Math 211 — Fall, 2013

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Hours: MTuTh 3:00–5:00; W 6:30p–8:00p; F 3:00–4:00
*Note: Due to certain commitments this semester, some Wednesday and Friday hours will be canceled.

Course Content: Mathematics 211 is the third semester of calculus. It revisits and adapts the concepts from first-year calculus in the setting of three-dimensional space. The main topics are geometry in space; vectors; functions of more than one variable including vector fields; the limits, differentiation, and integration of such functions; and applications.

Textbook and software: Colley, *Vector Calculus*, 3rd or 4th ed., Prentice-Hall.
Mathematica for Students (http://www.wolfram.com/products/student/mathforstudents/licenses.html)

A free screencast, Hands-On Start (http://www.wolfram.com/broadcast/screencasts/handsonstart/), teaches basic commands of *Mathematica*. Other tutorials are found at .

Course Goals: After this course, you should be able to do the following: to sketch three-dimensional graphs, to understand how the calculus of single-variable functions generalizes to multivariable functions, to evaluate limits of multivariable functions, to differentiate multivariable functions and vector fields, to integrate multivariable functions and vector fields, to discuss the roles of these processes of multivariable calculus in solving problems, to understand better the material of first-year calculus.

Classes: You are responsible for work covered in class. Furthermore you are expected to have done the reading for each class. Your ability to get the most out of each class is greatly diminished by a failure to be prepared.

Evaluation: Grades will be based on the following written work:

Tests (3 @ 100 pts)	**300 points**
Quizzes (8 @ 25 pts)	200 points
Graphing portfolio	100 points
Final examination	200 points
Total	800 points

The plus/minus system will be used. A rough guide to grades: A: $\geq$ 720 pts. B: 640–720 pts. C: 560–640 pts. D: 480–560 pts. F: $<$ 480 pts.

Tests: There are three in-class, closed-book, timed tests, each worth 100 points.

Final Examination: There will be a cumulative final examination worth 200 points.

Quizzes: All quizzes are announced and in-class. Each quiz is worth 25 points. In total there will be 10 quizzes of which 8 will be counted. In each of the three testing units, at most one quiz will be dropped.

Graphing Project: Due Friday, November 22. Each student is to prepare a portfolio of at least 2 three-dimensional images created with *Mathematica*. The portfolio should exhibit all the types of graphs encountered in the course: Cartesian coordinates ($z = f(x, y)$), polar/cylindrical coordinates ($z = f(r, \theta)$), spherical coordinates ($\rho = f(\theta, \phi)$), parametrized curves ($(x, y, z) = \mathbf{r}(t)$), and parametrized surfaces ($(x, y, z) = \Phi(u, v)$). The portfolio will be worth 50 points.

There is a screencast that may be helpful:
(http://www.wolfram.com/broadcast/screencasts/abbybrown/3D_Graphing/)
There is a *Mathematica* notebook that contains an interface to make producing graphs easier. It is called "Graphing Project — Interface" on Blackboard (https://classes.emory.edu).

Final Examination: (250 points.) A cumulative final examination will be given at the time scheduled by the Registrar.

Homework: Exercises are assigned almost every day of class. These exercises usually will not be collected but are for the benefit of the student. Solving problems and practicing their solution is only good way to learn mathematics. Students may ask questions about the homework, and quizzes based on the homework may be given. The instructor may ask to see a student's homework.

Although the homework exercises are not graded, it is important for the success of the student that they be completed as soon after covering the material as possible. Calculators ought to be used when appropriate, but the student should keep in mind that they are not permitted on the tests. Collaboration is encouraged, but each student should be sure that he or she ultimately can **solve problems unaided by notes, the textbook, a calculator, or other people**. Use good style on your homework. In general you need to spend at least 6-8 good hours per week on study not counting the time spent taking quizzes and reviewing for tests.

Question and Answer site The The Math Center has a new question and answer site for mathematics at Oxford that may be found at

The Math Center's Q & A (http://mathcenter.oxford.emory.edu/q2a/).

It is still in its experimental stage. Use it to ask questions about mathematics problems, including the course material. It is not meant for asking questions about class business. You need to register to be able to post.

Excuses: Excuses deemed legitimate by the instructor will be handled according to the individual circumstances and college policies.

The student is expected to take all tests and exams at the scheduled times. For legitimate excuses arrangements will be made to take a test **prior to** the testing time. Any student who needs special accommodations must provide documentation of the needed accommodation and make appropriate arrangements with the instructor several days in advance. There will be no make-up tests given after the testing time.

Written style: Thoughts are expressed by sentences: just so in mathematics. Pay attention to your textbook: it is written in sentences. **Your written work must be in complete sentences.** Note "$1 + 1 = 2$" is a complete sentence (it has a subject "$1 + 1$", verb "$=$" and predicate "2"). Use mathematical symbols wherever appropriate. Your work also needs to be neat and orderly to be intelligible. See the essay, "Clean Writing in Mathematics," from *Calculus: A Liberal Art*, by W.M. Priestley and the "Calculus Style Guide." Practice good style in all your work, including uncollected homework.

All questions answered: On the last day I will answer questions about anything except religion, politics, and the last test/problem set. Attendance is optional.

Honor Code: The Honor Code of Oxford College applies to all work submitted for credit in this course. To receive credit for work submitted you must place your name on it. By placing your name on such work, you pledge that the work has been done in accordance with the given instructions and that you have witnessed no Honor Code violations in the conduct of the assignment.

Tentative Calendar: The calendar of topics below is subject to change. The expansion of contact hours presents several alternatives for using class time. The topics will not change, but the dates and class actvities may be adjusted to take advantage of class time.

Date	**Topic**	**Section**
Wed 28 Aug	Vectors in Two and Three Dimensions	1.1
Fri 30 Aug	Vectors in Two and Three Dimensions	1.2
Mon 2 Sep	*Labor Day*	
Tue 3 Sep	Applications	
Wed 4 Sep	The Dot Products	1.3
Fri 6 Sep	The Cross Product	1.4
Mon 9 Sep	Vector geometry problems	1.5
Tue 10 Sep	Quiz/Applications	
Wed 11 Sep	Some n-Dimensional Geometry	1.6
Fri 13 Sep	New Coordinate Systems	1.7
Mon 16 Sep	Functions of Several Variables; Graphing	2.1
Tue 17 Sep	Quiz/Applications	
Wed 18 Sep	Limits and Continuity	2.2
Fri 20 Sep	Limits and Continuity	2.2
Mon 23 Sep	The Derivative	2.3
Tue 24 Sep	**Test 1**	
Wed 25 Sep	The Derivative	2.3
Fri 27 Sep	Properties; Higher-Order Partial Derivatives	2.4
Mon 30 Sep	The Chain Rule	2.5
Tue 1 Oct	Quiz/Applications	
Wed 2 Oct	The Chain Rule	2.5
Fri 4 Oct	Directional Derivatives and the Gradient	2.6
Mon 7 Oct	Parametrized Curves	3.1
Tue 8 Oct	Quiz/Applications	
Wed 9 Oct	Arclength and Differential Geometry	3.2
Fri 11 Oct	Vector Fields	3.3
Mon 14 Oct	*Fall Break*	
Tue 15 Oct	*Fall Break*	
Wed 16 Oct	Gradient, Divergence, Curl	3.4
Fri 18 Oct	Differentials and Taylor's Theorem	4.1
Mon 21 Oct	Extrema of Functions	4.2
Tue 22 Oct	Quiz/Applications	
Wed 23 Oct	Lagrange Multipliers	4.3
Fri 25 Oct	Some Applications of Extrema	4.4
Mon 28 Oct	Integration: Areas and Volumes	5.1
Tue 29 Oct	**Test 2**	
Wed 30 Oct	Double Integrals	5.2
Fri 1 Nov	Changing the Order of Integration	5.3

Mon 4 Nov	Triple Integrals	5.4
Tue 5 Nov	Quiz/Applications	
Wed 6 Nov	Change of Variables	5.5
Fri 8 Nov	Applications of Integration	5.6
Mon 11 Nov	Further applications	
Tue 12 Nov	Quiz/Applications	
Wed 13 Nov	Scalar and Vector Line Integrals	6.1
Fri 15 Nov	Green's Theorem	6.2
Mon 18 Nov	Conservative Vector Fields	6.3
Tue 19 Nov	Quiz/Applications	
Wed 20 Nov	Parametrized Surfaces	7.1
Fri 22 Nov	Surface Integrals	7.2
Mon 25 Nov	Stokes' Theorem	7.3
Tue 26 Nov	Quiz/Applications	
Wed 27 Nov	*Thanksgiving break*	
Fri 29 Nov	*Thanksgiving break*	
Mon 2 Dec	Gauss's Theorems	7.3
Tue 3 Dec	Quiz/Applications	
Wed 4 Dec	Further Vector Analysis	7.4
Fri 6 Dec	Further applications	
Mon 9 Dec	**Test 3**	
Tue 10 Dec	All questions answered	