Department of Mathematics, University of Toronto
MAT291H1F - Calculus III
Syllabus - Fall 2013

Brief Course Description

This is a first course in multivariable calculus, covering: functions of several variables and the gradient, multiple integrals and the Jacobian, line integrals, Green's theorem, divergence, gradient, and curl of a vector field, surface integrals (and some applications from electromagnetics), Stokes' theorem and the divergence theorem, constrained max/min problems and the method of Lagrange multipliers. Students will be required to be able to solve standard computational problems and understand the main concepts, definitions, and theorems in each section covered.

Developing your ability to think precisely and mathematically is an important objective. The foundations of many courses you will take in your remaining two years are based on the material that we will cover in this course. Your instructors and TAs are available for help should you encounter any difficulty.

Lectures/Administrative Information

Section	Time/Room	Instructor	Office
LEC01	T11-12/BA1190, W11-12/BA1190, R10-11/RS211	Kyle Thompson k3thomps@gmail.com	BA6191
LEC02	T1-2/RS211, W10-11/BA1190, R3-4/BA1180	F.P. Dawson dawson@ecf.utoronto.ca	SF1021H
LEC03	M2-3/MC254, T10-11/RS211, R11-12/RS211	Prashant Athavale, prashantva@gmail.com	HU1001A (215 Huron)
LEC04	M1-2/BA1180 T11-12/GB244 W11-12/SF1101	Curtis Pro curtispro@gmail.com	HU1025 (215 Huron)

The course coordinator is Curtis Pro; his contact email is curtispro@gmail.com. The course website can be found on Blackboard. All announcements and handouts will be posted to the website. Please visit the website regularly. Each instructor for the course will hold weekly office hours. From time to time, your instructors or TAs may wish to contact you with announcements via email. You are required to maintain a working utoronto.ca email address for this course. It is crucial that your email on ROSI (which appears on blackboard) is a utoronto.ca email address.

Textbook

Briggs and Cochran: Calculus: Early Transcendentals, 1st edition.

Tutorials

Every student is registered in one tutorial section. Tutorials begin the week of Sept. 16th. During your tutorials your TA will discuss some problems from the suggested homework problems (see the Schedule and Suggested Problems posted on the website). Consequently, to get the most out of your tutorial you must keep up to date with the homework and come prepared to ask questions, should you have any. This is a relatively fast-paced course, and regular attendance in your tutorial is an essential component of this course. The Schedule of tutorials is as follows:

Section	Time	Tutorial Room	TA	Email
TUT01	F10-12	HA401	Krishna Kishor	krishna.kishor@mail.utoronto.ca
TUT02	F10-12	HA410	Dave Yan	dyan@ele.utoronto.ca
TUT03	W4-6	BA2165	Siyu Liu	siyu.liu@utoronto.ca
TUT04	W4-6	HA410	Amin Yazdi	ayazdi@comm.utoronto.ca
TUT05	R9-11	BA2155	Dave Yan	dyan@ele.utoronto.ca
TUT06	R9-11	BA2165	Krishna Kishor	krishna.kishor@mail.utoronto.ca
TUT07	T2-4	BA2195	Siyu Liu	siyu.liu@utoronto.ca
TUT08	T2-4	HA410	Amin Yazdi	ayazdi@comm.utoronto.ca

Quizzes

Each week, during the last 25-30 minutes of the tutorial session, except during the week of the midterm, there will be a quiz based on the assigned homework problems from the previous week. This is to encourage you to work through all the homework problems before attending the tutorial, and help you get the most out of the course. **There are to be no make-up quizzes offered.** There will be 10 quizzes. We will only count your top 8 quiz marks. Also, in the last half hour of the tutorial, prior to writing the quiz, you will be requested to pack all books, bags and coats away, either at the front or back of the room. The question will be written on the blackboard and you should bring a piece of paper with you. Do not forget to mention your name and student number on the front of the piece of paper.

The TAs responsible for grading your quizzes, and who will administer them in the last half hour of the tutorial, are listed as follows:

Section	Time	Tutorial Rm	TA	Email
TUT01	F10-12	HA401	Utkarsh Patel	utkarsh.patel@mail.utoronto.ca
TUT02	F10-12	HA410	Jeff Nicholls	jeff.nicholls@mail.utoronto.ca
TUT03	W4-6	BA2165	Moez Haque	moez.haque@mail.utoronto.ca
TUT04	W4-6	HA410	Utkarsh Patel	utkarsh.patel@mail.utoronto.ca
TUT05	R9-11	BA2155	Catherine Kocia	catherine.kocia@mail.utoronto.ca
TUT06	R9-11	BA2165	Jeff Nicholls	jeff.nicholls@mail.utoronto.ca
TUT07	T2-4	BA2195	Catherine Kocia	catherine.kocia@mail.utoronto.ca
TUT08	T2-4	HA410	Moez Haque	moez.haque@mail.utoronto.ca

Midterm Exam

There will be one 110 minute midterm exam to be held on Thursday October 24 from 6-8 pm. Details will be posted on the course website before the exam date. **There will be no make-up exam.** The cover page of the midterm exam will have a box on it in which you must indicate your tutorial section number. Please do not forget to enter this number on the cover page of the midterm exam. You will be penalized if you do not do this or enter an incorrect tutorial section number. Any concerns regarding the grading of the midterm should be directed to Siyu Liu. He can be contacted by email at: siyu.liu@gmail.com

Remarking Procedure

Your midterm exam and quizzes will be returned to you in the tutorial section in which you are registered, usually within one week of being written/submitted. All questions regarding grading should be directed towards the TA assigned to grading your quiz and **not** to your instructor. In some instances you may feel that you have been graded unfairly. If you have written your midterm/quiz in **pencil**, then you must submit a request for regrading (with written justification) **before the end of the tutorial in which the work was returned.** If you have written your midterm/quiz in **pen**, then **within three days of the work being returned to you**, you can do the following:

1. First compose a short note justifying why your grade should be changed. We will not respond to frivolous requests. An addition error is an obvious reason for a remark.
2. Email your justification for a grade increase to the TA assigned to grading your quiz, or to Siyu Liu for the midterm and make an appointment with her/him if she/he agrees that a remark is warranted. **Please note that regrading may result in your mark being lowered.**

Missed Term Work

If you miss a quiz or midterm deadline for a legitimate and serious reason which you can document, you must submit this documentation, along with a Petition for Coursework form, to your instructor. The **Petition for Coursework form** is available at the Undergraduate Studies Office in the Sandford Fleming Bldg, Room 600. **All of this documentation must be submitted to your instructor by hand, no later than 7 days after the date of the quiz/exam.**

Marking Scheme

Your final mark will be calculated as follows:

Share of Final Mark	Deliverable
30%	Quizzes
30%	Midterm
40%	Final Exam

Department of Mathematics, University of Toronto
MAT291H1F - Calculus III
Schedule and Suggested Problems – 2013

Your instructor may be slightly ahead or behind this schedule. Your ability to correctly and completely solve the problems listed below is a very good indicator of your progress with the material. You are expected to solve at the very minimum all of the problems on this list.

Week 1 beginning September 5
Lecture: Introduction

Week 2 beginning September 9
Lectures:
Chapter 12: Functions of Several Variables
12.1 Planes and Surfaces **(Lect 1)**
12.2 Graphs and Level Curves **(Lect 2)**
12.3 Limits and Continuity **(Lect 3)**

Section 12.1: 3, 5, 11, 13, 15, 21, 23, 29, 35, 37, 41, 45, 49, 53, 57, 63, 67, 75, 79, 85.
Section 12.2: 3, 13, 17, 27, 34, 37, 39, 43, 47, 67.
Section 12.3: 7, 9, 11, 15, 19, 23, 25, 27, 29, 31, 33, 37, 41, 45, 47, 49, 53, 61, 63, 65, 69.

Week 3 beginning September 16 **(Tutorials begin. First Quiz)**
Lectures:
12.3 Limits and Continuity (continued) **(Lect 4)**
12.4 Partial Derivatives **(Lect 5)**
12.5 The Chain Rule **(Lect 6)**

Section 12.4: 1, 7, 9, 15, 19, 21, 27, 33, 39, 41, 43, 45, 57, 59, 61, 63, 67, 69, 71, 75.
Section 12.5: 3, 7, 13, 15, 17, 27, 29, 37, 44, 47, 49, 51, 53, 57.

Week 4 beginning September 23 **(Quiz 2)**

Lectures:
12.6 Directional Derivatives and the Gradient **(Lect 7)**
12.7 Tangent Planes and Linear Approximation **(Lect 8)**
Chapter 13: Multiple Integration
13.1 Double Integrals over Rectangular Regions **(Lect 9)**

Section 12.6: 3, 4, 5, 11, 13, 15, 19, 21, 25, 31, 35, 37, 43, 51, 53, 57, 71, 72.
Section 12.7: 3, 5, 11, 17, 23, 29, 33, 43, 51, 57, 58, 59.
Section 13.1: 1, 5, 9, 15, 21, 25, 29, 30, 33, 39, 43, 51.

Week 5 beginning September 30 **(Quiz 3)**
Lectures:
13.2 Double Integrals over General Regions **(Lect 10)**

13.3 Double Integrals in Polar Coordinates **(Lect 11)**
13.4 Supplementary Problems **(Lect 12)**

Section 13.2: 5, 7, 11, 17, 21, 23, 27, 31, 37, 41, 43, 45, 49, 53, 55, 61, 69, 71, 83.
Section 13.3: 3, 5, 9, 11, 21, 27, 31, 39, 47, 53, 59, 61, 65.

Week 6 beginning October 7 **(Quiz 4)**
Lectures:
13.4 Triple Integrals (2 lectures) **(Lect 13, 14)**
13.5 Triple Integrals in Cylindrical and Spherical Coordinates **(Lect 15)**

Section 13.4: 4, 5, 13, 17, 23, 27, 33, 37, 43, 45, 49, 55, 57, 59
Section 13.5: 9, 10, 13, 15, 17, 21, 25, 31, 37, 41, 43, 49, 51, 55, 57, 65, 74, 81.

Week 7 beginning October 14 **(Quiz 5)**
Lectures:
13.7 Change of Variables in Multiple Integrals (2 lectures) **(Lect 16, 17)**
Review for Midterm Exam

Section 13.7: 7, 9, 15, 19, 25, 27, 29, 33, 35, 39, 41, 47, 49, 61.
Chapter 13 Review (page 957): 3, 7, 13, 17, 19, 25, 31, 35, 37, 43, 47, 49, 53, 61, 67, 75, 77, 79.

Week 8 beginning October 21 (**midterm on October 24. No quiz this week)**
Lectures:
Chapter 14: Vector Calculus
14.1 Vector Fields **(Lect 18)**
14.2 Line Integrals (2 lectures) **(Lect 19, 20)**

Section 14.1: 2, 7, 11, 16, 19, 23, 31, 37, 44, 45.
Section 14.2: 1, 3, 13, 17, 23, 27, 29, 31, 35, 39, 47, 55, 57, 59, 63, 65.
Section 14.3: 1, 3, 7, 11, 19, 23, 27, 29, 36, 39, 41, 47, 49, 53, 55.

Week 9 beginning October 28 **(Quiz 6)**
Lectures:
14.3 Conservative Vector Fields **(Lect 21)**
14.4 Green's Theorem (2 lectures) **(Lect 22, 23)**

Section 14.4: 1, 8, 9, 13, 19, 27, 29, 37, 43, 46, 47, 51, 53, 59, 60, 61.

Week 10 beginning November 4 **(Quiz 7)**
Lectures:
14.5 Divergence and Curl (2 lectures) **(Lect 24, 25)**
14.6 Surface Integrals (2 lectures) **(Lect 26)**

Section 14.5: 3, 6, 11, 15, 19, 21, 23, 29, 33, 39, 43, 47, 57, 58, 59, 61.

Section 14.6: 3, 7, 11, 13, 19, 21, 25, 29, 33, 37, 41, 43, 45, 53, 55, 59, 69, 73.

Week 11 beginning November 11 **(Quiz 8)**
Lectures:
14.6 Surface Integrals **(Lect 27)**
14.7 Stokes's Theorem (2 lectures) **(Lect 28, 29)**

Section 14.7: 1, 3, 5, 9, 13, 15, 19, 25, 29, 37, 38, 39, 40, 41, 43, 46.

Week 12 beginning November 18 **(Quiz 9)**
Lectures:
14.8 Divergence Theorem (2 lectures) **(Lect 30, 31)**
Supplementary Problems with Maxwell's Equations and invoking Helmholtz's equation **(Lect 32)**

Section 14.8: 1, 3, 9, 11, 17, 21, 27, 29, 31, 35, 39, 47, 48, 49, 50, 51, 53.

Week 13 beginning November 25 **(Quiz 10)**
Lectures:
Chapter 12: Functions of Several Variables
12.8 Max/Min Problems (2 lectures) **(Lect 33, 34)**
12.9 Lagrange Multipliers **(Lect 35)**

Chapter 14 Review (page 1057): 1, 2, 5, 7, 9, 13, 21, 25, 29, 31, 33, 37, 39, 45, 51, 56, 57, 59, 63, 65.
Section 12.8: 3, 4, 8, 11, 13, 17, 21, 27, 31, 33, 39, 41, 43, 45, 47, 49, 51, 53, 55, 67.
Section 12.9: 1, 5, 7, 13, 15, 19, 21, 25, 34, 39, 41, 53, 55.

Week 14 beginning December 2 (no quiz this week)
Lectures:
Chapter 14 Review
Review for Exam