MAT186H1F Calculus I
University of Toronto
Fall 2025

I. Course Overview

Brief Course Description & Learning Objectives:

Welcome to MAT186 Calculus I at the University of Toronto! During this course we will practice transferable mathematical thinking skills such as modelling, communication, problem-solving, and the role of approximation.

Beginning with a brief pre-calculus module, we will then begin our calculus study in earnest with the underlying theory of limits and continuity. After that we'll investigate derivatives and how they apply to modelling an array of phenomena in the form of differential equations. Then we'll take a run through some notable other applications of differential calculus including how to exploit the linear approximation to numerically solve differential equations, and the all-important technique of applied optimization. We will then turn to integral calculus, where we will learn how thinking about Riemann sums allows us to represent some real-world quantities with definite integral formulas. Finally, we'll close the semester by connecting the notions of derivative and integral via the Fundamental Theorem of Calculus.

We hope that by the end of the course you have become fluent in the various concepts related to Calculus as outlined in the list of modules on page 8 as well as

- Developed your ability to take intellectual and creative risks to solve problems you haven't seen before.

- Learned to communicate succinctly and precisely using the language and notation of calculus.

- Developed your ability to model engineering and physics problems using calculus and interpret the results in a real-world context.

- Developed the ability to critically analyze your solutions and check whether or not they make sense.

- Developed your ability to present, and evaluate a logical argument.

Supporting Textbook and Supplementary Reading Material:

The supporting course textbook is on reserve at the Engineering and Computer Science Library and is available for purchase as an e-text (with a two year license) or a physical textbook. This textbook is not strictly required, but is recommended as an additional resource throughout the course.

Calculus Early Transcendentals (Third Edition)

- Physical Textbook ($79): Click here to purchase

- e-text ($67.99, two-year license): Purchase from Bookstore here

MyLab Registration for e-text:

1. Once purchased from the Bookstore, you will recieve a MyLab digital "Access Code".

2. Go here to access your MyLab course. You will first sign in with your existing Pearson student account or create a new account using your student email.

3. Input your Access Code from the Bookstore. This will be a small button on the left side of the screen. You can ignore the other offers on this page.

4. Select "Go to my course" to access your e-text.

Technology Requirements & Platforms Used:

In order to participate in this course, students will be required to have:

- Reliable internet access. It is recommended that students have a high speed broadband connection (LAN, Cable, or DSL) with a minimum download speed of 5 Mbps.

- A computer satisfying the minimal technical requirements. Please familiarize yourself with them.

Quercus:

Quercus is the MAT186 homepage: https://q.utoronto.ca.

Please check the homepage frequently for course announcements, logistics and course materials. All announcements posted are considered to have been announced to the class and not having read or seen an announcement is not an accepted reason for not following guidelines or missing deadlines. We recommend you configure your preferences on Quercus to receive an email notification as soon as an announcement has been posted.

Gradescope:

All assessments will be administered through Gradescope. Be sure to login to the Canadian server only at: www.gradescope.ca. Do not use the .com server. Your @mail.utoronto.ca account will be automatically signed up for a free account before the first term test.. Grades for tests can only be viewed on Gradescope and will not be synced with Quercus.

II. Learning Cycle & Course Components

Complete Pre-Class Essentials (PCEs):   **1.5 hours per week**
Three times a week, before class, you will complete a short reading followed by a two-question quiz on Quercus. The purpose of the readings is for you to familiarize yourself with the elementary concepts of the modules. The quiz allows you to make sure you're ready for class; that's why we call it a Pre-Class Essential. The quiz should be straightforward if you have done the reading.

Participate in Lectures: **3 hours per week**
You will have 3 lectures per week. The lectures will be active; there will be a mix of instructors introducing concepts and time to work on problems. This will give you an opportunity to practice with new material, test your basic understanding, and ask questions in real time so you can leave lecture having made genuine progress with course content.

Participate in Discussion Groups (Tutorials):   **1 hour per week**
Beginning the week of Mon. Sept. 15, you will have a discussion group (tutorial) facilitated by a Teaching Assistant (TA). The discussion will focus on some assigned problems which will be made available to you in advance of your group meeting. You should bring some of your draft work and be prepared to share your thoughts in small groups with your peers. TAs will circulate throughout the rooms, providing hints, and giving feedback on your preliminary ideas leading to a consensus on solutions.

Self-study, Prepare for a Term Test: **3-5.5 hours per week**
You should be prepared to study outside of class time. The time spent may vary from week-to-week but you should always be dedicating *at least* three hours per week. Practice problems created by the teaching team will be posted each week, in addition to the suggested textbook problems for each module. Consistent practice is how you will deepen your understanding of course content and develop your problem solving skills. The intention and attention you give to your practice will be fundamental to your success in this course.

You should therefore spend a total of about 8.5 to 11 hours per week on this course. This matches the expectation that full-time university students with 5 courses will spend about 40 to 55 hours per week on their studies.

Term Tests:
There will be two term tests that are common to all sections of the course. Each term test will emphasize material not already tested but may build on previous material. The *tentative* dates and times for the term tests are:

Term Test 1: Tues. Sept. 30, 10:00am-12:00pm

Term Test 2: Thurs. Nov 6, 7:00pm-9:00pm.

Universal Make-up: Tues. Nov. 25, 10:00am-12:00pm.

The universal make-up test is mandatory for any student who did not write Test 1 or Test 2 with a validated petition. It is optional for any student who wrote both Test 1 and Test 2 but wishes to improve their grade. See the next section (Grading Scheme & Course Policies) for more details. More detailed information about each test will be posted on Quercus one to two weeks before the date of the test.

Final Exam:
The final exam will be held during the final exam period Dec. 2025 and will be scheduled by the registrar. Information about the final will be posted on Quercus one to two weeks before the date of the final exam.

III. Grading Scheme & Course Policies

Grading Scheme:
Your final grade will be calculated by the following formula:

- Reflections - 2% of your final grade.

- Pre-Class Essentials (drop lowest 3) - 10% of your final grade.

- Term Test I & II - 38% of your final grade (combined). Each term test is worth an equal value toward your overall test grade. If you write both Test 1 and Test 2, you will have the option to write the universal make-up test to improve your lowest test grade as follows: 0.5(lowest grade test grade)+0.5(universal make-up test grade). Of course, if you are content with your Test 1 and Test 2 grades, you do not need to write the universal make-up test.

- Final Exam - 50% of your final grade.

Missed Assessments Policies:

- Any term-work you miss should be petitioned. The petition policy of the Faculty of Applied Science & Engineering can be found here. Please take a moment to familiarize yourself with it now, *before* an issue arises.

- We are dropping your lowest three Pre-Class Essential marks. Therefore, you do not need to submit petitions unless you had a legitimate reason to miss more than three PCEs. In that case, you need to submit a petition for all PCEs that you missed. If you miss more than three PCEs and have a valid petition for all occasions (including the "first three missed" PCEs), then your final grade will be re-weighted accordingly. Filing up to three petitions for PCEs will have no effect since the lowest three scores, including zeros, are dropped anyways, with or without petition. The policy described above is meant to save you from the hassle of filing petitions. They are not an additional way to excuse missed work. Of course, if you have more than three valid PCE petitions, all of them will be honoured.

- **If you miss a term test** you must submit a term-work petition within 7 days of the test date. If you miss a term test and you do not submit a petition or your petition is deemed invalid, you will receive a 0 on the term test. If you miss a term test and your petition is deemed valid, then you will write the universal make-up test to replace the original missed test.

- **If you miss the final exam** you must submit final exam petition within 7 days of the final exam date. The Faculty has specific policies regarding final exams. Please contact the First Year Office if you have any questions.

IV. Teaching Team & Administrative Information

Lecture Section	Instructor	Email
L0101	Geoffrey McGregor	geoffrey.mcgregor@utoronto.ca
L0102	Omar Alshawa	omar.alshawa@mail.utoronto.ca
L0103	Morgan Hooper	morgan.hooper@utoronto.ca
L0104	Sean Uppal	uppal@math.toronto.edu
L0105	Amaranta Martinez De La Rosa	amaranta.martinezdelarosa@mail.utoronto.ca
L0106	Almut Burchard	almut@math.utoronto.ca
L0107	Shai Cohen	sh.cohen@utoronto.ca
L0108	Schinella D'Souza	schinella.dsouza@utoronto.ca
L0109	Jason Hattrick-Simpers	jason.hattrick.simpers@utoronto.ca

Course Coordinator: Geoffrey McGregor

Office Hours:
Each instructor will hold regular weekly office hours. The office hours schedule will be posted on the Quercus homepage, and will begin the week of September 8. These are an opportunity to dialogue with course instructors outside of the classroom in either a small group or an individual setting. You may attend any office hour without an appointment. We are always happy to meet and speak with you.

If you have a math related question, be sure to have spent some time on it first, and be ready to explain what have you attempted. This will help instructors understand where you're "at" with a problem and allow us to provide more effective help. Even if you don't have a particular question but just a feeling that there's something you're not getting about a concept, we can help you work through this. You may also drop in to chat informally or listen to the questions of others.

Email Policy & Etiquette:
Email is reserved for administrative questions. *Please check the syllabus and Quercus first* before sending an email. If the answer to your question(s) is available in the syllabus or on the announcements page on Quercus, we may not respond to your email. Otherwise, we will respond to emails as soon as possible, usually within 24 hours (except on weekends). If you have a math question, please visit one of the instructor office hours posted on the Quercus page.

- *Put MAT186 in the subject line, use your UofT email, and always identify yourself.*

- *Be specific.* We're better able to help you the more specific you are. If your question is complex or lengthy and requires multiple back-and-forth emails, we will ask you to attend office hours instead.

- *Be professional.* Please use an appropriate tone, level of formality, and review what you've written before sending your email. Email, in the context of the class and communication with instructors, is professional correspondence and we ask you to treat it as such.

V. Supports

The Rewind Sessions are an opportunity to reengage with material covered in the previous week's lectures. Perhaps you need extra support for a particular sub-module (or two), or maybe you missed a class because you were sick. This is where The Rewind Sessions come into play. Run by an instructor or experienced TA, these sessions will review material from the previous week. We'll update the Quercus page with which topic(s) will be re-winded each week!

Drop-in Homework Club is held Monday through Thursday evenings from 5:00-7:00pm. The location will be announced once confirmed. This is a study space primarily for first year engineering students and is staffed with Teaching Assistants from the Math Learning Centre. We encourage you to use this space regularly when working on your Calculus practice problems, or reviewing for an upcoming exam.

Just-In-Time Review Sessions are held during the second week of class on prerequisite math skills for calculus, including sessions on functions, equations and inequalities, and trigonometry. For more information about these sessions please check out the MLC Quercus page: https://q.utoronto.ca/courses/128914/pages/review-of-prerequisite-math-skills

G.E.A.R.S is a peer-led support initiative designed to help new engineering students with coursework and transition effectively into university life. Check the following link for more information http://uoft.me/gears

EngSuccess is a peer-mentorship initiative where upper-year undergraduate engineering students (mentors) support first-year engineering students through academic and social guidance. The goal is to help incoming students navigate challenges, get familiar with the Skule community, and improve both academic success and professional development. Check the follopwing link for more information https://undergrad.engineering.utoronto.ca/advising-and-wellness/eng-success/

VI. Institutional Policies

Academic Integrity:
Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves.

Please familiarize yourself with the University of Toronto's Code of Behaviour on Academic Matters: https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019. A simplified version is available here: https://www.academicintegrity.utoronto.ca/perils-and-pitfalls/

The use of generative artificial intelligence (AI) tools is strictly prohibited in all course assessments unless explicitly stated otherwise by the course coordinator. This includes, but is not limited to, ChatGPT, GitHub Copilot, and open-source models that you have trained and/or deployed yourself. You may not interact with, nor copy, paraphrase, or adapt any content from any generative AI for the purpose of completing assignments in this course. Use of generative AI will be considered use of an unauthorized aid, which is a form of academic misconduct under the Code of Behaviour on Academic Matters.

This course policy is designed to promote your learning and intellectual development and to ensure that our evaluations are a fair and accurate assessment of your learning. Though it may be tempting to use generative AI to assist you when completing your assignments, this will simply inhibit your learning. If the work you submit is essentially the output of generative AI, then what have you learned and what value are you adding? Think of it this way: if a potential employer or supervisor can get as much from an AI tool as what you're able to do yourself, then why should they hire you at all? You should aim to understand course content at a level that far exceeds what an automated tool can achieve. Our course—and in particular, each assignment—is designed to help you attain true mastery of the course content. If you have questions or are stuck, please come to office hours, where we'll be happy to help!

Copyright:
Course 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.

Accessibility:
The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs. Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please feel free to approach your Course Instructor and/or the Accessibility Services office as soon as possible. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

https://undergrad.engineering.utoronto.ca/advising-and-wellness/accessibility-services/

Equity, Diversity and Inclusion:
The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

VII. Modules

A Pre-Calculus	Textbook Reference
A1 Trigonometry	Section: 1.4
A2 Inverse Functions	Sections: 1.3, 1.4
A3 Logarithms & Exponentials	Section: 1.3
A4 Estimations, Absolute Values & Inequalities	

B Limits & Continuity	Textbook Reference
B1 Limits	Sections: 2.1-2.5
B2 Limits continued	Sections: 2.1-2.5
B3 Squeeze Theorem	Section: 2.3
B4 Continuity & IVT	Section: 2.6

C Derivatives	Textbook Reference
C1 Derivative at a Point	Section: 3.1
C2 The Derivative Function	Section: 3.2
C3 Derivatives Rules	Sections: 3.3 & 3.7
C4 Linear Approximation	Section: 4.6
C5 Interpretation of the Derivative	Section: 3.6
C6 Implicit & Inverse Differentiation	Sections: 3.8 & 3.10
C7 Related Rates	Section: 3.11

D Applications of Derivatives	Textbook Reference
D1 Differential Equations & their Solutions	Section: 9.1 (pg. 597, 598)
D2 Phase Lines & Slope Fields	Section: 9.2
D3 Euler's Method	Section: 9.2
D4 L'Hôpital's Rule	Section: 4.8
D5 Critical Points	Section: 4.1
D6 Applied Optimization	Section 4.5

E Definite Integrals & Riemann Sums	Textbook Reference
E1 Approximating Definite Integrals	Section: 5.1
E2 Sigma Notation & Subintervals	Section: 5.1
E3 Limits of Riemann Sums	Section: 5.2
E4 Modelling with Riemann Sums (Four Parts)	Section: 6.1-6.6

F Antiderivatives	Textbook Reference
F1 Antiderivatives	Section: 4.9
F2 Initial Value Problems	Section: 4.9
F3 Fundamental Theorem of Calculus, Part I	Section: 5.3
F4 Fundamental Theorem of Calculus, Part II	Section: 5.3

VIII. Tentative Schedule:

Some sections may be slightly ahead or behind this schedule. Please note that there are no lectures nor discussion groups during the Fall Reading Break Oct. 27 - Oct. 31.

Dates	Modules
Sept. 2 - Sept. 5	Introduction, A1, A2
Sept. 8- Sept. 12	A3, A4, B1
Sept. 15 - Sept. 19	B2, B3, B4
Sept. 22 - Sept. 26	C1.C2, C3
Sept. 29 - Oct 3	C4, C5, C6
Oct. 6 - Oct 10	C7, D1, D2
Oct. 14 - Oct 17	D3, D4
Oct. 20 - Oct. 24	D5, D6, E1
Nov. 3 - Nov. 7	E2, E3, E4-1
Nov. 10 - Nov. 14	E4-2, E4-3, E4-4
Nov. 17 - Nov. 21	F1, F2, F3
Nov. 24 - Nov. 28	F4, Catch-up, Review
Dec. 1 - Dec. 2	Review for Monday Lectures