Multivariable Calculus, Fall 2017
Math 113, Section C

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Course Website: http://users.wfu.edu/gemmerj/Math113C.html
Office Hours: Tuesday 3-5, Wednesday 1-2, Thursday 2-4
Class Meeting Times: MTWF 9:00-9:50
Class Location: Manchester Hall 020

Textbook: Stewart, James. *Calculus 8th edition.* Cengage Learning, 2015.

Prerequisites: MST 111-112.

Course Description: A complete introduction to the calculus of multivariable functions. Specific topics will include parametric functions, vectors, curves in space, limits and continuity, partial differentiation, optimization, Lagrange multipliers, integration (volume, surface, line), vector fields, fundamental theorems of multivariable calculus (Green's, Gauss's, and Stoke's theorems).

Course Rationale: The development of The Calculus is one of the most profound intellectual achievements of humankind. While single variable calculus (Calc 1 and 2) was primarily developed in the 17th and 18th century, multivariable or vector calculus was not a fully developed subject until the end of the 19th century! The development of multivariable calculus was intimately tied into discoveries in physics at the time. In particular, James Clark Maxwell extended the concept of electric fields first invented by Michael Faraday to create a unified theory of electricity and magnetism. Maxwell's treatise was one of the first scientific works to make use of and develop multivariable calculus. In the 21st century multivariable calculus is an indispensable tool of modern theoretical sciences with applications in optics, neuroscience, physics, chemistry, and of engineering. Moreover, it serves as a stepping stone to further mathematical topics such as partial differential equations, differential geometry, and analysis to name a few.

This course will provide an introduction to the basic principles of multivariable calculus along with some introductory applications of calculus. Along the way students will further improve their analytic and computational skills, mastery of abstract concepts, quantitative as well as qualitative analysis, and their ability to write mathematics.

Class Delivery: The course material will be delivered through a combination of lectures and in class group assignments. Evaluation of the students understanding of the material will be assessed through written homework assignments, Mathematica assignments, in-class exams, in class quizzes, in class group work and a final exam.

Course Policies:

✦ **Grading:** Your grade will be based on:

- Weekly written homework: 10%
- Mathematica Assignments: 5%
- Quizzes: 5%
- Group work: 5%
- Three in-class exams: 45% (15% each)
- Final Exam: 30%

You are guaranteed the following grades if your final percentage lies within the following ranges:

90-92.9: A-	**93-100: A**	
80-82.9: B-	**83-86.9: B**	**87-89.9: B+**
70-72.9: C-	**73-76.9: C**	**77-79.9: C+**
60-62.9: D-	**63-66.9: D**	**67-69.9: D+**

✦ **Written homework:** Written homework will be assigned most weeks on Thursday and will be due Friday at the beginning of class the following week. The assigned homework problems will be posted on the course website. Late homework will not be accepted under any circumstances. However, I will drop the lowest homework score from your grade. Written homework must consist of solutions that show all steps, be your own work and be written clearly using complete sentences as appropriate (see homework policy).

✦ **Mathematica assignments:** Mathematica assignments will be assigned most weeks on Thursday and will be due Friday at the beginning of class the following week. The assignment will be posted on the course website in the form of a Mathematica notebook and will be submitted on Sakai. The specific formatting for each assignment is described in detail in the first Mathematica assignment.

✦ **Quizzes:** On most Fridays there will be a short 5-10 minute in-class quiz. These quizzes will consist of a very short problem that will test your knowledge of the prior lectures. These quizzes are to help both the students *and* the instructor understand concepts that students may be struggling with. All quizzes will be announced in class. *There will be no "pop" quizzes*. There are no retakes for missed quizzes, however I will drop the lowest quiz score from your final grade.

✦ **Group work:** Throughout the course there will be several unannounced "class works". These consist of structured group assignments that will be completed during class time. These assignments will generally be exploratory allowing students to learn a new concept through a "hands on" approach.

✦ **In-Class Exams:** There will be three in-class exams and a comprehensive final in the course. The tentative dates of these exams are September 22, October 20, and November 17. You must contact me by **September 5** if you have any university-approved conflicts with these dates. Otherwise you may miss the exam only in the case of serious illness or emergency.

✦ **Final Exam:** The final exam is scheduled during the Math Block final exam period, at 9:00am on December, 11.

Tentative Course Calendar:

1. Week 1 (8/28–9/1): Parametric Curves, Polar Coordinates: 11.1–11.3
2. Week 2: (9/4–9/8): Polar Coordinates, Euclidean Space: 11.4, 11.5, 12.1
3. Week 3: (9/11–9/15): Vectors: 12.2-12.5
4. Week 4: (9/18–9/22): Curves in space: 13.1-13.3, **Exam #1**

5. Week 5: (9/25–9/29): Differential calculus in several variables Part 1: 14.1–14.3
6. Week 6: (10/2-10/6): Differential calculus in several variables Part 2: 14.4–14.6
7. Week 7: (10/9–10/13): Applications of partial derivatives: 14.7-14.9
8. Week 8: (10/16-10/20): Partial Derivatives Review: 14.10, **Exam #2**

9. Week 9: (10/23–10/27): Double Integrals Part 1: 15.1-15.2
10. Week 10: (10/30–11/3): Double Integrals Part 2, Triple integrals Part 1: 15.3–15.5
11. Week 11: (11/6-11/10): Triple Integrals Part 2: 15.7–15.8
12. Week 12: (11/13–11/17): Line Integrals: 16.1–16.2, **Exam #3**

13. Week 13: (11/20-11/22): Conservative fields and Green’s Theorem: 16.3–16.4
14. Week 14: (11/27–11/30): Surface Integrals: 16.5–16.6
15. Week 15: (12/4-112/8): Stoke’s and Gauss’s Theorem: 16.7-16.8
17. Final Exam: (12/11)

Important Dates:

1. September 22: Exam 1.
3. October 20: Exam 2.
4. November 17: Exam 3.
5. December 11: Final exam.

The Honor Code: At Wake Forest, we expect you to behave as honorable citizens of the class, the university, and the world as a whole. When you complete an assignment with your name on it, you are representing that everything you are turning in is your own work. That means that you do not copy from other students, textbooks, or websites. If at any time I become aware of cheating or plagiarism in this course, I will submit the information to the honor council.