Math 235
Calculus III
Maryville College
Spring 2012

https://www.maryvillecollege.edu/academics/faculty/msiopsis/math-235/

Instructor:
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Time and Location:
MWF 1-1:50
SSC 201
Tr 9:30-10:20
SSC 201

Text:
Calculus, 9th Ed.; Howard Anton; Wiley & Sons Pub, 1999. Chapters 10-14

Office Hours: Monday and Wednesday 10
Tuesday 8:30-9:30
Friday 11

Course Description: A course in multivariable calculus using computer technology. Topics include polar coordinates, conic sections, functions of several variables, vectors, partial differentiation, and multiple integration.

Components of Course: Your final grade in this course will be based on the work listed below.

Homework (20% of final grade) Homework assignments will be posted on Wiley plus each afternoon. You will have 48 hours to complete an assignment once it is posted. You are expected to check for the homework assignment each day. Homework questions should be addressed mostly during office hours, although there will be some time in class to ask questions.

In-class Exams (20% each or 60% of final grade): There will be three in-class exams. Make-up exams will be given only in VERY exceptional circumstances. Exam dates are listed below. If you know you will be missing an exam for a sport or other scheduled activity please let me know well in advance (preferably at the beginning of the semester).

Exam 1 – Friday, March 2
Exam 2 – Wednesday, April 4
Exam 3 – Wednesday, May 2

Final Exam (20%): The cumulative final exam for this course will be given on Thursday, May 17th at 9:00 AM You MUST take the final at this scheduled time.

Grading Policy: Number grades will be given to all assignments and exams. The following policy will be used in converting final percentages to final letter grades:

If your final numerical grade is....	Then your final letter grade is...
≥ 90%	At least an A-
≥ 80%	At least a B-
≥ 70%	At least a C-
≥ 60%	At least a D-
< 60%	F

Technology: Graphing calculators are <u>not</u> required for this course but you are welcome to use one. An important part of this course involves learning to use the software program *Maple* to assist you in problem solving. *Maple* is available on the computers in the Math Lab (room 204 in SSC).

Study Guides: "Study Guides" will be posted on the course website daily. These include the pages of the text you should read each day with a list of homework problems. You are responsible for keeping track of homework assignments and exam dates, even if I do not remind you in class.

Extra Help: My office hours are set aside for you to get help with homework or any other questions you may have about the course. You may make appointments to see me at other times if your schedule conflicts with my office hours. The best way to contact me is through e-mail.

Additional Information:

Attendance: Attendance at all classes is expected, but not enforced.

Students with disabilities: Students who may need special accommodations because of a documented disability should see me during office hours as soon as possible and <u>BEFORE THE FIRST EXAM</u>.

Prerequisites: Math 225 (Calculus II) or equivalent.

Course Objectives:

- To master the mathematical topics of multi- variable calculus, including limits, derivatives, and integration as well as their applications and related topics.
- To develop the ability to think logically, critically, and abstractly. This will be accomplished primarily through problem solving and will involve the mastery of individual concepts as well as the synthesis of such concepts to master more complicated concepts.
- To develop mathematical writing skills as a means of understanding and retaining key concepts and as preparation for upper level courses in mathematics and the sciences.
- To see computer technology as a tool to assist in problem solving and to help in mastering concepts.
- To appreciate the Calculus for mathematics' sake only, without the necessity of physical applications, and to be familiar with its history.
- The following goals from Core Content Standards for Mathematics for Teacher Licensure students will also be met in this course
    - 1.1 Use mathematical language, symbols, definitions, proofs, and counterexamples correctly and precisely to present mathematical reasoning
    - 1.2 Apply and adapt a variety of appropriate strategies to problem solving, including testing cases, estimation and then checking induced errors and the reasonableness of solutions
    - 1.3 Develop inductive and deductive reasoning to independently make and evaluate mathematical ideas and to communicate solution strategies
    - 1.4 Move flexibly between multiple representations (contextual, physical, written, verbal, iconic/pictorial, graphical, tabular, and symbolic) to solve problems, to model mathematical ideas, and to communicate solution strategies
    - 1.5 Recognize and use mathematical ideas and processes that arise in different setting, with an emphasis on formulating a problem in mathematical terms, interpreting the solutions, mathematical ideas and communication of solution strategies
    - 1.7 Use technologies appropriately to develop understanding of abstract mathematical ideas, to facilitate problem solving and to produce accurate and reliable models
    - 1.9 Use a variety of methods aligned with instructional techniques to provide formative and summative assessment of mathematical learning
    - 1.10 Understand the dynamic nature of mathematics and its role in history, current events, and individual lives
    - 2.3 Explore vectors as elements in a numeric system, focusing on graphic representations as well as ordered n-tuple notation
    - 2.5 Develop an understanding of equivalent representations of numbers via an equivalence relations and ability to substitute equivalent representation when performing operations

3.1 Develop the definitions of relations and functions from multiple approaches including verbal, numeric, symbolic, graphic, diagrammatic, and subset of a cross-product. Distinguish between relations and functions and move flexibly between different descriptions. Explore one-to-one and onto functions in this setting

3.2 Develop formal and informal understanding of domain, range and restriction of domain; establish the nature of both algebraic and transcendental functions

3.3 Develop a complete understanding of functions as elements in an arithmetic system using composition of the functions as the operation and the inverse function as the inverse element. Explore the relation between a function and its inverse graphically; establish the requirements for the existence of the inverse function

3.4 Differentiate between continuous and discontinuous functions and establish their importance to the development of the concept of limit and to calculus

4.4 Apply the processes of linear algebra, calculus of vectors and linear transformations to solving real world applications

4.5 Explore vectors as elements with algebraic properties, focusing on the properties of the operations in both the geometric as well as n-tuple (arithmetic) context

5.2 Explore the conic sections, including parabolas, ellipses and hyperbolas. Extend these concepts to the three-dimensional surfaces whose cross-sections/level curves are conic sections (cones, hyperbolic, paraboloids, ellipsoids, etc) Analyze solids using cross-sections and level curves

5.6 Describe the key characteristics of a curve, identity families of curves, and determine parameters which affect the nature of the particular curve. Parameters to be identified should include those that control vertical and horizontal shifts, periodicity, and amplitude. Include the use of calculus to determine maxima, minima and inflection points

8.5 Calculate derivatives of polynomial, exponential and trigonometric functions and compositions of these functions using the derivative and the limit theorems. Approximate derivatives numerically

8.6 Perform standard integration techniques and establish integration as a method of calculating volume. Approximate values of definite integrals numerically

8.7 Extend the concept of rectangular area to approximation of area of irregular shapes. Use the approximation to specifically develop Riemann sums and the concept of the integral