University of Toronto
Department of Mechanical and Industrial Engineering
MIE 237: Statistics (Winter 2026)

- Instructor: Prof. Vahid Sarhangian; Office: BA8108; Email: sarhangian@mie.utoronto.ca

- Office hours: Regular office hours TBD in class; also by appointment

- Teaching Assistants:

    - Tutorial TA: Max Beggs (max.beggs@mail.utoronto.ca)
    - Lab TA: Rachel Wong (rache.wong@mail.utoronto.ca)
    - Project TA: Ziyuan Zhang (zyuan.zhang@mail.utoronto.ca)

- Course Schedule:

    - Lectures: Tuesday, 9-10 in MS 2170 and Thursday, 9-11 in WI1017
    - Tutorials: Wednesday, 9-11 in GB221 and Friday, 11-13 in BA1240
    - Labs: Tuesday, 10-11, 2-3, 3-4 in WB255

Course Description

This course is an introduction to statistical thinking and methods for second-year Industrial Engineering (IE) students. It focuses on the core tools of frequentist Statistics including estimation, hypothesis testing, confidence intervals, linear regression, and principles of experimental design, while emphasizing how these methods support evidence-based decision making in IE applications.

Prerequisites

Calculus (APS162); Probability (MIE 236); and Programming (APS106).

Software

We will use the R programming language and the RStudio IDE in this course. RStudio is available on the ECF computers, and you may also wish to download it onto your personal computers. Additional details will be provided in the Lab 1 handout.

Evaluation and Grading

Item	Mark (%)
Tutorial Quizzes	10
Lab Quizzes	10
Group Project	15
Midterm	30
Final	35

- **Tutorial Quizzes**: There will be a quiz in each tutorial (except the first tutorial). Five quizzes will be randomly selected and graded (2% each). The lowest quiz grade will be dropped.
- **Lab Quizzes**: There will be 5 lab quizzes (2% each; see course schedule table for dates marked with *). The lowest quiz grade will be dropped.
- **Exams**: There will be a final exam (date and time to be announced) and a midterm test (March 5, 9-11). You may bring one sheet (double-sided, hand-written with pen/pencil) of notes for the midterm and final.
- **Group Project**: You will do a project in teams of 2-3 students. Details to be announced on Quercus. There will be two deliverables for the project: a proposal (20% of the project grade) due by February 27th, and a final report (80% of the project grade) due by April 7th. No late submissions are accepted.
- **Class participation bonus**: Students who actively participate in class discussions and answer/ask questions in class and/or on Piazza will have up to 2pts added to their final grade.
- **Note**: All graded assessments are mandatory.

Resources and Textbook

- Slides: Instructor's notes will be uploaded to Quercus prior to the lectures. You are strongly encouraged to bring the notes to class and annotate them during lectures.
- Textbook: The textbook for the course is *Probability and Statistics for Engineers and Scientists (9th Edition) (2010) by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye.* Readings will be recommend.

Tentative Course Schedule

Week of	Topic	Chapter in book	Tutorial	Lab
Jan-5	Introduction and Prob. Review	1-7	-	1
Jan-12	Sampling distributions	8	1	2*
Jan-19	One sample estimation	9	2	3
Jan-26	Two sample estimation	9	3	4*
Feb-02	One sample hypothesis Testing	10	4	5
Feb-09	Two sample hypothesis Testing	10	5	6*
Feb-16	**Reading Week**	-	-	-
Feb-23	Correlation and linear Regression	11	6	7
Mar-02	Linear Regression / Midterm	11	-	-
Mar-09	Multiple Linear Regression	12	7	8*
Mar-16	Multiple Linear Regression	12	8	9
Mar-23	One factor Experiments	13	9	10*
Mar-30	Factorial Experiments	14	10	11
Apr-06	Other topics / Review	-	-	-

Learning Outcomes

- Develop a fundamental understanding of key (frequentist) statistics concepts of parameter estimation, hypothesis testing, regression, and experiment design.

- Develop and apply statistical thinking to reason about uncertainty and data-driven decision making in engineering contexts.

- Build, interpret, and validate linear regression models for prediction and inference and distinguish between statistical association and causality.

- Use R to perform data analysis, estimation, hypothesis testing, visualization, and regression modeling.

Policies & Statements

Cell Phones and Laptop Usage

Technology can support student learning, but it can also become a distraction. Research indicates that multitasking (texting, surfing the Internet, using social networks) during class time can have a negative impact on learning (Clapp, Rubens, Sabharwal & Gazzaley, 2011; Ellis, Daniels, Jauregui, 2010; Hembrooke & Gay, 2003). **Please refrain from using laptops or mobile phones during lectures, unless you have prior permission from the instructor.**

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 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.

Use of Generative AI

Students may use artificial intelligence tools, including generative AI, in this course as learning aids or to help with course project. However, students are ultimately accountable for the work they submit.

- Students may not use artificial intelligence tools for taking tests and quizzes.

- Any content produced by an artificial intelligence tool must be cited appropriately. Many organizations that publish standard citation formats are now providing information on citing generative AI (view the U of T Libraries Citation Guide for Artificial Intelligence Generative Tools).

- Course instructor and the TAs reserve the right to ask students to explain their process for creating their submissions. You will not receive credit for code / content you cannot fully explain.

Wellness and Mental Health Support

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. 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 UofT 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 UofT Engineering Mental Health & Wellness webpage, and a small selection are also included here:

- UofT Engineering's Mental Health Programs Officer

- Accessibility Services & the On-Location Advisor

- Health & Wellness and the On-Location Health & Wellness Engineering Counsellor

- Graduate Engineering Council of Students' Mental Wellness Commission

- SKULE Mental Wellness

- UofT Engineering's Learning Strategist and Academic Success

- 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.

If you find yourself feeling distressed and in need of more immediate support, consider reaching out to the counsellors at UofT Telus Health Student Support or visiting U of T Engineering's Urgent Support – Talk to Someone Right Now.

Accomodations

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 purpose of academic accommodations is to support students in accessing their academics by helping to remove unfair disadvantages. We can assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. 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 Inlcusion

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

- UofT Equity Offices & First Nations House Resources.

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 or Darlee Gerrard if you are interested.

Indigenous students at UofT are also invited to visit First 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!