

MIE542H1: Human Factors Integration (2025 Winter)

Course Description

The integration of human factors into engineering projects. Human Factors Integration (HFI) process and systems constraints, HFI tools, and HFI best practices. Modelling, economics, and communication of HFI problems. Examples of HFI are drawn from energy, healthcare, military, transportation, and software systems. Application of HFI theory and methods to a capstone or other design project, including HFI problem specification, concept generation, and design solution through an iterative and open-ended design process. (Note: project topic subject to lecturers' approval.)

Topics to be covered are expected to include

- What is Human Factors Integration (HFI), its goals, benefits?
- HFI in the Design Process.
- Operating Experience and its contribution to design.
- Function and Task Analysis as part of HFI
- Concept of Operations and its contribution to design.
- Regulations, Standards, Design Guides
- Risk Assessment as part of HFI
- Verification and Validation as part of HFI
- Procurement and HFI.

Details will be discussed during the first lecture. You must attend the first lecture if you are interested in this course, even if you are waitlisted.

Course Objectives

1. To develop an understanding of approaches to integrating human factors in systems design engineering for complex, safety-critical environments.
2. To describe and apply methods and approaches for integrating Human Factors into design processes.
3. To understand systems design processes and cycles.
4. To develop an understanding of the roles and responsibilities of Human Factors practitioners within the design process and team.
5. To develop an understanding of how to communicate requirements arising from human factors integration analyses and methods.
6. To develop design concepts that meet the identified requirements.
7. To prepare for continuous learning through the professional practice of HFI methods.

Teaching Team

Kim Iwasa-Madge, B.A.Sc., CHFP, PMP, P. Eng.

Email: kim.iwasa.madge@utoronto.ca

Robert Leger, Ph.D., CCPE, P.Eng

Email: Rob.Leger@utoronto.ca

Kim or Rob will be available for questions following lectures.

TA – To Be Determined

Email: To Be Determined

Required Technical Knowledge

You are expected to have basic knowledge of Human Factors methods and techniques, equivalent to having taken undergraduate Human Factors courses, as a minimum. Prerequisites: MIE240H1 or MIE1401H1 OR permission of instructor

Readings

- No Required Text
- Reading materials are available on Quercus. Readings will be assigned as the course proceeds and will be available via the U of T library or from the internet.
- There are readings assigned for many lectures and some tutorials. Students are advised to complete the reading before the corresponding lecture and tutorial. The readings **will** include examinable material not disclosed by other means.

Lectures (In-Person)

Tuesday 18:00-21:00 In-person BA2135. There are 39 lecture-hours.

The lectures **will** include examinable material not disclosed by other means. The lecture presentations and handouts will be posted on Quercus.

Tutorials and Group Work

Thursday 15:00-17:00 In-person BA2135

The tutorials are a combination of sessions that cover mandatory course content that supplements the lectures and Q&A time with your TA (If you want tutorial time during non-mandatory course material sessions, please email ahead of time and book a time with the TA). Students are expected to read assigned materials before the tutorials and be prepared to participate in tutorial activities. The tutorials will include examinable material not disclosed by other means.

As assignments are to be completed within a group - you will need to be at tutorials and available to facilitate the group work. Group work for assignments is a requirement of this course. Each group must have 3 to 4 members. If you are not a participating, interactive member of a group, you cannot pass this course.

Each group is required to submit an attribution table to the end of every assignment. Marks may be assigned proportionally via the attribution table to members of the workgroup.

Breakdown of Marks (approximate and may be modified as course progresses)

Component	Weight
Assignments 1-4 (group work is MANDATORY) (=4x5%)	20%
Assignment 5: Oral Presentation (on final project, individually marked, but delivered on group project, during lectures/tutorials, MANDATORY)	5%
Assignment 6 is the FINAL Assignment - Project (group work is MANDATORY) provided at the beginning of the term so that you can consider the requirements as you pick your project, and so that you can see how it relates to the group assignments, and work on it as the course progresses.	30%
Test 1 (individual, closed-book to be scheduled during lecture or tutorial, MANDATORY)	25%
Test 2 (individual, closed book, to be scheduled during lecture or tutorial, MANDATORY)	20%
TOTAL	100%

Assignments and Tests

There will be a total of 5 written, group assignments worth a total of 50%. There is 1 oral communication assignment/presentation, worth 5%. There are two tests, worth a total of 45%. The information in the table that follows is approximate and may be modified as the course progresses.

Schedule for Assignments and Tests

Component	Weight	Approximate Due Dates
GROUP WORK, TESTS, PRESENTATION ARE MANDATORY		
Assignment 1 (Project Outline, Group MANDATORY)	5%	Sun 26 Jan 2025, 11 pm
Assignment 2 (Operating Experience and Design Guide/Standards/Codes, Group MANDATORY)	5%	Sun 9 Feb 2025, 11 pm
Test 1 (Individual, closed book, lecture time or tutorial time as backup, MANDATORY)	25%	Tues 11 Feb 2025, starting 6:10 pm
Assignment 3 (Function and Task Analyses, Group MANDATORY)	5%	Sun 2 Mar 2025, 11 pm
Assignment 4 (Risk FMEA or HAZOP, Group MANDATORY)	5%	Sun 9 Mar 2025, 11 pm
Test 2 (individual, closed book, lecture time or tutorial time as backup, MANDATORY)	20%	Tues 25 Mar 2025, starting 6:10 pm
Assignment 5: Oral Presentation (individually marked, topic is group project, MANDATORY)	5%	Tues 18 Mar 2025 AND Thurs 20 Mar 2025
Assignment 6: Final Project Submission (Group MANDATORY)	30%	Mon 12 Apr 2025 11pm
TOTAL	100%	

Submission of Assignments

Assignments are to be submitted electronically, on the due date, by the specified time. Submission via Quercus is preferred, and backup submissions can be made to the TA and instructors. Your submission may be reviewed by Turnitin, or equivalent.

If the submission is late but made before the final late date as specified in the assignment, the late submission will be marked, but there will be a deduction of 10% of the total marks available for the assignment, per each 24-hour period late.

Groups are to hand-in a full pdf submission, with electronic sign-off and date for each member of the group, attesting to the fact that the work submitted either by the group is his/her/their own work. If the sign-off is not signed and dated by all members of the group, there may be a deduction marks (as specified in the marking criteria for the assignment).

It is required that an attribution table be attached to every assignment. Marks may be assigned proportionally via the attribution table to members of the workgroup. If the attribution tables are not provided, there may be a deduction of marks (as specified in the marking criteria for the assignment).

Tests/Examinations

There will be two (2) tests. There will be no exam. The tests are comprehensive of all lectures, tutorials, and reading material from the course, guest lectures and lecture aids (e.g., films). All tests are in paper format, in-person, written during class (or tutorial as backup).

Tests are closed book and you may NOT refer to any document or file posted to the course Quercus site, your own notes, or other materials/sources. You may not communicate by any means with any other individual or group during the test or access any type of tutorial service or online forum.

Course Timetable (Subject to change, check announcements/lectures for updates)

Week Dates (Sun to Sat)	Assignments/Tests	Lecture (Tuesday, 6-9 pm) ALL LECTURES ARE MANDATORY	Tutorial (Thursday, 3-5 pm)
Jan 5 - 11		Course Introduction	Form groups for the project, decide on project begin project write-up for Assignment #1 (MANDATORY FOR GROUP FORMATION AND PROJECT SELECTION) THERE IS A TUTORIAL ON THURS 9 JAN.
Jan 12 - 18	Assignment 1 high-level summary of project so we can prepare Quercus for submissions and give to Guest Lecturer. Due via email 16 Jan, end of tutorial.	Intro to HFI	Form groups for the project, decide on project begin project write-up for Assignment #1 (MANDATORY FOR GROUP FORMATION AND PROJECT SELECTION)
Jan 19 - 25		a) HSI and Design Process b) Regs/Stdg/Guidelines	Answer Questions on Assignment #1 THERAC discussion #1 (MANDATORY COURSE CONTENT)
Jan 26 - Feb 1	Assignment 1 due on Sun Jan 26, 11 pm	Guest Lecturer: Library Services	THERAC discussion #2 (MANDATORY COURSE CONTENT)
Feb 2 - 8		a) HFI Program Planning b) OER, FA, TA	Answer questions on Assignment #2 Open for study/questions before Test 1, which will be on Tuesday, Feb.11 (MANDATORY)
Feb 9 – 15	Assignment 2 due on Sun Feb 9, 11 pm Test 1 on Feb 11, 6:10 pm start	TEST 1	Answer questions on Assignment 3 (due after Reading Week)
Feb 16-22	READING WEEK		
Feb 23 – Mar 1		Risk Analysis Watch Bhopal video, discuss safety and design issues	Answer questions and work on Assignment #3 (MANDATORY)

Week Dates (Sun to Sat)	Assignments/Tests	Lecture (Tuesday, 6-9 pm) ALL LECTURES ARE MANDATORY	Tutorial (Thursday, 3-5 pm)
Mar 2 - 8	Assignment 3 due on Sun March 2, 11 pm	Verification and Validation	Answer questions and work on Assignment #4 (MANDATORY)
Mar 9 - 15	Assignment 4 due on Sun March 9, 11 pm	Concept of Operations Review Design Requirements Review difference between design requirements versus design guidance	Procurement Process (MANDATORY)
Mar 16 - 22	Assignment 5: Oral Presentations on March 18 & 20 (lecture and tutorial time slots).	Presentations during lecture	Presentations during tutorial (MANDATORY, if tutorial time is required to fit presentations)
Mar 23 - 29	Test #2 on Tues March 25, 6:10 pm	TEST 2	Open for questions on final project.
Mar 30 - April 5	Assignment 6: Final Assignment due on Mon April 7, 11 pm	No formal lecture, open for questions on final project. If you want to hold discussions with lecturers, request meeting time.	No tutorial, Capstone Exhibition Day
April 6- 12	Assignment 6: Final Assignment due on Mon April 7, 11 pm		

Quercus

The Quercus site is used to post lecture notes, references, and supplementary materials, distribute assignment instructions, conduct class surveys, and respond to questions. You are expected to visit the site several times per week. Questions of general interest to the class should be posted on the bulletin board and will be answered by the teaching staff. Your individual questions or issues should be addressed through your TA. If your TA is unable to answer a question or resolve a problem, he or she will refer it to an instructor.

Course materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation and are protected by copyright. In this course, you are permitted to download materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

Absence From Tests/Presentations/Contribution to Group Work

A reminder that as of September 2023, the requirement for a Verification of Illness (VOI) was re-introduced for all term-work and final exam petitions. Apart from one term-work petition per term without documentation if specific requirements are met. This policy applies to MIE542 tests, presentations, and contribution to group work. If you miss lectures and are unable to contribute to the group work, you may be asked to complete the verification of illness process.

[Verification of Illness or Injury - University Registrar's Office \(utoronto.ca\)](https://utoronto.ca/utoronto/verification-of-illness-or-injury)

Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with

the General Academic Regulations on Academic Integrity, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to a serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Safety

As professional engineers in training, you have a duty of responsibility to ensure that safety is duly considered at all times. To this end, you are expected to behave with your personal safety and the safety of others in mind. Instructions for the completion of safety training requirements have been sent in an email to all students. Safety training can also be accessed at <https://safetytraining.engineering.utoronto.ca/>

Inclusivity

All students and faculty at the University of Toronto have a right to learn, work and create in a welcoming, respectful, inclusive and safe environment. In this class we are all responsible for our language, action and interactions. Discriminatory comments or actions of any kind will not be permitted. This includes but is not limited to acts of racism, sexism, Islamophobia, anti-Semitism, homophobia, transphobia, and ableism. As a class, we will work together to create an inclusive learning environment and support each other's learning.

If you experience or witness any form of discrimination, please reach out **to the Engineering Equity Diversity & Inclusion Action Group online, an academic advisor, a U of T Equity Office, or any U of T Engineering faculty or staff member that you feel comfortable approaching.**

Accommodations

If you have a learning need requiring an accommodation, the University of Toronto recommends that students immediately register at Accessibility Services at www.studentlife.utoronto.ca/as.

- Location: 4th floor of 455 Spadina Avenue, Suite 400
- Voice: 416-978-8060
- Fax: 416-978-5729
- Email: accessibility.services@utoronto.ca

The University of Toronto supports accommodations of students with special learning needs, which may be associated with learning disabilities, mobility impairments, functional/fine motor disabilities, acquired brain injuries, blindness and low vision, chronic health conditions, addictions, deafness and hearing loss, psychiatric disabilities, communication disorders and/or temporary disabilities, such as fractures and severe sprains, recovery from an operation, serious infections or pregnancy complications.

Please discuss your accommodation requirements with your instructors.

Mental Health

As a university student, you may experience a range of health and/or mental health challenges that could result in significant barriers to achieving your personal and academic goals. Please note, the University of Toronto and the Faculty of Applied Science & Engineering offer a wide range of free and confidential services that could assist you during these times.

As a U of T Engineering student, you have an [Academic Advisor](#) (undergraduate students) or a [Graduate Administrator](#) (graduate students) 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:

- [Accessibility Services](#) & the [On-Location Advisor](#)
- [Graduate Engineering Council of Students' Mental Wellness Commission](#)

- [Health & Wellness](#) and the [On-Location Health & Wellness Engineering Counsellor](#)
- [Inclusion & Transition Advisor](#)
- [U of T Engineering Learning Strategist](#) and [Academic Success](#)
- [My Student Support Program \(MySSP\)](#)
- [Registrar's Office](#)
- [SKULE Mental Wellness](#)
- [Scholarships & Financial Aid Office & Advisor](#)

If you find yourself feeling distressed and in need of more immediate support resources, consider reaching out to the counsellors at [My Student Support Program \(MySSP\)](#) or visiting the [Feeling Distressed webpage](#).