

# Course Syllabus

# MTH243: Calculus III (multi-variable) Instructor: Dr. Glenn Faubert

Fall2013

## Introduction

MTH 243 is a third calculus course. Its prerequisite is MTH142 or the equivalent. We will focus on functions of two, three, or more variables extending the ideas of elementary calculus to higher dimensions.

## Objectives: At the conclusion of this semester you will be able to...

1. read and interpret 3d plots and 2d/3d contour diagrams, read and interpret tables of functions of several variables, and plot by hand the graph of simple functions of 2 variables, and simple contour plots of 2 or 3 variables.
2. do calculations with vectors that involve the concepts of addition, scalar multiplication, dot product, cross product, magnitude, projection, and use these concepts in geometry and physics applications.
3. calculate partial and directional derivatives, gradients and differentials of function of several variables, use local linearization to approximate functions,
4. calculate critical points, use the second derivative test to determine local extrema and saddle points (for functions of two variables only), use these concepts to solve unconstrained optimization problems, and use Lagrange multipliers to solve constrained optimization problems.
5. calculate double and triple integrals algebraically, change variables in integrals from rectangular coordinates to polar, cylindrical, spherical coordinates (and vice versa).
6. use the concept of parametrization to represent curves and surfaces
7. represent and interpret plots of vector fields (including flow lines)
8. use vector valued functions to do calculations of line integrals, flux integrals, divergence, and curl, apply these concepts and to problems in physics and geometry,
9. calculate flux integrals geometrically and algebraically over surface graphs.

## Text

The text for the class is Multivariable Calculus, by McCallum, Hughes-Hallet, et. al. fifth edition, John Wiley & Sons Publishing. It is assumed that will you have access to the text by the second class meeting.

## Sakai

SAKAI will be used in this class for all student/teacher electronic correspondence. Important class announcements, a grade book, submission of homework, and student/teacher messaging will all be done on SAKAI. If this is your first semester using SAKAI, get comfortable with it right away! Go to the URI main page and click on SAKAI and start poking around. Your SAKAI user name and password is the same as your URI email account.

## Calculators

A graphing calculator is required (TI 83 or higher, or equivalent). Calculator use is allowed on all exams, quizzes, and homework assignments. Cell phone use is prohibited on all exams and all quizzes. Do not expect to use your cell phone (or tablet computer) as a calculator in class.

## Mathematica

We will continue to use Mathematica in this course. The Mathematica software is available in the campus computer labs. A student version can be downloaded for free to URI students. Our work with Mathematica will be organized into Mathematica projects that you can download from SAKAI.

## Grading

Your grade will be based on two in-class exams, a comprehensive final exam, announced closed-book quizzes, unannounced open-notes quizzes, Mathematica assignments, and Wiley-Plus assignments. Minimum points for letter grades are shown below.

<u>Grade</u>	<u>Minimum %</u>	<u>Component</u>	<u>Points</u>
A	92	Exam 1	100
A-	90	Exam 2	100
B+	87	Mathematica	50
B	82	Quizzes	50
B-	80	Wiley-Plus	50
C+	77	Final Exam	150
C	72	Total	500
C-	70		
D+	67		
D	60		
F	0		

## **Exams**

Two exams plus a cumulative final will be given on the dates shown below. Exams are always closed-book. No questions will be taken during exams. You may have a calculator but never a cell phone on your desk during exams. Cell phones must always be off and out of sight during exams. Cell-phone interruptions during an exam will be penalized 1 point per second of interruption. Any visible electronic device, except a calculator, is a 5-point score deduction. Cell-phone or computer use during an exam will be penalized 50 points. A missed exam requires prior notification and written documentation satisfying the instructor before any make-up is allowed. If a sanctioned make-up is not taken then the grade for the exam will be zero.

## **Quizzes**

Quizzes will consist of announced and unannounced in-class assignments on recent material. Their purpose is to give you a head start on homework and to encourage regular attendance. There are never make-ups for missed quizzes; this would defeat their purpose. There will be an announced quiz nearly every Wednesday. A valid written excuse is required to be exempted from announced quizzes. A SAKAI message delivered before class is enough to be exempted from unannounced quizzes..

## **WileyPlus**

Part of your grade will be based on Wiley-Plus homework. This will be similar to MTH141 and 142. You should do as many problems on Wiley-Plus as you have time for. Only a small percent of all available problems will be assigned as graded online homework.

## **Attendance**

Attendance is required. Unannounced quizzes and random attendance checks will be used to encourage attendance. If a quiz is unannounced it will be "open book" and "open notes." Students who need to miss a class should notify their instructor via SAKAI before the start of class on the day that they will miss. If students provide such prior notice via SAKAI, they will be exempt from penalty for missing unannounced quizzes and random attendance checks. Note: This exemption does NOT apply announced quizzes, or exams.

## **Honor code**

If you are caught breaking the URI honor code, you could be given an F for the assignment or the entire class, or reported to the university for review and possible dismissal. As a student of higher standards, you pledge to embody the principles of academic integrity. You may work with other students on homework and Mathematica assignments as follows: You may discuss concepts, principles and methods with each other; however, you must prepare your own final submission separately. You are not to copy another student's work. Collaboration among students is not permitted during examinations.

## **Special accommodations**

Students with special requirements and proper documentation through Disability Services should inform their instructor as early as possible. University regulations require that documentation be provided at least one week before special consideration is given.

## **Course outline**

On the next page is a comprehensive course outline; use it to keep up with the reading, plan your studying, find your homework assignments, know when your exams are, etc. We will follow the schedule quite closely, but of course it is subject to possible minor editing in the case of typos, unforeseen events, weather anomalies, etc.

### Schedule for MTH243 Fall 2013

Class	Date	Section of Text/Topics	Suggested problems	Events/Exams
1	W 9/4	12.1 Functions of two variables	#1,3,4,5,7,9,11,22,24	
2	F 9/6	12.2 Graphs of functions of two variables	#1,2,5,9,12,14	
3	M 9/9	12.3 Contour diagrams	#1,2,3,5,7,9,11,13,16,17	
4	W 9/11	12.4 Linear functions (planes)	#1,3,5,9,10,15,21,23,25	
5	F 9/13	12.5 Functions of three variables	#1,3,4,11	
6	M 9/16	13.1 Vectors, part I	#3,5,6,7,15,21,25,27,29,31	Wiley-Plus due 11pm
7	W 9/18	13.2 Vectors, part II	#1,7,8,11,13,14,21,24	
8	F 9/20	13.3 The vector dot product	#1-45 odd	
9	M 9/23	13.4 The vector cross product	#1-37 odd, 41	Wiley-Plus due 11pm
10	W 9/25	14.1 The partial derivative	#1-9 odd, 10-14, 17,19,21,22	Last day to drop without W
11	F 9/27	14.2 Computing partial derivatives algebraically	#1-21 odd, 27,35,41,42,43	
12	M 9/30	14.3 Local linearity, the differential	#1-11 odd, 18,22	
13	W 10/2	14.4 Gradients and directional derivatives in 2D	#1-25 odd, 31,33,47,48,71,72,76	
14	F 10/4	14.5 Gradients and directional derivatives in 3D	#3,7,13,17-29 odd, 37,39,53,57	Mathematica 1 due via SAKAI
15	M 10/7	Review		Wiley-Plus due 11pm
<b>16</b>	<b>W 10/9</b>	<b>Exam I (covers sections 12.1-14.5)</b>		<b>Exam I (in class)</b>
17	F 10/11	14.6 The chain rule	#1,3,9,13,18,21	No class Mon. 10/14
18	W 10/16	14.7 Second order partial derivatives	#1,3,5,7,9,19,21	Last day to drop 10/17
19	F 10/18	15.1 Local extrema	#1,3,5,7,9,11,17,24,29	
20	M 10/21	15.3 Constrained optimization	#1,3,5,13	Wiley-Plus due 11pm
21	W 10/23	16.1 Definite integrals of functions of two variables	#1,3,9,11,15,27	
22	F 10/25	16.2 Iterated integrals (double)	#1,3,5,7,17,19,21,29,35,37,45	
23	M 10/28	16.3 Iterated integrals (triple)	#1,3,5,7,11,17,21,35	
24	W 10/30	16.4 Double integrals in polar coordinates	#1,3,5,6,7,9,13,15,20,21,22,23	
25	F 11/1	16.5 Integrals: cylindrical and spherical coordinates	#1,2,3,5,8,9,13,15,19,25,27,,31	
26	M 11/4	17.1 Parameterized curves	#2,4,9,13,19,21,29,36,47,49,57	Wiley-Plus due 11pm
27	W 11/6	17.2 Motion, velocity, and acceleration	#1,3,5,7,11,13,15,25,29	
28	F 11/8	17.3 Vector fields	#1,3,5,7,9,10,11,13,15,17	No class Mon. 11/11
29	W 11/13	17.4 The flow of a vector field	#1,3,6,7	
30	F 11/15	17.5 Parameterized surfaces	#1,9,15,17,25a	Mathematica 2 due via SAKAI
31	M 11/18	Review		Wiley-Plus due 11pm
<b>32</b>	<b>W 11/20</b>	<b>Exam II (covers sections 14.6-17.5)</b>		<b>Exam II (in class)</b>
33	F 11/22	18.1 The idea of a line integral	#1,2,3,7,9,13,21,22,23	
34	M 11/25	18.2 Computing integrals over parameterized curves	#1,4,5,7,9,10,11,13	
35	W 11/27	18.3 Gradient fields, path-independent fields	#1,9,10,11,13,19,21,22,23,29,39	No class Fri. 11/29
36	M 12/2	18.4 Path dependent vector fields, Green's Theorem	#1,4,5,6,9,14,15,17,20,21	Wiley-Plus due 11pm
37	W 12/4	19.1,2 Flux integrals of graphs	19.1#2,3,9,11,19 & 19.2#1,3,5,7	
38	F 12/6	20.1,3 Divergence and Curl	20.1 #1,3,5,7 & 20.3 #1,3,5,7	
39	M 12/9	Review: ch 18-20		Last class
<b>F</b>	<b>M 12/16</b>	<b>Final Exam (cumulative, ch12-20) 8:00-11:00 am</b>		<b>Final Exam (in class)</b>