

## **MAT 237Y - Advanced Calculus- 2016**

Welcome to MAT 237, a course in advanced calculus! We wish you a rewarding learning experience! We hope that you will end up loving calculus as much as we do!

### **Objective**

The goal of this course is to present the student with a basic knowledge of the theory of differential and integral calculus of functions of several variables. The course will emphasize both computation and theory. Our aim is that by the end of the course, each student should be comfortable constructing a clear, rigorous solution to a problem of moderate difficulty.

### **Expectations**

We believe that a conceptual approach to understanding is the key aim of a university education. Our lectures and the evaluations will be based on this philosophy. We encourage students to focus on the following:

- Understanding the idea behind definitions, theorems, and proofs.
- Improving their problem solving skills in order to apply them to new problems.
- Provide clear, concise, and logical arguments in their solutions to problems.

### **Prerequisites**

MAT137Y / MAT157Y / (MAT135H, MAT136H (90%) ), MAT223H / MAT240H

### **Lectures**

L0101	MWF9	MP 103	Niksirat, M.	<a href="mailto:niksirat@math.utoronto.ca">niksirat@math.utoronto.ca</a>
L0201	MWF2	KP 108	E. Mazzeo	<a href="mailto:emazzeo@math.utoronto.ca">emazzeo@math.utoronto.ca</a>
L5101	MTW 5-6	MP 203	Jerrard, R.	<a href="mailto:rjerrard@math.utoronto.ca">rjerrard@math.utoronto.ca</a>
L5201	R 6-9	MP 202	Faifman, D.	<a href="mailto:dfaifman@math.utoronto.ca">dfaifman@math.utoronto.ca</a>

E. Mazzeo is the course coordinator. You should contact him for administrative issues.

**Notes:**

We will be using Tyler Holden's notes as the primary textbook for the class. They are available on the website at <http://utmat237.com/notes/>

**Textbook (not required, but for reference):**

"Advanced Calculus" by Gerald B. Folland, Publisher: Prentice Hall, Chapters 1-5.

**Big List O'Problems**

We will be providing a Big List O'Problems, sorted by section and difficulty level. These are questions specifically tailored to the learning objectives of our course. In addition to this, we guarantee that at least 25% of the problems which appear on the tests will be at most slight modifications of questions from this list.

We encourage students to work together in solving these questions. A student who solves most of the questions (up to the moderate level of difficulty) will be in an excellent position to do well in the course. We should remark that The Big List is BIG. In fact, it is too big to make memorization of the solutions a viable strategy for success.

**Please Note:**

The Big List O' Problems don't have written solutions. We believe this is one of the keys to why this course is successful in teaching students how to solve problems, (as opposed to teaching students how to read solved problems). Solve them on a weekly basis, and make use of the many contact hours with your TA's and instructors to receive assistance in solving these problems.

**Office Hours**

Students are encouraged to come to office hours for, small group or one on one, assistance in understanding the course material. Office hours are also a good opportunity to ask questions on material that was covered earlier in the course. The TAs and instructors will be holding office hours throughout the term. The [schedule will be posted on the course homepage.](#)

**Website**

The website for the course is available at <http://utmat237.com/>

We will use blackboard only for you to be able to check your grades.

**Tutorials**

Tutorials are an essential part of our course. Tutorials will serve as a forum for students to make progress on problem solving. In particular, students should use this time to get assistance from their teaching assistants to solving problems from the The Big List. Tutorials will start in the 2<sup>nd</sup> week of classes.

## **Term Tests**

There will be five term tests, two in the first half of the course, and three in the second half of the course. Each test will be worth 12% of your final mark.

### **Test Dates:**

Test 1	Week #4	Friday, October 7, 5-7 pm.
Test 2	Week #10	Friday, November 18 <sup>th</sup> , 6-8 pm.

Test 3	Week #3	Friday, January 20 <sup>th</sup> , 5-7 pm.
Test 4	Week #7	Friday, February 17 <sup>th</sup> , 6-8 pm.
Test 5	Week #11	Friday, March 24 <sup>th</sup> , 6.30-8.30 pm.

The alternate sitting for students with a documented and justifiable reason will take place on the same day 2 hours earlier.

### **N.B: In order to take this course, you must be available to take the term tests.**

There will be no make-up tests. If you have a documented, legitimate reason for missing the test, the weight of the term test will be transferred to your final exam. Students with course conflicts or any other foreseeable conflicts with both the early and regular sitting, must inform the course coordinator of the conflict by no later than Mon, September 26, 2016, 11:59 pm.

## **Evaluation Scheme**

The grading scheme will be as follows:

Term Tests	60% (5 of them, 12% each)
Final Exam	40%

## **Missing Term Tests**

Tests that are missed due to legitimate extenuating circumstances, such as illness must be supported by appropriate documentation. Please visit [www.illnessverification.utoronto.ca](http://www.illnessverification.utoronto.ca) for more details. In the event of illness, the only valid supporting documentation is a Verification of Illness Form. This form should be scanned and submitted by e-mail to the course coordinator with the subject: "237 Illness" within three working (3) days of the date of the test. Missing a test without the proper supported documentation will result in a grade of zero (0).

## Schedule

We will try to keep to this schedule.

### Fall Term

<u>Week</u>	<u>Dates</u>	<u>Topics</u>	<u>Tyler's Notes</u>
Week 1	Sept 12 <sup>th</sup> - 16 <sup>th</sup>	Sets, Functions, & Vectors	1.1, 1.2
Week 2	Sept 19 <sup>th</sup> - 23 <sup>rd</sup>	Open, Closed, and Boundary	1.3
Week 3	Sept 26 <sup>th</sup> - 30 <sup>th</sup>	Sequences, Limits, and Complete	1.4
Week 4 (Term Test #1)	Oct 3 <sup>rd</sup> - Oct 7 <sup>th</sup>	Continuity	1.5
Week 5	Oct 10 <sup>th</sup> - 14 <sup>th</sup>	Compact	1.6
Week 6	Oct 17 <sup>th</sup> - 21 <sup>st</sup>	Convex & Connected	1.7
Week 7	Oct 24 <sup>th</sup> - 28 <sup>th</sup>	Derivatives	2.1
Week 8	Oct 31 <sup>st</sup> - Nov 4 <sup>th</sup>	The chain rule	2.2
Week 9 (3 days)	Nov 7 <sup>th</sup> - 11 <sup>th</sup> (No classes: Mon, Tue)	The mean value theorem & higher order partials	2.3, 2.4
Week 10 (Term Test #2)	Nov 14 <sup>th</sup> - Nov 18 <sup>th</sup>	Taylor's Theorem	2.5
Week 11	Nov 21 <sup>st</sup> - 25 <sup>th</sup>	Critical points & lagrange multipliers	2.6
Week 12	Nov 28 <sup>th</sup> - Dec 2 <sup>nd</sup>	Uniform Continuity & Parametrizations	1.8 & (prof's notes)
Week 13 (2 days)	Mon Dec 5 <sup>th</sup> & Tue Dec 6 <sup>th</sup>		

### Spring Term

<u>Week</u>	<u>Dates</u>	<u>Topics</u>	<u>Tyler's Notes</u>
Week 1 (2 days)	Thur Jan 5 <sup>th</sup> & Fri Jan 6 <sup>th</sup>		
Week 2	Jan 9 <sup>th</sup> - 13 <sup>th</sup>	Implicit Function Theorem & Inverse Function Theorem	3.1
Week 3 (Term Test #3)	Jan 16 <sup>th</sup> - Jan 20 <sup>th</sup>	Curves & Surfaces	3.2
Week 4	Jan 23 <sup>rd</sup> - 27 <sup>th</sup>	Integration in 1-D	4.1
Week 5	Jan 30 <sup>th</sup> - Feb 3 <sup>rd</sup>	Integration & Jordan Measure	4.2
Week 6	Feb 6 <sup>th</sup> - Feb 10 <sup>th</sup>	Iterated Integrals	4.3

<u>Week</u>	<u>Dates</u>	<u>Topics</u>	<u>Tyler's Notes</u>
Week 7 (Term Test #4)	Feb 13 <sup>th</sup> - Feb 17 <sup>th</sup>	Change of Variables	4.4
Week 8	Feb 20 <sup>th</sup> - Feb 24 <sup>th</sup> (Reading week)		
Week 9	Feb 27 <sup>th</sup> - Mar 3 <sup>rd</sup>	Vector Derivatives, Arc Length & Line Integrals	5.1, 5.2, 5.3
Week 10	Mar 6 <sup>th</sup> - 10 <sup>th</sup>	Green's Theorem & Vector Fields	5.4, 5.5
Week 11	Mar 13 <sup>th</sup> - Mar 17 <sup>th</sup>	Surface Integrals	5.6
Week 12 (Term Test #5)	Mar 20 <sup>th</sup> – Mar 24 <sup>th</sup>	The divergence theorem	5.7
Week 13	Mar 27- Mar 31 <sup>st</sup>	Stokes' Theorem	5.8
Week 14 (3 days)	Apr 3 <sup>rd</sup> - 7 <sup>th</sup> (No classes on Thu, Fri)		

### **E-mail policy**

1. Please address your professor appropriately. 2. You must use your utoronto.ca email account. 3. Please include “**237**” in the **subject** of your e-mail. 4. Questions about how to solve math questions should be asked in person during contact hours. 5. Please read the syllabus and homepage to see if your administrative question has been answered there. 6. Please don't expect a reply on weekends, or an immediate reply on weekdays.

### **Academic Integrity:**

Students are responsible for being familiar with all aspects of academic integrity. Please visit the website [www.artsci.utoronto.ca/osai](http://www.artsci.utoronto.ca/osai) for more information.

### **Accessibility:**

If you have a learning need requiring an accommodation the University of Toronto recommends that students immediately register at Accessibility Services at <http://www.accessibility.utoronto.ca/index.htm>. As the instructors of this course, you are also invited to communicate with us at any time about your learning needs. Confidentiality of learning needs is respectfully and strictly maintained.