Course Instructor: Andy Miller
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Course Web Site: www.math.ou.edu/~amiller/2443
Office Hours: Regular weekly office hours will be announced in class and posted at the course web site and on Canvas.

Text: The course textbook will be Calculus (Eighth Edition) by James Stewart (Cengage, 2016). Most of chapters 14 through 16 will be covered. Reading and studying this text as the semester progresses is important for success in the class. If confusions arise with this then please don’t hesitate to inquire about them during class time or office hours.

Course Web Site: A course web site at www.math.ou.edu/~amiller/2443 will be used as a central means for disseminating information. Homework assignments, review materials and other basic information relevant to the course will be posted there. A course calendar will be maintained on CANVAS.

Brief Description: The course description which appears in the OU General Catalog gives a condensed outline of the topics to be covered:

2443 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariate functions; multiple integrals; line and surface integrals.

The goal of the course is to lay out a theory for functions of several variables, with the primary focus being on functions of two or three variables. The development of ideas will proceed by first examining differential calculus concepts for multivariable functions (Chapter 14), and then moving to discussions of multiple integrals (Chapter 15). The ultimate goal is to develop and discuss various versions of the fundamental theorem of calculus which relate the differential and integral concepts with each other—the three main results are known as Green’s Theorem, Stokes’ Theorem and the Divergence Theorem (Chapter 16). A wide array of new topics will need to be introduced and mastered in order to formulate and understand these fundamental theorems. This includes such concepts as: vector fields, line integrals, surface parametrization, and integrals of vector fields.

This is the final course in the four semester sequence of calculus courses 1823-2423-2433-2443. The sequence relates to a wide range of additional offerings in the mathematics department. Among them are: Introduction to Ordinary Differential Equations (Math 3113) and Physical Math (Math 3413), which are continuations of calculus focusing on differential equations; and Linear Algebra (Math 3333) which moves toward developing important non-calculus viewpoints of mathematics. Both differential equations and linear algebra provide major interfaces of mathematics with science, geo-science, computer and engineering disciplines. Students who would like to develop a more thorough formal background in mathematics can take the Discrete Mathematical Structures course (Math 2513). The mathematical principles behind calculus are more completely developed in the analysis courses (Math 4433 and 4443) which require Math 2513 as a prerequisite.
Course Prerequisites: The Calculus III (Math 2433) prerequisite for this course is extremely important as we shall frequently rely on understanding of basic topics from the first three semesters of calculus. Paramount among these topics are: rules of differentiation, techniques of integration, calculus properties of elementary functions, the geometry of vectors (including: dot and cross product of vectors, equations of lines and planes), describing curves by parametric equations and basic principles of graphing. Deficiencies in your understanding of any of these topics may make it difficult for you to perform well in this course. The topics from Chapter 12 of the textbook are so important that it is worth listing the section headings: three-dimensional coordinate systems; vectors; the dot product; the cross product; equations of lines and planes; cylinders and quadric surfaces.

Computers and Calculators: You are encouraged to use calculators and/or computers in working on assignments for the course. In particular, mathematical software packages (such as MATHEMATICA, MAPLE or MATLAB) can be very effective in helping to visualize many of the 3-dimensional objects we will encounter. However the use of calculators or computers on exams will not be permitted.

The Math Center: The Math Center in PHSC 209 is open for walk-in students five days per week, and is also open on the south campus on Sunday afternoons. It provides an excellent study environment for math students, and is staffed with tutors who can provide explanations and assist with questions about topics from this course. (The weekly Math Center hours will be posted at the course web site.) A good strategy for taking advantage of this valuable resource is to work with a few different tutors to find one whose explanations resonate well with you. As a general rule the Math Center tends to be less busy later in the days and on Sunday.

Exams: There will be three midterm tests and a final exam scheduled as follows:

- Exam 1: Friday, February 16
- Exam 2: Friday, March 16
- Exam 3: Friday, April 20
- Final Exam: Wednesday, May 9, 8:00–10:00 AM

Grading: Grades will be determined according to the breakdown:

- Written Classwork: 10%
- WeBWorK Assignments: 10%
- Midterms: 50% (15%, 15%, 20%)
- Final Exam: 30%

and final course grades will be based on the scale:

A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Please note that the assignments and classwork comprise a significant portion of the course grade. Each in-class quiz will be graded out of 20 points. In calculating the quiz and assignment portions of the total course grade, the lowest 20% (roughly) of grades will be dropped at the end of the semester. Make-up quizzes will only be allowed for students that have a time conflict with a university-sanctioned extracurricular activity and alternate time arrangements will need to be agreed to in advance of the quiz. A similar policy holds for midterm exams.

Class Attendance: The day-to-day class lectures and discussions form the backbone of this course. Routine attendance at class is essential and expected of students.
**Homework and On-Line Assignments:** Homework problems will be assigned on a regular basis over the semester (generally weekly except during exam weeks). Homework papers will not be collected but each homework assignment will form the basis for an in-class quiz to be given on or after its due date.

Regular assignments using the open source on-line homework system WeBWork will be due throughout the semester. Instructions on the use of WeBWork will be given in class, and posted at the course web site.

Assistance on homework and related problems will be available during weekly office hours, and you are also welcome to e-mail me with any questions that might arise. As you have probably discovered by now discussing assignments and preparing for midterms with classmates can be a very effective approach to mastering course material.

Because our class meeting time is limited, it is to be expected that there will occasionally be assignment problems involving concepts which have not been discussed in class—in this case a perusal of the textbook should easily locate any needed information. PLEASE NOTE: Almost always there are worked out examples in the text that can give you excellent ideas on how to approach the assigned problems.

**Recommendations:** The main objective for the course is to acquaint you with fundamental calculus concepts for multivariable functions, and to help you to understand these concepts deeply and to see how they may be applied in a variety of different settings. As the course material is very sophisticated, much thought and persistent work on your part will be necessary in order for you to achieve these goals. The best approach to success is to focus on learning about the new concepts that we will discuss. Developing a genuine interest in the subject and a general inquisitiveness about its concepts can really help to motivate your work as you progress through the semester. Throughout the semester new material will be developed rapidly, and so keeping up with the course on a day-to-day basis, and not allowing yourself to fall behind, is extremely important.

To prepare for exams, it is recommended that you try working as many problems from the book as possible—this certainly includes going beyond the assigned homework assignments. Condensed answers to the odd numbered problems can be found in the back of the book to assist in determining whether your approach is correct. If questions arise or if you get stuck working on any problem, it is important that you try to isolate the problem and ask about it, either during the class lectures or at the office hours. Questions and comments are always welcome during class periods. You are strongly encouraged to take advantage of office hours to help clear up mathematical questions that you may have and to help you progress toward a fuller understanding of the subject. In this course the only “bad” questions are questions you have that you don’t ask about!

**Student Disabilities:** The University of Oklahoma is committed to providing reasonable accommodations for all students with disabilities. If you require special accommodation in the course please discuss this with me as soon as convenient so that we can take steps to ensure your full participation in the course and to facilitate your academic opportunities.

**Academic Misconduct:** Students should be familiar with the Academic Misconduct Code which may be found at www.ou.edu/studentcode. The rules governing cases of academic misconduct may be found at www.ou.edu/provost/integrity. Any violations of these rules will be duly reported.