Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

COURSE AND OPTIONS SELECTION HANDBOOK

INDUSTRIAL ENGINEERING

3RD YEAR

CONTENTS

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 ACORN.** 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 best interest to submit your selections.

We greatly appreciate your cooperation with this exercise. It can be completed on Degree Explorer at the link below:

degreeexplorer.utoronto.ca

ALL INFORMATION IN THIS HANDBOOK WAS MOST RECENTLY UPDATED IN JANUARY 2021. COURSES, DEGREE REQUIREMENTS, AND DATES MAY CHANGE FROM YEAR TO YEAR, SO BE SURE TO DOUBLE CHECK ON THE CURRENT YEAR'S ACADEMIC CALENDAR

IMPORTANT DATES

DATE	
Early February	**CURRICULUM TALK: 3RD YEAR INDY CURRICULUM**
Mid February - Early March	**COURSE & OPTIONS SELECTION OPENS** **degreeexplorer.utoronto.ca** Students may now login and make their curriculum selections for the upcoming academic year
Late July	**COURSE SELECTION (ROUND 1) OPENS *ACORN*** Students may now make changes to their timetable. Electives offered by the Faculty of Engineering and Enhanced Enrollment Arts & Science electives are now open for enrollment
Mid August	**COURSE SELECTION (ROUND 2) OPENS *ACORN*** For courses offered by the Faculty of Arts & Science
Late August	**LAST DAY TO PAY OR DEFER TUITION FEES**
Early September	**ENGINEERING FALL (F) LECTURES BEGIN**
Late September	**FALL (F) & FULL-YEAR (Y) COURSE ADD DEADLINE** Last day to add or substitute Fall (F) or Full-Year (Y) Session courses
Early November	**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
Early January	**ENGINEERING WINTER (S) LECTURES BEGIN**
Mid January	**WINTER (S) COURSE ADD DEADLINE** Last day to add or substitute Fall (S)
Early March	**WINTER (S) & FULL YEAR (Y) COURSE DROP DEADLINE**

*For fee and refund schedule information, follow the link below:
https://studentaccount.utoronto.ca/

CURRICULUM

FALL SESSION - YEAR 3

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Industrial Ergonomics and the Workplace	MIE343H1	3 / 3 / 0 / 0.5
Design and Analysis of Information Systems	MIE350H1	3 / 1 / 1 / 0.5
Systems Modelling and Simulation	MIE360H1	3 / 2 / 1 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Ergonomic Design of Information Systems	MIE344H1	3 / 3 / 0 / 0.5
Business Process Engineering	MIE354H1	3 / 2 / 0 / 0.5
Operations Research III: Advanced OR	MIE365H1	3 / 2 / 1 / 0.5
Analytics In Action	MIE368H1	3 / 2 / 0 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

WHAT IS A CS ELECTIVE?
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 requirement. Additionally, the Rotman School of Management does not typically permit students outside of their faculty to take their courses (i.e. RSM courses).

WHAT IS AN HSS ELECTIVE?
Humanities and Social Sciences (HSS) courses explore the central issues, thought processes and scholarly methods found in these disciplines. Please note HSS electives are a subset of Complementary Studies (CS) courses; they **can be used to satisfy CS elective requirements.**

CURRICULUM

WINTER SESSION - YEAR 3

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Algorithms & Numerical Methods	MIE335H1	3 / 1 / 1 / 0.5
Resource and Production Modelling	MIE363H1	3 / 0 / 2 / 0.5
Quality Control and Improvement	MIE364H1	3 / 1 / 2 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Case Studies in Human Factors and Ergonomics	MIE345H1	3 / 0 / 2 / 0.5
Cases in Operations Research	MIE367H1	3 / 0 / 2 / 0.5
Artificial Intelligence Fundamentals	APS360H1	3 / 0 / 1 / 0.5
Reliability and Maintainability Engineering	MIE469H1	3 / 0 / 2 / 0.5
Introduction to Artificial Intelligence	MIE369	
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

CAN I APPLY FOR A TECHNICAL ELECTIVE SUBSTITION?
No. You must choose a technical elective off the approved curriculum list. Only in fourth year are IndE students able to apply for a technical elective substition.

HUMAN FACTORS

Industrial Engineers also improve productivity and efficiency by studying and improving the actual physical work environment. Human factors engineering is the study of people as workers and as managers, both from the physiological and psychological points of view. The study of human physiology, particularly the nervous system, leads to fascinating discoveries concerning reaction to stimuli, sensory perception, human performance at operator tasks, and people's ability to process information. These principles are applied to the design of human-machine systems, with particular attention to problems of information display, control layout, compensatory controls systems, and the design of work environments. People's behaviour in work organisations is examined from the point of view of individual and social psychology. These studies lead to important conclusions concerning managerial and leadership styles, organisational goals and incentives, employee relations, and the implementation of planned change.

For example, a mechanical engineer may design a new car, and a human factors engineer would be responsible for the design of the interior: control layout, seating, vision, reachability, usability in unusual circumstances, etc. A nuclear engineer will design a nuclear generator, and a human factors engineer will design the control system displays to minimise the probability of human error.

CORE COURSES

3F - MIE343H1F - INDUSTRIAL ERGONOMICS AND THE WORKPLACE
The Biology of Work: anatomical and physiological factors underlying the design of equipment and work places. Biomechanical factors governing physical workload and motor performance. Circadian rhythms and shift work. Measurement and specification of heat, light, and sound with respect to design of the work environment.

HUMAN FACTORS

SUGGESTED TECHNICAL ELECTIVES (3RD YEAR)

3F – MIE344H1F – ERGONOMIC DESIGN OF INFORMATION SYSTEMS
The goal of this course is to provide an understanding of how humans and machines can be integrated with information systems. By the end of the course, students will be able to: Observe, and engage in dialogue with, users in ways that clarify users' views, needs, and capabilities; Develop all phases of the user interface design process in response to the needs of a user interface design project; Demonstrate initiative, personal responsibility and accountability in both personal and group contexts; Communicate information, analyses, and solutions accurately, reliably, orally, and in writing to a range of audiences (e.g., the professor, the TAs, classmates, users); Extend the insights they have gained from their experience through the course in their future interactions with users in the workplace; Use the completed project to promote their candidacy for employment opportunities.

3W – MIE345H1S – CASE STUDIES IN HUMAN FACTORS AND ERGONOMICS
A detailed analysis will be made of several cases in which human factors methods have been applied to improve the efficiency with which human-machine systems operate. Examples will be chosen both from the area of basic ergonomics and from high technology. Emphasis will be placed on the practical use of material learned in earlier human factors courses and ergonomics methods to a set of circumstances under which humans are considered central to the proposed solution; Understand and mitigate obstacles associated with conducting human factors and ergonomics activities in different situations; Map human factors and ergonomics characteristics of different case studies to the Human-Tech ladder; Demonstrate initiative, personal responsibility, and accountability in both personal and group contexts; Use "real-world" knowledge acquired from this course to market candidacy for employment opportunities.

SUGGESTED TECHNICAL ELECTIVES (4TH YEAR ONLY)

MIE440H1 - Design of Innovative Products
MIE523H1 - Engineering Psychology and Human Performance
MIE457H1 - Knowledge Modelling and Management
MIE542H1 - Human Factors Integration
MIE561H1 - Healthcare Systems
MIE567H1 - Dynamic & Distributed Decision Making

FIELDS OF APPLICATION

Transportation, Communication, Healthcare, Military, Energy, Banking

HUMAN FACTORS

SAMPLE COURSE SELECTION FOR STREAM (3RD YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Industrial Ergonomics and the Workplace	MIE343H1	3 / 3 / 0 / 0.5
Design and Analysis of Information Systems	MIE350H1	3 / 1 / 1 / 0.5
Systems Modelling and Simulation	MIE360H1	3 / 2 / 1 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Ergonomic Design of Information Systems	MIE344H1	3 / 3 / 0 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Algorithms & Numerical Methods	MIE335H1	3 / 1 / 1 / 0.5
Resource and Production Modelling	MIE363H1	3 / 0 / 2 / 0.5
Quality Control and Improvement	MIE364H1	3 / 1 / 2 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Case Studies in Human Factors and Ergonomics	MIE345H1	3 / 0 / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

HUMAN FACTORS

SAMPLE COURSE SELECTION FOR STREAM (4TH YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Integrated System Design	MIE463H1	3 / - / 2 / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Financial Engineering	APS502	
Operations Research III: Advanced OR	MIE365H1	3 / 2 / 1 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Organization Design	MIE459H1	4 / - / - / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Human Factors Integration	MIE542H1	3 / - / 2 / 0.5
Healthcare Systems	MIE561H1	3 / - / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

OPERATIONS RESEARCH

Operations research and management science involve the mathematical modelling of real systems and processes with a view to being able to predict and optimally control their performance. For example, we can use statistics to determine how much inventory should be carried in a warehouse to minimise expected costs of carrying the stock and of shortages. We use queueing theory to analyse the waiting time of people or jobs waiting for service in banks, emergency rooms and production facilities. We use linear algebra (called linear programming) to determine the optimal product mix to maximise profit subject to capacity constraints on resources, or the optimal allocation of service facilities (like fire stations) to minimize the expected service time. Areas include scheduling, reliability, maintenance, forecasting, queueing, value analysis and decision making under uncertainty.

Operations Research came into its own during the Second World War, when it became apparent that many problems of scheduling and deployment of resources, which had previously been managed intuitively, could be quantitatively modelled and solved analytically. Since the war, operations research techniques and models have been applied in an ever-increasing variety of industries, from finance to healthcare to government. The modern manager can no longer rely on seat-of-the-pants judgement, but must take a scientific approach to decision making. Much of today's industrial engineering activity is the application of management science in support of decision making at all levels of any organisation. Design, develop and use simulation models for improved decision making.

OPERATIONS RESEARCH

CORE COURSES

3F - MIE360H1F – SYSTEMS MODELLING AND SIMULATION
Principles for developing, testing and using discrete event simulation models for system performance improvement. Simulation languages, generating random variables, verifying and validating simulation models. Statistical methods for analyzing simulation model outputs, and comparing alternative system designs. Fitting input distributions, including goodness of fit tests. Role of optimization in simulation studies.

3W - MIE335H1S – ALGORITHMS & NUMERICAL METHODS
Algorithmic analysis, big-O asymptotic analysis; numerical linear algebra, solution techniques for linear and non-linear systems of equations; matrix factorization, LU and Cholesky factorization, factorization in the revised simplex method; Newton's method, Gale-Shapley method, greedy methods for combinatorial optimization, branch-and-bound search methods; graph theory and graph theoretic algorithms; design and implementation of algorithms to optimize mathematical models.

TECHNICAL ELECTIVES (3RD YEAR)

3F – MIE354H1F – BUSINESS PROCESS ENGINEERING
This course focuses on understanding multiple perspectives for grouping, assessing, designing and implementing appropriately integrated and distributed information systems to support enterprise objectives.
The emphasis is on understanding how Business Process Management techniques and tools can contribute to align an organization's business and information technology perspectives, as well as the characteristics of application and system types and the implications for their design, operation, and support of information needs. The course reviews platforms and technology infrastructure, including; legacy systems, client/server, the Internet, the World Wide Web, and the emergence of a web-service-based service oriented architecture. Students will work in the laboratory to develop a business process.

The course covers Information Systems concepts, tools and techniques, and it is addressed primarily to an audience of process/business analysts instead of targeting an audience of developers/programmers.

OPERATIONS RESEARCH

3F – MIE365H1F – OPERATIONS RESEARCH III: ADVANCED OR

Design of operations research models to solve a variety of open-ended problems. Linear programming extensions are presented: goal programming, column generation, Dantzig-Wolfe decomposition, and interior point solution methods. Non-linear programming solution methods are developed: optimality conditions, quadratic programming and bi-level programming. Solutions to advanced stochastic models: stochastic programming, 2-person and n-person game theory, and Markov Decision Processes.

3F – MIE368H1F - ANALYTICS IN ACTION

This course showcases the impact of analytics focusing on real world examples and case studies. Particular focus on decision analytics, where data and models are combined to ultimately improve decision-making. Methods include: linear and logistic regression, classification and regression trees, clustering, linear and integer optimization. Application areas include: healthcare, business, sports, manufacturing, finance, transportation, public sector.

3W – MIE367H1S – CASES IN OPERATIONS RESEARCH

To provide students with the experience and confidence to apply Operational Research techniques to solve a variety of cases that industrial engineers may face in their professional life. The course will use one case per week which describes a real situation. Students will be required to analyze the case on their own, in a small group and with the class. Extensive preparation of each case prior to class participation is essential for the success of this course. After initial discussion, students will be required to fully solve the case, including a numerical solution. Timely individual analysis and solution of each case is critical to both class participation and development of the ability to analyze a case during the midterm and final exams.

3W – MIE469H1S – RELIABILITY AND MAINTAINABILITY ENGINEERING

An introduction to the life-cycle costing concept for equipment acquisition, operation, and replacement decision-making. Designing for reliability and determination of optimal maintenance and replacement policies for both capital equipment and components. Topics include: identification of an item's failure distribution and reliability function, reliability of series, parallel, and redundant systems design configurations, time-to-repair and maintainability function, age and block replacement policies for components, the economic life for capital equipment, provisioning of spare parts.

OPERATIONS RESEARCH

SUGGESTED TECHNICAL ELECTIVES (4TH YEAR ONLY)

APS502H1 - Financial Engineering
MIE451H1 - Decision Support Systems
MIE566H1 - Decision Analysis
MIE562H1 - Scheduling
MIE519H1 - Advanced Manufacturing Technologies
MIE561H1 - Healthcare Systems

FIELDS OF APPLICATION

Logistics, Supply Chain Management, Healthcare, Production System, Financial Engineering, Maintenance

OPERATIONS RESEARCH

SAMPLE COURSE SELECTION FOR STREAM (3RD YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Industrial Ergonomics and the Workplace	MIE343H1	3 / 3 / 0 / 0.5
Design and Analysis of Information Systems	MIE350H1	3 / 1 / 1 / 0.5
Systems Modelling and Simulation	MIE360H1	3 / 2 / 1 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Business Process Engineering	MIE354H1	
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Algorithms & Numerical Methods	MIE335H1	3 / 1 / 1 / 0.5
Resource and Production Modelling	MIE363H1	3 / 0 / 2 / 0.5
Quality Control and Improvement	MIE364H1	3 / 1 / 2 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Cases in Operations Research	MIE345H1	3 / 0 / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

OPERATIONS RESEARCH

SAMPLE COURSE SELECTION FOR STREAM (4TH YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Integrated System Design	MIE463H1	3 / - / 2 / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Financial Engineering	APS502	
Operations Research III: Advanced OR	MIE365H1	3 / 2 / 1 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Organization Design	MIE459H1	4 / - / - / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Human Factors Integration	MIE542H1	3 / - / 2 / 0.5
Dynamic & Distributed Decision Making	MIE567H1	
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING MINOR

Artificial intelligence (AI) is the study of computational processes that simulate intelligent behaviour. These processes include knowledge representation and reasoning, optimal sequential decision-making under uncertainty, and learning from past experience. Specifically, the last area comprises the subfield of AI known as Machine learning (ML) that focuses on computational and statistical methods for learning patterns from historical data for descriptive and predictive purposes.

Together, AI and ML represent the forefront of technology innovation powering a wide range of industrial applications including search engines, conversational assistants, e-commerce, autonomous driving, intelligent logistics scheduling, digital marketing, adaptive user interfaces, and health applications ranging from prediction of adverse outcomes to automated diagnosis in medical imaging. AI and ML both contribute to and benefit from techniques developed in Operations Research (OR) although AI and ML techniques often tend to focus more heavily on the computational and algorithmic aspects of proposed solutions.

To this end, strong preparation in programming and software design is an essential skill for AI and ML practitioners. AI and ML expertise is in high demand in industry with employment in all of the aforementioned application areas and many more; it is also an excellent course of study for those wishing to pursue future research careers in this field with rapidly expanding frontiers.

CORE COURSES

3W - MIE335H1S - ALGORITHMS & NUMERICAL METHODS

Algorithmic analysis, big-O asymptotic analysis; numerical linear algebra, solution techniques for linear and non-linear systems of equations; matrix factorization, LU and Cholesky factorization, factorization in the revised simplex method; Newton's method, Gale-Shapley method, greedy methods for combinatorial optimization, branch-and-bound search methods; graph theory and graph theoretic algorithms; design and implementation of algorithms to optimize mathematical models.

TECHNICAL ELECTIVES

4S - MIE424H1S - OPTIMIZATION IN MACHINE LEARNING

1. To enable deeper understanding and more flexible use of standard machine learning methods, through development of machine learning from an Optimization perspective.
2. To enable students to apply these machine learning methods to problems in finance and marketing, such as stock return forecasting, credit risk scoring, portfolio management, fraud detection and customer segmentation.

3F - MIE368H1F - ANALYTICS IN ACTION (FORMERLY MIE465)

This course showcases the impact of analytics focusing on real world examples and case studies. Particular focus on decision analytics, where data and models are combined to ultimately improve decision-making. Methods include: linear and logistic regression, classification and regression trees, clustering, linear and integer optimization. Application areas include: healthcare, business, sports, manufacturing, finance, transportation, public sector.

4F - MIE451H1F - DECISION SUPPORT SYSTEMS

This course provides students with an understanding of the role of a decision support system in an organization, its components, and the theories and techniques used to construct them. The course will cover basic technologies for information analysis, knowledge-based problem solving methods such as heuristic search, automated deduction, constraint satisfaction, and natural language understanding.

4S - MIE457H1S - KNOWLEDGE MODELING AND MANAGEMENT

This course explores both the modeling of knowledge and its management within and among organizations. Knowledge modeling will focus on knowledge types and their semantic representation. It will review emerging representations for knowledge on the World Wide Web (e.g., schemas, RDF). Knowledge management will explore the acquisition, indexing, distribution and evolution of knowledge within and among organizations. Emerging Knowledge Management System software will be used in the laboratory.

4F - MIE566H1F - DECISION ANALYSIS

The purpose of this course is to provide a working knowledge of methods of analysis of problem and of decision making in the face of uncertainty. Topics include decision trees, subjective probability assessment, multi-attribute utility approaches, goal programming, Analytic Hierarchy Process and the psychology of decision making.

For additional info on Minor in Artificial Intelligence:
https://undergrad.engineering.utoronto.ca/academics-registration/minors-certificates/undergraduate-engineering-minors/minor-in-artificial-intelligence/

INFORMATION ENGINEERING

The Information Engineering specialization of the Industrial (Systems) Engineering program creates professionals that address the challenge of successfully applying information technology to help people and organizations innovate and become more efficient.

Our graduates have outstanding employment opportunities in numerous private and public organizations as well as in the global consulting firms that service them. There is current and future demand for professionals that combine expertise in process design and management, business analysis, project management, systems integration, and a fusion of industry knowledge and information technology skills.

Information engineering provides exciting and diverse career opportunities that encompass the development and evolution of information systems. Our graduates address the following challenging issues: how to provide doctors and nurses with timely access to electronic patient data wherever is needed, how to design information systems that run the business of online stores such as music download sites and bookstores, how to reduce large volumes of data into information that is useful to the decision-making processes of government officials, and how to take advantage of information technology to plan, coordinate and support disaster recovery and relief efforts

INFORMATION ENGINEERING

CORE COURSES

3F - MIE350H1F – DESIGN AND ANALYSIS OF INFORMATION SYSTEMS
Provides students with an understanding of the mothods of information system analysis and design. These include methods for determining and documenting an organization's structure (FDD), activities, behaviours and information flows (DFDs, decision tables and trees, network diagrams, etc); model acquisition (data repositories), verification and validation. Methods such as SADT, RAD and prototyping will be covered. Students will acquire a working knowledge of various frameworks for analysis (e.g., information technology categories, system and application classifications, decision types, data vs information). Throughout the course, emphasis is placed on the importance of systems thinking and organizational culture in the analysis and design process. In the laboratory, students will use a CASE-based computer program (Visible Analyst) for the analysis and design of information systems for selected organizations. Students will be asked to work in teams to create a web-based information site and to document and present their development progress through the use of a structured project log.

3F - MIE360H1F – SYSTEMS MODELLING AND SIMULATION
Principles for developing, testing and using discrete event simulation models for system performance improvement. Simulation languages, generating random variables, verifying and validating simulation models. Statistical methods for analyzing simulation model outputs, and comparing alternative system designs. Fitting input distributions, including goodness of fit tests. Role of optimization in simulation studies.

3W - MIE335H1S – ALGORITHMS & NUMERICAL METHODS
Algorithmic analysis, big-O asymptotic analysis; numerical linear algebra, solution techniques for linear and non-linear systems of equations; matrix factorization, LU and Cholesky factorization, factorization in the revised simplex method; Newton's method, Gale-Shapley method, greedy methods for combinatorial optimization, branch-and-bound search methods; graph theory and graph theoretic algorithms; design and implementation of algorithms to optimize mathematical models.

INFORMATION ENGINEERING

TECHNICAL ELECTIVES (3RD YEAR)

3F – MIE354H1 – BUSINESS PROCESS ENGINEERING
See page 11.

3F – MIE344H1 – ERGONOMIC DESIGN OF INFORMATION SYSTEMS
See page 7.

3F – MIE368H1 - ANALYTICS IN ACTION (FORMERLY MIE465)
See page 12.

SUGGESTED TECHNICAL ELECTIVES (4TH YEAR ONLY)

APS502H1 - Financial Engineering
MIE465H1 - Analytics in Action
MIE451H1 - Decision Support Systems
MIE566H1 - Decision Analysis
MIE562H1 - Scheduling
MIE519H1 - Advanced Manufacturing Technologies
MIE561H1 - Healthcare Systems

FIELDS OF APPLICATION

Data Analysis, Database Design, Business Process Modelling, Information Systems, Ontologies

INFORMATION ENGINEERING

SAMPLE COURSE SELECTION FOR STREAM (3RD YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Industrial Ergonomics and the Workplace	MIE343H1	3 / 3 / 0 / 0.5
Design and Analysis of Information Systems	MIE350H1	3 / 1 / 1 / 0.5
Systems Modelling and Simulation	MIE360H1	3 / 2 / 1 / 0.5
TECHNICAL ELECTIVE		
Business Process Engineering	MIE354H1	
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Algorithms & Numerical Methods	MIE335H1	3 / 1 / 1 / 0.5
Resource and Production Modelling	MIE363H1	3 / 0 / 2 / 0.5
Quality Control and Improvement	MIE364H1	3 / 1 / 2 / 0.5
TECHNICAL ELECTIVE		
Case Studies in Human Factors and Ergonomics	MIE345H1	3 / 0 / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS/HSS Elective	-	- / - / - / 0.5

INFORMATION ENGINEERING

SAMPLE COURSE SELECTION FOR STREAM (4TH YEAR)

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Integrated System Design	MIE463H1	3 / - / 2 / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Financial Engineering	APS502	
Operations Research III: Advanced OR	MIE365H1	3 / 2 / 1 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Organization Design	MIE459H1	4 / - / - / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Human Factors Integration	MIE542H1	3 / - / 2 / 0.5
Dynamic & Distributed Decision Making	MIE567H1	
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

BUSINESS MINOR

SAMPLE COURSE SELECTION FOR STREAM (3RD YEAR) TO ACHEIVE THE BUSINESS MINOR

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Industrial Ergonomics and the Workplace	MIE343H1	3 / 3 / 0 / 0.5
Design and Analysis of Information Systems	MIE350H1	3 / 1 / 1 / 0.5
Systems Modelling and Simulation	MIE360H1	3 / 2 / 1 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Business Process Engineering	MIE354H1	3 / 2 / - / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
Fundamentals of Accounting and Finance	JRE300H1	3 / - / 1 / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT
Algorithms & Numerical Methods	MIE335H1	3 / 1 / 1 / 0.5
Resource and Production Modelling	MIE363H1	3 / 0 / 2 / 0.5
Quality Control and Improvement	MIE364H1	3 / 1 / 2 / 0.5
TECHNICAL ELECTIVE (CHOOSE ONE):		
Case Studies in Human Factors and Ergonomics	MIE345H1	3 / 0 / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
Markets and Competitive Strategy	JRE410	

BUSINESS MINOR

SAMPLE COURSE SELECTION FOR STREAM (4TH YEAR) TO ACHEIVE THE BUSINESS MINOR

FALL SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Integrated System Design	MIE463H1	3 / - / 2 / 0.5
Capstone Design	MIE491Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Introduction to Artificial Intelligence	CSC384H1	3 / - / - / 0.5
Ergonomic Design of Information Systems	MIE344H1	3 / 3 / - / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
People Management and Organizational Behavior	JRE420H1	3 / - / 1 / 0.5

WINTER SESSION

CORE REQUIRED COURSES		LEC/LAB/TUT/WGT.
Organization Design	MIE459H1	4 / - / - / 0.5
Capstone Design	MIE490Y1	- / - / 4 / 1.0
TECHNICAL ELECTIVES (TWO OF):		
Human Factors Integration	MIE542H1	3 / - / 2 / 0.5
Healthcare Systems	MIE561H1	3 / - / 2 / 0.5
COMPLEMENTARY STUDIES ELECTIVE		
CS Elective	-	- / - / - / 0.5

DEGREE REQUIRMENTS

DEGREE EXPLORER degreeexplorer.utoronto.ca

Degree Explorer is a planning tool designed to help students and advisors evaluate academic progress towards completion of requirements for graduation. It is not a transcript. It 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 ACORN does not mean it will fullfill your degree requirements.

TO GRADUATE, YOU NEED

- All Core Courses
- 2.0 CS Credits (1.0 or more must be HSS)
- 3.0 Technical Elective Credits
- 600 hours of professional experience, or PEY credit

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. 0.5 credits = 1 half year course. These are typically taken in second and fourth year, or in the summer (have to pay extra tuition). For a list of faculty approved elective lists, please consult the following links. You can also request other A&S courses to act as a substitute:

HSS Courses https://undergrad.engineering.utoronto.ca/academics-registration/electives/humanities-social-science-hss-electives/
CS Courses https://undergrad.engineering.utoronto.ca/academics-registration/electives/complementary-studies-cs-electives/

TECHNICAL ELECTIVES

- One in each semester 3rd year, two in each semester in 4th year
- Select from list of approved electives
- Can apply for another course to substitute for a Technical Elective
- Can substitute at most two technical electives

PRACTICAL EXPERIENCE REQUIREMENT (PER)

- Minimum of 600 hours to graduate
- Work should support professional career of student
- Must contain a good measure of responsiblity
- Form must be filled out and submitted to MIE Undergrad Office
- If you do PEY, you do not need to submit PER form

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. A certificate requires three (3) courses. There are many minors and certif-icates, which are listed and detailed at **undergrad.engineering.utoronto.ca** Enroling for a minor puts it on your Degree Explorer, which can help you plan. You can de-enrol at any point.

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: **undergrad.engineering.utoronto.ca**
***Please note that enrolling in a minor does not guarantee you a spot in any of the engineering minor electives, as they are open to everyone.** To avoid disappointment, plan ahead and select courses 6 AM on course selection days. You are responsible for making sure you fulfill the requirements.

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.

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 its required courses.

I'M NOT SURE WHICH ELECTIVES TO TAKE.

The Arts & Science Student's Union puts together a publication called the Anti-Calendar, which provides honest student feedback about many arts & science elective courses offered. **http://assu.ca/anti-calendar**.

ENROLLMENT AND REGISTRATION

OVERLOADS

- To take more than 5 courses in a semester, must get approval from undergrad office
- Need to have 75%+ average in previous semester or extenuating circumstances

"EXT" OR EXTRA COURSES

- If taking a course not needed for your degree, you can apply to designate it as EXT
- Mark will not count towards your GPA, but till shows on transcript
- Credit can be used for minors/certificates
- Deadline to designate EXT is the same as drop deadline

FAILED COURSES

If you have failed a core curriculum course, you must re-take it at the next available opportunity. Many first year engineering courses are offered during the summer. If you were unsuccessful in a second or third year course that is a pre-requisite for an upper level course, you must retake the pre-requisite course first. To add a core curriculum course, submit the **Course Request Form** (https://www.mie.utoronto.ca/programs/undergraduate/forms-policies/) to the Undergraduate Office by one week before the add course deadline. To add a failed stream course or HSS/CS elective, you may do so yourself on the course selection dates.

ENROLLMENT & REGISTRATION QUICKLINKS

COURSE FINDER — coursefinder.utoronto.ca
- Timetable, enrolment, waitlists

DEGREE EXPLORER — degreeexplorer.utoronto.ca
- Plan and check on track to graduate

ENGSOC TIMETABLE BUILDER — schedule.skule.ca
- Visual timetable builder

ARTS & SCIENCE ANTI-CALENDAR — assu.ca/anti-calendar
- Course descriptions and reviews

MIE UNDERGRADUATE FORMS — https://www.mie.utoronto.ca/programs/undergraduate/forms-policies/
- PER, Course request, TES, etc.

MIE UNDERGRADUATE OFFICE

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

EMAIL undergrad@mie.utoronto.ca

PHONE (416) 978 6420

HOURS Monday - Friday, 9 AM to 4 PM

WWW.MIE.UTORONTO.CA