Department of Mathematics, University of Toronto
MAT 137Y, Calculus!
Course Information, 2009-2010
http://www.math.toronto.edu/courses/137/

About The Course

Welcome to the University of Toronto, and to MAT 137Y, the introductory calculus course for science majors. This sheet answers the most common questions about the course.

Please take a few minutes to study this course information handout carefully, and keep it for future reference.

Modern calculus, a synthesis of mathematical developments based on the notion of limit and driven by problems of geometry and physics, is both the universal language of sciences and the cornerstone of contemporary mathematics. As such it has a wide scope, and its relevance can be understood in several ways. Our calculus courses here at the Unversity of Toronto reflect several needs and objectives. In contrast to MAT 135Y which treats calculus as a practical service course to the scientific community and relies on examples as principal means of conveying the mathematical content, MAT 137Y concentrates on the conceptual nature of the subject. With its emphasis on the theorems and their proofs, this course is substantially different from the "problem-and-solution" type courses familiar in high schools.

The aim of the course is two-fold. The first is to understand the concepts of calculus and develop the computational skills necessary to apply these concepts to the solution of a wide range of problems, many of which arise in real-world situations. The second (and equally important) aim of the course, which is largely absent in MAT 135Y, is to learn to articulate the concepts of calculus clearly and precisely and to use them to prove theorems in calculus. This gives a deeper understanding of the concepts of calculus but more importantly it provides a training in precise mathematical thought and expression in general. The kind of thinking which you will learn in this course will be valuable in almost any discipline and particularly so in mathematically-oriented areas such as computer science and physics. This course differs from MAT 157Y only in the level of theoretical demands placed on the student with the understanding that MAT 157Y is directed to the most theoretically-minded student with a deep commitment to mathematics.

MAT 137Y is demanding and challenging, but its subject matter is great and should make for an exciting course. The instructors and tutors are here to help you – do not hesitate to contact them. What follows is more detailed information concerning the course.

Lectures/Administrative Information

Lecture sections meet for three hours a week. There are six lecture sections of the course.

Section	Time	Lecture Room	Instructor	Office
L0101	MWF9	SS 1087	E. Meinrenken	BA 6112
L0201	MWF12	LM 162	S. Uppal	UC 45
L0301	MWF1	LM 162	S. Homayouni	TBA
L0401	T9, R9-11	SS 1085	E. Milman	BA 6107
L0501	T10, R9-11	LM 161	F. Rochon	ES 4141
L5101	R6-9	MP 137	F. Ziltener	HU 1025

The administrative coordinator is Joel Chan; contact information is provided on the course website.

Your instructor will hold weekly office hours for the course; you are welcome to visit your instructor during those hours for help or inquiries. The instructor may also give you phone and e-mail information upon his or her discretion. When contacting any instructor by e-mail, please send messages in plain text – HTML or MIME attachments are discouraged.

The course syllabus, which gives a schedule and outline for this course, is on the back page of this handout.

All announcements and handouts will be posted on the course website. Please make sure you have access to the Internet and visit the website regularly.

Textbooks

The text for this course is *Calculus, One Variable, Tenth Edition*, by Salas, Hille, and Etgen; Wiley, © 2007. This text, along with the optional Student Solutions Manual, may be purchased at the University of Toronto Bookstore.

Tutorials

Teaching assistants for the course will conduct tutorials starting Monday September 21. Tutorials meet for one hour a week, either Monday or Tuesday. All students must be registered for a T-section using ROSI; please register immediately if you have not done so.

On Friday September 18, you will be assigned a tutorial code which will indicate your tutorial room and the name of your tutor. The list will be posted on the course website. If you are enrolling into this course on or after September 19, you will need to send an e-mail message to `137tutorials@math.toronto.edu` in order to register for a tutorial, providing your available times. Tutorials will be assigned subject to availability. You may also send e-mail should you encounter a valid schedule conflict for your tutorial.

Tutorials are an integral part of the course and are equally important as the lectures; problem sets and term tests are returned to you, quizzes are held during tutorials, and you have the opportunity to discuss problems and term test material in a smaller class environment. As with all your university work, what you get out of tutorials is proportional to your level of preparation. It is a good idea to have made a serious attempt at all the homework problems before your tutorial, and to have questions to ask your tutor. Tutorial time will usually be spent going over previous problem sets and getting suggestions on upcoming ones.

Teaching assistants are also available for consultation in the New College Math Aid Centre (MAC) at WI 500 (Wilson Hall). You are encouraged to attend MAC hours for MAT 137Y; the schedule will be announced on the course website.

Problem Sets

There will be 12 problem sets due approximately every other week beginning September 24. Problem sets will be posted on the course website roughly two weeks before the deadline, and are due on Thursdays before 6:10 p.m. You may submit your completed problem set to your instructor in class, or to the course assignment box located at SS 1071.

Late assignments will not be accepted for any reason. Students in the evening section may hand in their assignments in class before the lecture begins. If you are in the evening section and your daytime commitments will prevent you from handing in your assignments on time, you may arrange to have your assignments handed in class late without penalty. Please speak to the instructor if this applies to you.

Due to limited resources, not all the assigned problems will be marked. However, the real reason for doing the problem sets is not the mark value (which is disproportionately low for the amount of effort required) but the learning value of the experience. *Mathematics is inherently a participatory activity*. Similarly, you can't learn to swim by watching someone do laps; you have to get into the pool yourself. Even if there were time to work lots of problems in the lectures, doing so would not result in your learning mathematics.

You should expect to spend at least eight hours per week on problem sets, so do not wait until the last minute to begin on your assignments. Your problem set mark will be determined by eliminating the worst two problem sets and computing the average mark of each remaining problem set, and then scaling it out of 100 marks.

Quizzes, Term Tests and Final Exam

A large portion of your course mark will be determined by three quizzes, three term tests, and the final exam.

There will be three quizzes of on the weeks of October 19, November 30, and February 8. Each 30 minute quiz will be written in tutorial and consist of four questions that are similar to the questions assigned in the problem sets. Your quiz mark will be determined by computing the average mark of all three quizzes and then scaling it out of 100 marks.

There will be three term tests which are scheduled for Thursday November 5, Wednesday January 13, and Wednesday March 10. All three term tests will be held from 6:10 – 8:00 p.m., so the evening section class is cancelled. Test locations will be announced on the course website well in advance. Each test will emphasize the most recent material, but may cover some earlier material as well. Term tests will roughly consist of five to seven questions with multiple parts. All tests will be out of 100 marks.

Should you be unable to write any of the term tests due to a scheduling conflict, you will be allowed to write an early sitting of the test. More information will be provided on the course website.

If you miss a term test for medical or family reasons, you must bring appropriate documentation to your instructor. In the case of illness, your doctor must fill out the University of Toronto Student Medical Certificate. You may then take a "universal make-up test" on Monday March 22, which covers material from all three term tests.

There will be a three hour cumulative final exam during the April 2010 exam period. The exact date and time will be posted by the Faculty of Arts and Science.

Marking System

Your final mark for this course will be determined by your term mark and your final exam mark. The term mark is weighted as follows:

$$\begin{aligned}\text{Term Mark} = \ & 25\% \cdot (\text{Test 1 Mark}) + 25\% \cdot (\text{Test 2 Mark}) + 25\% \cdot (\text{Test 3 Mark}) \\ & + 15\% \cdot (\text{Problem Set Mark}) + 10\% \cdot (\text{Quiz Mark}).\end{aligned}$$

Your final course mark is computed by the following formula:

$$\text{Final Course Mark} = \tfrac{3}{5} \cdot \max(\text{Term Mark, Final Exam Mark}) + \tfrac{2}{5} \cdot \min(\text{Term Mark, Final Exam Mark}).$$

In sum, your final exam will account for either 40% or 60% of your course mark, whichever leads to the higher mark. This means each term test is worth 10% or 15% of your final mark depending on your performance on the final exam.

Academic Misconduct

Academic integrity is one of the cornerstones of the University of Toronto. It is important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of your university degree to which you will all hope to earn.

Assignments in mathematics are subject to the same policies regarding plagiarism as an English essay or any type of written work. In sum, it is an offence for students to commit the following acts:

- To plagiarize; in other words, to use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

For more information, please read the *Code of Behaviour on Academic Matters* (available in the Arts and Science calendar) and check the handouts section of our course website for our policy regarding plagiarism and academic misconduct.

Online Material

Most online material will be located at our website, which is listed on the front page of this handout. In addition, there will be a web page at the University of Toronto Portal, located at `http://portal.utoronto.ca/`.
All registered students should see a link to this course. The portal will be used solely to check grades. All other information, including announcements, solutions will be made through the course website.

The course website will have the latest version of this course outline should there be any corrections or additional information. Announcements will be made if there are any changes.

MAT 137Y, 2009–2010 Course Syllabus

The following is an *approximate* schedule for MAT 137Y; at various points during the year your instructor may get slightly ahead or behind. There are four blocks of material into which the course content is divided: Number Systems, Functions, and Graphs; Limits and Continuity; the Calculi of Differentials and Integrals; and Applications, including special functions, polynomial approximation, sequences and series. The first block is preparatory and quite brief. The second block consists of "ε-δ" material that is of paramount importance in laying the foundations for "the Calculus," but which is technical and likely to be completely unfamiliar. The third block comprises differentiation and integration—the two main themes of "Calculus"—and various techniques for calculating derivatives and integrals (hence the term "calculus"). The last block comprises a more-or-less standard sampling of the vast array of mathematical problems which yield to the methods developed. All sections below refer to the sections in Salas, Hille, and Etgen (10th Ed.) unless otherwise noted.

Week Beginning		Work Due	Section(s):	Topic(s)
1	Wed Sept. 9		1.2–1.5:	Review of Inequalities, Functions and Graphs
2	Wed Sept. 16		1.6–1.7:	Review of Trigonometry, Number Systems
3	Wed Sept. 23	Problem Set 1	1.8:	Introduction to Proofs, Normal and Strong Induction
4	Wed Sept. 30	Problem Set 2	2.1, 2.2:	ε-δ definition of limit
5	Wed Oct. 7		2.3, 2.4:	Theorems on Limits, continuity
6	Wed Oct. 14	PSet 3 & Quiz 1	2.5, 2.6:	Squeeze theorem, Theorems of continuity
7	Wed Oct. 21		2.6, 11.1:	Boundedness, Least Upper Bounds
8	Wed Oct. 28	Problem Set 4	3.1–3.5:	Definition of derivative, techniques
9	Wed Nov. 4	**Term Test 1**	3.6, 3.7, 4.10:	Implicit differentation, Related Rates
10	Mon Nov. 16		4.1–4.5:	Mean Value Theorem, Extrema, Optimization
11	Mon Nov. 23	Problem Set 5	4.6–4.8:	Concavity, Curve Sketching
12	Mon Nov. 30	Quiz 2	4.12, 11.5, 11.6:	Newton's Method (Time Permitting), L'Hôpital's Rule
			:	December Exams and Christmas Break
13	Mon Jan. 4	Problem Set 6	5.1–5.3:	Definition of Integral
14	Mon Jan. 11	**Term Test 2**	5.4–5.8:	Fundamental Theorem of Calculus
15	Mon Jan. 18		6.1–6.3:	Geometric Applications of Integrals
16	Mon Jan. 25	Problem Set 7	7.1–7.6:	Inverses; Logarithms and Exponentials
17	Mon Feb. 1	Problem Set 8	7.7, 8.2, 8.3:	Inverse Trig Functions, Techniques of Integration
18	Mon Feb. 8	Quiz 3	8.4–8.6:	More Techniques of Integration
	Mon Feb. 15		:	Reading Week (No classes)
19	Mon Feb. 22	Problem Set 9	11.7, 12.6:	Improper Integrals, Taylor Polynomials
20	Mon Mar. 1	Problem Set 10	12.6, 11.2, 11.3:	Remainder Term of Taylor Polynomials, Sequences
21	Mon Mar. 8	**Term Test 3**	11.4, 12.1–12.3:	Sequences and Series
22	Mon Mar. 15	Problem Set 11	12.3–12.5:	Convergence of Series
23	Mon Mar. 22	Problem Set 12	12.8, 12.6:	Power Series and Taylor Series
24	Mon Mar. 30		12.9:	Operations on series of functions, Exam Review