Faculty of Applied Science and Engineering - Department of Mechanical & Industrial Engineering

MIE561H1 S

Healthcare Systems

Winter 2025 Syllabus

Course Meetings

MIE561H1 S

Section	Day & Time	Delivery Mode & Location
LEC0101	Wednesday, 12:00 PM - 3:00 PM	In Person: BA 1230
TUT0101	Thursday, 10:00 AM - 12:00 PM	In Person: BA 2195

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Lectures and tutorials will be in person, unless indicated otherwise. Please refer to quercus for the most up to date course schedule.

Course Contacts

Instructor: Professor Saba Vahid
Email: saba.vahid@utoronto.ca
Office Hours and Location: after each class and by email
Additional Notes: Please allow 24-48 hours for response to emails and include course number in the subject.

Instructor: Professor Talha Hussain
Email: talha.hussain@utoronto.ca
Office Hours and Location: after each class and by email
Additional Notes: Please allow 24-48 hours for response to emails and include course number in the subject.

Course Overview

MIE 561 is a "cap-stone" course. Its purpose is to give students an opportunity to integrate the Industrial Engineering tools learned in previous courses by applying them to real world problems. While the specific focus of the case studies used to illustrate the application of Industrial Engineering will be the Canadian health care system, the approach to problem solving adopted in this course will be applicable to any setting. This course will provide a framework for identifying and resolving problems in a complex, unstructured decision-making environment. It will give students the opportunity to apply a problem identification framework through real world case studies. The case studies will involve people from the health care industry bringing current practical problems to the class. Students work in small groups preparing a feasibility study discussing potential approaches. Although the course is directed at Industrial Engineering fourth

year and graduate students, it does not assume specific previous knowledge, and the course is open to students in other disciplines.

Course Learning Outcomes

After completing MIE 561, students will be able to:

1) Identify, describe and apply an appropriate model for analyzing unstructured problems in a complex decision-making environment.

2) Define, describe, analyse and criticize methods for resolving complex problems in a practical situation.

3) Describe appropriate (and inappropriate) applications of engineering techniques.

4) Effectively communicate an understanding of a complex problem and a method of resolution, in writing, at a level consistent with current business practice.

5) Briefly describe Canada's health care system and the impact of its structure on decision making.

Prerequisites: None
Corequisites: None
Exclusions: None
Recommended Preparation: None
Credit Value: 0.5
Graduate Attributes:
- 11A. Economics and Project Management: Demonstrate ability to estimate the life-cycle economic and financial costs and benefits for relevant engineering activities. [Applied]
- 11B. Economics and Project Management: Demonstrate ability to evaluate the economic and financial performance of an engineering activity and compare alternative proposals on the basis of these measures. [Applied]
- 11C. Economics and Project Management: Demonstrate ability to read and understand financial statements for engineering activities. [Introduced]
- 11D. Economics and Project Management: Demonstrate ability to plan and manage engineering activities to be within time and budget constraints. [Developed]
- 1A. Knowledge Base for Engineering: Demonstrate competence in mathematics and modeling. [Introduced]
- 12A. Life-Long Learning: Demonstrate the ability to independently summarize, analyze, synthesize and evaluate information from a wide variety of sources (learning independently). [Applied]
- 12B. Life-Long Learning: Demonstrate the ability to develop a strategy to identify and address gaps in knowledge (becoming a self-directed learner). [Developed]
- 2A. Problem Analysis: Demonstrate the ability to identify and characterize an engineering problem. [Applied]
- 2B. Problem Analysis: Demonstrate the ability to formulate a solution plan (methodology) for an engineering problem. [Applied]
- 2C. Problem Analysis: Demonstrate the ability to formulate and interpret a model. [Applied]
- 2D. Problem Analysis: Demonstrate the ability to execute a solution process for an engineering problem. [Applied]

- 3A. Investigation: Demonstrate the ability to define a problem. [Applied]
- 3B. Investigation: Demonstrate the ability to devise and execute a plan to solve a problem. [Introduced]
- 3C. Investigation: Demonstrate the ability to use critical analysis to reach valid conclusions supported by the results of the plan. [Applied]
- 4A. Design: Demonstrate ability to frame a complex, open-ended problem in engineering term. [Applied]
- 4B. Design: Demonstrate ability to generate a diverse set of candidate engineering design solutions. [Applied]
- 4C. Design: Demonstrate ability to select candidate engineering design solutions for further development. [Applied]
- 4D. Design: Demonstrate ability to advance an engineering design to a defined end state. [Applied]
- 5A. Use of Engineering Tools: Demonstrate ability to use fundamental modern techniques, resources and engineering tools. [Introduced]
- 5B. Use of Engineering Tools: Demonstrate ability to use discipline specific techniques, resources and engineering tools. [Introduced]
- 5C. Use of Engineering Tools: Show recognition of limitations of the tools use. [Applied]
- 6A. Individual and Team Work: Demonstrate ability to establish and monitor team organizational structure. [Applied]
- 6B. Individual and Team Work: Demonstrate ability to promote team effectiveness through individual action. [Applied]
- 6C. Individual and Team Work: Demonstrate success in a team based project. [Applied]
- 7A. Communication Skills: Demonstrate the ability to identify and credibly communicate engineering knowledge. [Applied]
- 7B. Communication Skills: Demonstrate the ability to use different modes of communication. [Introduced]
- 7C. Communication Skills: Demonstrate the ability to develop communication through an iterative process. [Applied]
- 8A. Professionalism: Demonstrate the ability to describe engineering roles in a broader context, e.g. as pertains to the environment, health, safety, and public welfare. [Applied]
- 8B. Professionalism: Demonstrate the ability to recognize the impacts of engineering within a global society (the broader public interest). [Developed]
- 8C. Professionalism: Demonstrate the ability to behave in a professional manner. [Developed]
- 9A. Impact of Engineering on Society and the Environment: Demonstrate understanding of the relationships among technology and the social, cultural, economic and environmental conditions of society, locally and globally, in both the short-and long-term. [Applied]
- 9B. Impact of Engineering on Society and the Environment: Demonstrate the ability to identify and choose alternative ways to mitigate or prevent adverse social, environmental, human health and safety impacts. [Developed]
- 9C. Impact of Engineering on Society and the Environment: Demonstrate awareness of legal issues relevant to an engineering activity. [Introduced]

Course Materials

Required Texts:

Marchildon, Gregory P. *Health systems in transition: Canada*. No. 1. University of Toronto Press, 2013. – Available through the WHO

Deber, Raisa B. *Treating health care: How the Canadian system works and how it could work better*. University of Toronto Press, 2018.

Prescription for Excellence: How Innovation Is Saving Canada's Health Care System by Michael Rachlis, Harper-Collins Canada. (https://www.michaelrachlis.com/wp-content/uploads/2020/07/Prescription-for-Excellence-pb-0412.pdf)

Readings: Assigned readings will be provided throughout the course. Students will be expected to read the material and will be tested on content from the readings.

Marking Scheme

Assessment	Percent	Details	Due Date
Midterm exam	10%	This is a comprehensive midterm exam, covering all materials covered to this date.	2025-03-05
Case study reports	40%	There will be 3 case study reports	2025-02-12,2025-03-19,2025-04-02
Case study participation	5%	Participation on group case study discussion	No Specific Date
Presentation	2.5%	Professional presentation of case study results to class	No Specific Date
Case study group discussion	2.5%	Effective management of group case study discussion	No Specific Date
Final Exam	40%	The final exam is a mini case study.	Final Exam Period

Late Assessment Submissions Policy

Late assignments are not accepted, unless accompanied by a univeristy approved excuse prior to the due date.

Policies & Statements

University Land Acknowledgement

I wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

Learn more about Canada's relationship with Indigenous Peoples here.

Indigenous Students' Supports

If you are an Indigenous engineering student, you are invited to join a private Discord channel to meet other Indigenous students, professors, and staff, chat about scholarships, awards, work opportunities, Indigenous-related events, and receive mentorship. Email Professor Bazylak if you are interested.

Indigenous students at U of T are also invited to visit Nations House's (FNH) Indigenous Student Services for culturally relevant programs and services. If you want more information on how to apply for Indigenous specific funding opportunities, cultural programs, traditional medicines, academic support, monthly social events or receive the weekly newsletter, go to the FNH website, email or follow FNH on social media: Facebook, Instagram, or TikTok. A full event calendar is on the CLNX platform. Check CLNX often to see what new events are added!

Wellness and Mental Health Support

Your personal wellness and mental health are important. The University of Toronto and the Faculty of Applied Science & Engineering offer a wide range of free and confidential services that can support your well-being.

As a U of T Engineering student, you have a Departmental Undergraduate Advisor or a Departmental Graduate Administrator who can support you by advising on personal matters that impact your academics. Other resources that you may find helpful are listed on the U of T Engineering Mental Health & Wellness webpage, and a small selection are also included here:

- U of T Engineering's Student & Community Wellness Coordinator
- Health & Wellness and the On-Location Engineering Wellness Counsellor
- Health & Wellness Peer Support Program
- Accessibility Services & the On-Location Advisor
- Graduate Engineering Council of Students' Mental Wellness Commission
- SKULE™ Mental Wellness
- U of T Engineering's Learning Strategist and Centre for Learning Strategy Support
- Registrar's Office and Scholarships & Financial Aid Office & Advisor

We encourage you to access these resources as soon as you feel you need support; no issue is too small. You may reach out to the counsellors at U of T Telus Health Student Support for 24/7 free and confidential counselling support.

If you find yourself feeling distressed and in need of more immediate support visit uoft.me/feelingdistressed or U of T Engineering's Urgent Support – Talk to Someone Right Now.

Accommodations

The University of Toronto supports accommodations for students with diverse learning needs, which may be associated with mental health conditions, learning disabilities, autism spectrum, ADHD, mobility impairments, functional/fine motor impairments, concussion or head injury, visual impairments, chronic health conditions, addictions, D/deaf, deafened or hard of hearing, communication disorders and/or temporary disabilities, such as fractures and severe sprains, or recovery from an operation.

If you have a learning need requiring an accommodation the University of Toronto recommends that students register with Accessibility Services as soon as possible.

We know that many students may be hesitant to reach out to Accessibility Services for accommodations. The process of accommodation is private; we will not share details of your needs or condition with any instructor.

If you feel hesitant to register with us, we encourage you to reach out for further information and resources on how we can support. It may feel difficult to ask for help, but it can make all the difference during your time here.

Phone: 416-978-8060
Email: accessibility.services@utoronto.ca

Equity, Diversity and Inclusion

Looking for community? Feeling isolated? Not being understood or heard?

You are not alone. You can talk to anyone in the Faculty that you feel comfortable approaching, anytime – professors, instructors, teaching assistants, first-year or upper years academic advisors, student leaders or the Assistant Dean of Diversity, Inclusion and Professionalism.

You belong here. In this class, the participation and perspectives of everyone is invited and encouraged. The broad range of identities and the intersections of those identities are valued and create an inclusive team environment that will help you achieve academic success. You can read the evidence for this approach here.

You have rights. The University Code of Student Conduct and the Ontario Human Rights Code protect you against all forms of harassment or discrimination, including but not limited to acts of racism, sexism, Islamophobia, antisemitism, homophobia, transphobia, ableism, classism and ageism. Engineering denounces unprofessionalism or intolerance in language, actions or interactions, in person or online, on- or off-campus. Engineering takes these concerns extremely seriously and you can confidentially disclose directly to the Assistant Dean for help here.

Resource List:

- Engineering Equity, Diversity & Inclusion Groups, Initiatives & Student Resources
- Engineering Positive Space Resources
- Request a religious-based accommodation here
- Email Marisa Sterling, P.Eng, the Assistant Dean, Diversity, Inclusion & Professionalism here
- Make a confidential disclosure of harassment, discrimination or unprofessionalism here or email engineering@utoronto.ca or call 416.946.3986
- Email the Engineering Society Equity & Inclusivity Director here
- U of T Equity Offices & First Nations House Resources

Plagiarism Detection Tool

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (https://uoft.me/pdt-faq).

Academic Integrity

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, collaborating with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism—representing someone else's work as your own or submitting work that you have previously submitted for marks in another class or program—is a serious offence that can result in sanctions. Speak to me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see the U of T Academic Integrity website.

Quercus Information

This course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis. To access the course website, go to the U of T Quercus log-in page at https://q.utoronto.ca. Once you have logged in to Quercus using your UTORid and password, you should see the link or "card" for this course. You may need to scroll through other cards to find this. Click on this link to open our course area, view the latest announcements and access your course resources.There are Quercus help guides for students that you can access by clicking on the

"?" icon in the left side column.

SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.