

MIE 1403: Analytical Methods in Human Factors Research



Term: September – December 2026

Instructor: Dr. Ryan Kealey

Contact Information: By email: ryan.kealey@mail.utoronto.ca

Office Hours: by appointment via email

Course Meeting Time: Thursdays, 6-9pm

Course Location: AB 114

Description: This course is intended as a supporting course for those students conducting research in Human Factors. There will be a brief introduction to Human Factors & research practice, followed by a deep dive into aspects of becoming an effective HF researcher. These include topics related to engaging with HF literature (library resources, HF journals, conducting a systematic review, and writing effective reviews of journal articles), a survey of data collection methods for HF research, and finally what (and how) we measure outcomes in HF research. Assessment will occur across a series of assignments & class work specific to different aspects of the course.

Goals and learning objectives:

- Demonstrate effective skills in searching the HF literature and capability in producing systematic reviewing (not full reviews but pared down variants).
- Show understanding and comprehension of the variety of data collection and measurement approaches available to Human Factors researchers and understand how and when to utilize them effectively in a variety of assessment measures including presentations and Research reports.
- Students will gain perspective on effectiveness in competency as technical reviewers for HF submissions.

Readings: Readings will be posted on the Blackboard site.

Copyright in Instructional Settings:

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor. In the case of private use by students with disabilities, the instructor's consent will not be unreasonably withheld. For more information on copyright and the University of Toronto, please visit the [copyright page](#).

Academic Honesty Policy:

UofT's academic integrity policy states that "Honesty and fairness are considered fundamental values shared by students, staff and faculty at the University of Toronto. The University's policies and procedures that deal with cases of cheating and plagiarism are designed to protect the integrity of the institution. As a result, the University treats cases of cheating and plagiarism very seriously. Any student accused of committing an academic offence will find that the accusation is dealt with formally and that the penalties can be severe if it is determined that they did, in fact, cheat."

(<http://www.utoronto.ca/academicintegrity/>)

AI statement: I highly encourage you to not replace your cognitive efforts with an automated platform. I understand that you are under pressure from the institution, your labs, the way your pet looks up at you with huge eyes, pleading for their third bowl of food that will definitely make them sick but you still give in anyhow, but still, I must ask you to consider what you are doing to your ability to judge and make decisions. It is a slippery slope to give up your judgement and decision making – there are plenty of opportunities to incorporate AI into your learning effectively, however, there is still little agreement on exactly how this looks across course content and learning situations so be prudent and selective in your use cases. If you are struggling with something in the course, or heck, outside of it – I'm always up to chat.

Required Technology:

Please refer to the minimum technology requirements – if you are having trouble with these and are having trouble viewing the online lectures or any other technical issues, you can let me know. Minimum requirements found here:

<https://www.vicprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/#faq>

Inclusivity:

You belong [here](#). The University of Toronto commits to all students, faculty and staff that you can learn, work and create in a welcoming, respectful and inclusive environment. In this class, we embrace the broadest range of people and encourage their diverse perspectives. This team environment is how we will innovate and improve our collective academic success. You can read the evidence for this approach [here](#).

We expect each of us to take responsibility for the impact that our language, actions and interactions have on others. Engineering denounces discrimination, harassment and unwelcoming behaviour in all its forms. You have rights under the [Ontario Human Rights Code](#). If you experience or witness any form of harassment or discrimination, including but not limited to, acts of racism, sexism, Islamophobia, anti-Semitism, homophobia, transphobia, ableism and ageism, please tell someone so we can intervene. Engineering takes these reports extremely seriously. You can talk to anyone you feel comfortable approaching, including your professor, an [academic advisor](#), our [Assistant Dean, Diversity, Inclusion and Professionalism](#), the [Engineering Equity Diversity & Inclusion Action Group](#), any staff member or a [U of T Equity Office](#).

You are not alone; if you need support, you can find a list of clubs and groups that support people who identify in many diverse ways [here](#). Working together, we can all achieve our full potential.

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, blindness and low vision, chronic health conditions, addictions, deafness and hearing loss, 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 as soon as possible with Accessibility Services at <https://studentlife.utoronto.ca/service/accessibility-services-registration-and-documentation-requirements/>.

Phone: 416-978-8060

Email: accessibility.services@utoronto.ca

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.

As a U of T Engineering graduate student, you have access to an [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:

- [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](#).

Assessments:**

ID	Description	Weight	Due Date	Type
A1	Knowledge Synthesis Activities (SR + MA)	15%	Sept 24	Individual
A2	Survey and Scaling Assignment	15%	Oct 15	Individual
A3	Leading Class Discussion / Poster Presentation	20%	Nov 19	Groups of 2
A4	Analytic Research Report	30%	Dec 10	Groups of 2
CA	In-class Conceptual Assessments (x4)	20%	Sept-Dec	Individual

5% late penalty per day beyond submission date or arrangement with instructor.

1. Research Statement & Systematic Review Proposal (individual):

You will be required to submit a systematic review proposal + *condensed* scoping/systematic review on an initial set of papers. More details to follow and will be included on the handout

2. Survey & Scaling Experiment (individual)

You will be working individually to conduct a scaling experiment to analyze and evaluate an interesting (read: relevant and appropriate) psychometric quality. More details to follow and will be included on the handout.

3. Leading Class Discussion & Poster Presentation (paired):

You will work in pairs to detail an approach to solving a complicated problem involving the need for multiple study approaches. More details to follow and will be included on the handout

4. Analytic Research Assignment (paired)

Working in pairs you will conduct a larger, focused Human Factors study to understand expert behaviour related to playing (video) games or some other representative knowledge-based tasks. The idea is to provide you with hands-on experience with participative methods for eliciting knowledge from experts and therefore must include an ACTUAL EXPERT. More details to follow and will be included on the handout

5. Conceptual assessments (individual)

Throughout the course there will be assessments to determine your understanding of course materials at a concept level with the ability to apply them. These are cumulative and can pull from any content shared up to that point – not meant to be difficult but are meant to demonstrate an adequate understanding of the concepts.

*****Assignments are being revised and may reflect changes once class begins***

Course Schedule

Week	Date	Description	Assignments
1	Sept 10	<u>Topics:</u> - Course Overview - Research Design & Strategy	
2	Sept 17	<u>Topics:</u> - Searching the academic literature – Garni Assadourian - Knowledge Synthesis	
3	Sept 24	<u>Topic:</u> - Knowledge Synthesis: the sequel - Meta-Analysis	Concept Assessment 1
4	Oct 1	<u>Topics:</u> - Participative Methods 1: - Scaling Methods, SDT, Questionnaires/Survey	A1 Due
5	Oct 8	<u>Topics:</u> - Participative Methods 2: - Knowledge Elicitation - Task Analysis	
6	Oct 15	<u>Topics:</u> - Observational Methods: - Observational (direct observation, ethnography) - Experimental (Lab, Simulation (Driving, Microworld), Field Experiments) - Biometrics	A2 Due
7	Oct 22	<u>Topics:</u> - Cognitive Load/Mental Workload	Concept Assessment 2
8	Oct 29	FALL READING WEEK – No Class	
9	Nov 5	<u>Topics:</u> - Situational Awareness	
10	Nov 12	<u>Topics:</u> - Publishing & Reviewing in HF Literature + Q/A session - Methodological Metacognition	Concept Assessment 3
11	Nov 19	<u>Topics:</u> - Assignment 3: Presentations	A3 Due
12	Nov 26	<u>Topics:</u> - Brief introduction to Design & Interface Analysis Methods: - UCD, Data-Gathering & Measurement - Moderated/Unmoderated testing	
13	Dec 3	<u>Topics:</u> - HF in industry; diversity of thought - AI and Ethics in HF	Concept Assessment 4
14	Dec 10	<u>Topics:</u> - No lecture – office hours virtually	A4 Due