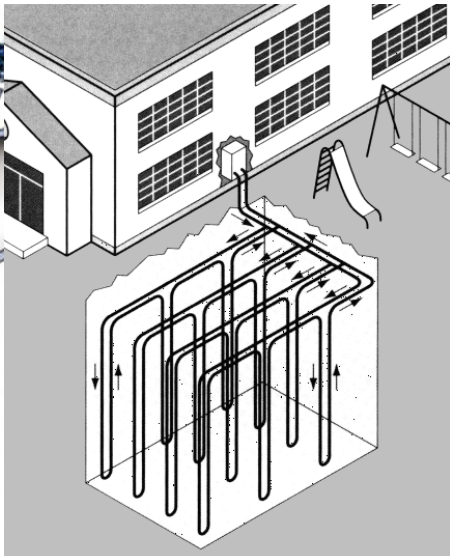
Ontario Power Generation, Hatch, General Motors, Bombardier, HydroOne

LINKS

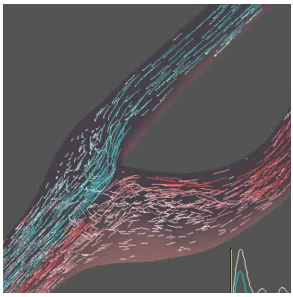
Association of Energy Engineers
www.aeecenter.org

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

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

Students may choose to take either MIE331 **OR** CHE354 for their 3W stream Course.

3W - MIE331H1S - PHYSIOLOGICAL CONTROL SYSTEMS

Prerequisite: CHE353H1F

The purpose of this course is to provide undergraduate engineering students with an introduction to physiological concepts and selected physiological control systems present in the human body. Due to the scope and complexity of this field, this course will not cover all physiological control systems but rather a selected few. This course will combine linear control theory, physiology, and neuroscience with the objective of explaining how these complex systems operate in a healthy human body.

TOPICS: Homeostasis, modeling physical systems (Laplace transform), transfer functions & block diagrams, endocrine system, cardiovascular system, system response in time and frequency domains, stability analysis, nervous system, design of PID controllers, controllability and observability, system identification

EVALUATIONS: Quiz 1 - 25%, Quiz 2 - 25%, Labs - 15%, Final Exam - 35%

TEXTBOOK: Human Physiology: from cells to systems, Second Canadian Edition, Nelson by L. Sherwood, R. Kell and C. Ward

BIOENGINEERING

3W - CHE354H1S- CELL & MOLECULAR BIOLOGY

Prerequisite: CHE353H1F

To introduce students to concepts and techniques relevant to bioengineering research, including cell cultivation, molecular biology, protein biochemistry, and genetic engineering. In addition to opportunities for hands-on learning and application of bioengineering techniques and instrumentation, this course will explain fundamental aspects of biomolecular chemistry that govern bioengineering practice.

EVALUATIONS: Quizzes - 10%, Lab Attendance and Reports - 20%, Term Test 1 - 15%, Term Test 2 - 15%, Final Exam - 40%

TEXTBOOK: (Recommended) Life: The Science of Biology, vol. 1 by Sadava et al., Biology of Microorganisms, 12th Edition by Brock, Environmental Biotechnology: Principals and Applications by Rittmann and McCarty

4F - MIE520H1F - BIOTRANSPORT PHENOMENA

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 (FOURTH YEAR)

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)

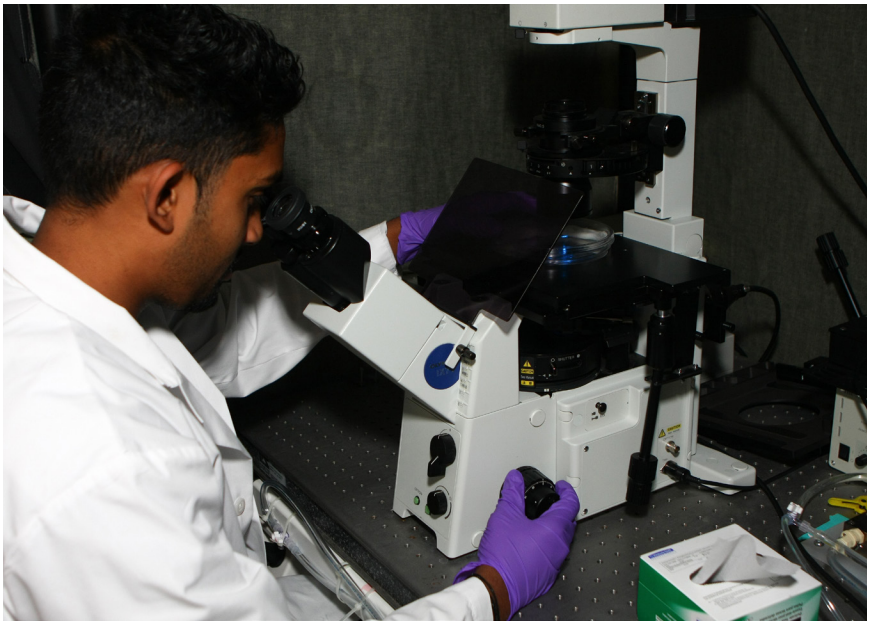
COMPANIES

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 http://uoft.me/miecurriculum). 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 ENGINEERING
3RD YEAR

ENROLLMENT & REGISTRATION CHECKLIST

FEBRUARY - MARCH

COURSE & OPTIONS SELECTION
February 18 to March 4

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

It is important to make an informed decision about your stream selections at this time. Although there are opportunities to change your streams before 3rd year begins, this COS data is what the Faculty uses to gauge class sizes and teaching resources. Selecting the correct streams now will GUARANTEE you a spot in those streams.

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 4).** 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 Undergraduate Office.

MECHANICAL
ENGINEERING
3RD YEAR

ENROLLMENT & REGISTRATION CHECKLIST

- ☐ **Review your timetable to view your stream and natural science selections.** If you participated in COS, your stream and natural science selections will appear at this time. If you did not participate in COS, your stream courses & natural science elective 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.
- ☐ **If you have changed your mind about your stream or natural science selections, now is the time to plan.** Review page 32 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.

COURSE SELECTION (ROUND 1) OPENS 6 AM
July 22

- ☐ **You may now make changes to your timetable in terms of stream & natural science elective selections (provided there is space).** Log in early to avoid dissappointment. If you submited a Course Request Form, changes may begin to appear at this time.

COURSE SELECTION (ROUND 2) OPENS 6 AM
August 6

- ☐ **If applicable, you may now select or make changes to natural science electives offered by the Faculty of Arts & Science at this time.** Log in early to avoid dissappointment.

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”.

MECHANICAL
ENGINEERING
3RD YEAR

ENROLLMENT & REGISTRATION CHECKLIST

FALL 2014

ENGINEERING FALL (F) SESSION LECTURES BEGIN
September 4

- ☐ First day of Third Year Mech!
- ☐ 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.

COURSE REQUESTS FORMS FOR FALL (F) & FULL-YEAR (Y) COURSES DUE
September 15

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.

MECHANICAL
ENGINEERING
3RD YEAR

ENROLLMENT & REGISTRATION CHECKLIST

WINTER 2015

ENGINEERING WINTER (S) SESSION LECTURES BEGIN
January 5

☐ You're halfway there!

COURSE REQUESTS FORMS FOR WINTER (S) COURSES DUE
January 12

COURSE ADD DEADLINE FOR WINTER (S) COURSES
January 18

☐ Once classes begin, if you still want to make changes to any winter (S) session courses you can do so up until this date. **In other words, if you still are debating your stream selections you can do so up until this date, provided there is space.**

COURSE DROP DEADLINE FOR WINTER (S) COURSES
March 8

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

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 waitlist 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 24, 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.

NOTES

NOTES

MIE UNDERGRADUATE OFFICE

Room 109, Mechanical Building, 5 King's College Rd.

EMAIL undergrad@mie.utoronto.ca

PHONE (416) 978 6420

FAX (416) 978 7753

HOURS Monday - Friday, 10 AM to 4 PM

WWW.MIE.UTORONTO.CA/UNDERGRAD