

MA 165 Calculus I with Lab

Syllabus

Instructor: Dr. Terri Magnus

Brief course description:

Calculus is the study of change and motion. After a quick review of the major types of basic functions, students will explore, analyze, and apply the mathematical concepts of limit, continuity, and derivative. A brief introduction to integration will be included at the end of the semester. We will use the rule of four, studying the subject from graphical, analytical, numerical, and verbal viewpoints.

Required Course Materials: A graphical calculator with a table function. The overhead projector calculator will be a TI-83. TI-82's and TI-83's are easy to use and are programmable. TI-85's and TI-86's are acceptable but slightly more complex. They do have better statistical capabilities (not needed for Calculus) than the 82/83 versions. If you own a brand other than TI, you are welcome to use it, but the instructor may not be familiar with the commands. Particularly in this case, make sure you have a manual for the calculator.

Recommended Course Materials: Graph paper, ruler, stapler, sharpener or extra pencils, colored pencils. You may opt to buy the student solutions manual (worked out solutions of odd problems) at the bookstore. A copy will also be made available for in room use in the math conference room (upstairs Regis), odd answers are in the back of your text, and the CD-Rom that accompanies your text gives some hints to solving problems.

Course Objectives:

- To help students understand and appreciate the major concepts of differential calculus
- To engage students in mathematical reasoning
- To develop students' abilities to approach calculus topics from graphical, numerical, and symbolic points of view
- To help students learn to read mathematics and to become independent learners of mathematics
- To develop students' abilities to create mathematical models and use these models to solve problems
- To engage students in the solution of problems, especially open-ended problems, that apply the derivative concept
- To develop students' ability to write about mathematical ideas and problem solutions
- To help students learn the basic algebraic techniques of differentiation

Teaching Strategies:

- Lecture on concepts and techniques
- Presentation of examples and strategies
- Large and small group discussions, and explorations
- Reading and writing assignments
- Practice and learning through homework assignments
- Computer labs to enhance visualization and conceptual understanding
- Applications to demonstrate relevance and extend learning
- Active student engagement in group work and discussions
- Quizzes, and tests to encourage and monitor learning

Course Requirements:

- Regular attendance in class
- Homework to be self-assessed, completion expected
- Active participation and engagement in full-class, small-group, and individual activities
- Short Project(s) and writing assignments
- Quizzes, tests, and final examination

Tests: September 24, October 24, and November 26 during the latter half of class

Cumulative Final Exam: Thursday, December 12, 2-4 p.m.

Writing Assignments: Students will write two short essays and complete a small applied calculus project. Details on the first two assignments are attached.

Homework: Students are encouraged to complete all homework problems soon after the section is discussed in class. Questions for the weekly quiz will for the most part be based on these problems and students submitting completed, thorough, well-answered weekly homework assignments at the time of the quiz will receive a grade no lower than 7 out of 10 on that week's quiz. The instructor may also collect particular homework assignments in order to provide constructive feedback to the students and to verify that students are making reasonable progress on these assignments. Students are encouraged to discuss homework questions with the instructor, other students, and the department tutor. The work submitted should be your own though. Rework any problems that you received help with (even if it's from the instructor or at the beginning of class). Give credit to any ideas that came from another individual. A limited amount of time at the beginning of each class will be allocated for discussion of homework problems.

Quizzes: Quizzes will be given every Tuesday (except classes immediately preceding or following a test day), and will be equivalent to a homework grade. The lowest two quiz grades will be dropped and the rest averaged together. No make-up quizzes will be allowed. On each quiz, you may guarantee a grade of 70% or better by presenting your worked-out solutions of the recommended homework problems at the time of the quiz.

Assessment and computation of grades:

Quizzes/Homework	15%
Short essays	5%
Tests	39%
Project	6%
Participation and in-class activities (see rubric)	10%
Final exam	25%

Participation and in-class activities grade will be based on the following rubric.

Level of Attendance	high participation	avg participation	low participation
High (0-1 absences)	A	B	C
Medium (2-3 absences)	B	C	D
Low (4 or more absences)	C	D	F

Classroom Policies:

- Active participation requires attendance and arrival to class in time to be prepared for work when the class period begins. Students arriving late on the day of a quiz or test will not be given extra time.
- Respect your classmates as well as your instructor. Discussion in class will pertain to the topic of the course. All students have a right and responsibility to ask questions and give insight related to the understanding of course content. Students having a large number of questions should consult the instructor outside of class.
- Participation in large and small group discussions is required and assessed for active engagement and contribution.
- The time spent on this course outside of class should average six to twelve hours per week. This includes reading the textbook, reviewing class notes, doing assigned work, working on projects, and preparing for tests.
- All work turned in on tests, quizzes, and individual papers must be entirely your own. Behavior contrary to this will result in a grade of F on the assignment. On homework, acknowledge any ideas you received from others. Students should be aware of and adhere to the college's policy on plagiarism.

- You are encouraged to study together outside of class. The work you turn in should be entirely your own, though. If you receive help in completing the homework, make sure you put away any notes, write the answer in your own words, and give credit to your collaborators.

Guidelines for group work:

- Every group member has the right and responsibility to contribute to the group's work. All members of the group are to be respected and listened to. If you find that you tend to dominate the group discussion, make an extra effort to enable and encourage other group members to participate. If the work is to be submitted, make sure there is a copy (preferably more than one) in class on the day it is due.
- Share your ideas with others. You'll be surprised to find out how often your ideas will help lead to a right answer! No idea or question is stupid.
- Arrive prepared and ready to start. When discussing homework in a group, be sure to try all problems in advance and identify where you have questions.
- During an in-class activity, do not ask the instructor for assistance until everyone in the group has the same question.
- Take responsibility for your own learning. Share your strategies/questions with the aim of having others understand what you are getting at and where/why you are stuck. This is different from "I couldn't get ..." and expecting another student to show you their answer.
- Avoid taking responsibility for someone else's learning (since they will not learn). Listen to others with the aim of understanding their strategies and questions. This is more beneficial (and harder) than just showing them how to do it your way.
- Even when there are no questions, spend some group time comparing resolutions. It feels great to show something amazing you've come up with or to share in someone else's solution. Take some time to enjoy these moments.
- Have fun, but stick to task.

Evaluation Criteria for Assignments and Quizzes

10 (A/A+)	Excellent work. You appear to have a very good understanding of the main concepts and procedures in the assignment. Your answers are thorough, well written, and show insight. Explanations are logical, thorough, and precise. Papers are neat and well organized.
9 (B/B+/A-)	Above average work. You completed the assignment and appear to have a good understanding of most of the main ideas or concepts. You may have made a few errors, but not many. Explanations show understanding, are logical, and are for the most part complete, but may need some editing.
8 (B-/C+)	Satisfactory work. You completed most of the assignment and understand some of the main ideas, but need work in other areas. Some of the problems may have been started, but unfinished. Work shows some sense of understanding, but you may need to work on style, completeness, logical order, and/or precision. Graphs may lack clarity. Look over the areas where you had trouble and seek help from the instructor. You may need to be more thorough in your work.
7 (C/D)	Although you made a good attempt at the assignment, your work shows a lack of understanding, sloppiness or carelessness, or inattention to detail. You may need to include more reasons or steps in your answers. Your work is sketchy, disorganized, or lacking insight. If you had trouble on the assignment, seek help from the instructor. You may have misread the directions for the assignment. Difficult problems may have been not attempted, incomplete, or showed a lack of understanding and direction.
5 or below (F)	Incomplete or poor work. You did not complete most of the assignment. The work that was completed was not well done. You need to include more than just answers in your solutions. If you need help getting started, please ask!
0 (F)	Not enough was done on the assignment to get credit. Perhaps no paper was submitted or what was submitted was illegible.

R (hw only)	Redo for credit. You had real difficulties on this assignment and I feel that you would learn a lot from redoing the assignment within two class meetings. Get help with the material!
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Mathematics is not a spectator sport. Just as one doesn't become a great athlete by watching games, one can't develop the skill of mathematics by watching the teacher. Give it a try! Take a break and come back to work at it some more. With practice and hard work will come understanding. You'll be amazed at what you can accomplish! Be sure to come see me whenever you need a little coaching or pep talk. I'm here for you!

Bibliography: You may wish to reference other calculus texts to see more examples of problems worked out. Many are kept in the conference room in upstairs Regis Hall. A copy of the student solutions manual for our text is also available for use in the conference room. Do not remove the books from the conference room so that other students will have access to them.

Callahan et al, *Calculus in Context*, New York: W. H. Freeman (1993).

Finney, Thomas, Demana, and Waits, *Calculus, Graphical, Numerical, Algebraic*, Reading, MA.: Addison-Wesley (1994).

Hughes-Hallett, Gleason, et al, *Calculus*, New York: John Wiley & Sons (1994).

Larson, Hostetler, and Edwards, *Calculus: Early Transcendental Functions*, Boston: Houghton Mifflin Co. (1999).

Ostebee and Zorn, *Calculus from Graphical, Numerical, and Symbolic Points of View*, Florida: Saunders/Harcourt Brace (1997).

Smith and Moore, *Calculus, Modeling, and Applications*, Lexington, MA: D. C. Heath and Company (1996).


You may also find precalculus and algebra texts helpful in reviewing functions, manipulations, and computations. There are some in the library for check out and in the Regis Hall conference room for on-site use.

Rubric for Class Participation Grades

Level of Participation	High	Medium	Low
Level of Attendance			
High (0-1 absences)	A	B	C
Medium (2-3 absences)	B	C	D
Low (4 or more absences)	C	D	F

Tentative Homework Assignments:

8/27-8/29	1.1, app. A	Intro to Calculus, Representing a Function, Absolute Value,	1.1(2,3,7,8,9,11,15,16,17,19,25,31,35,51,59) A(1,5,13,15,22,23,31,37,39)
9/3-9/5	App. B and C, 1.2	Coordinate Graphs, Mathematical Models, Trigonometry	B(1,3,17,19,23,25), 1.2(1,4,9,13,15abde), C(1,7,13,17,19a,27)
9/10-9/12	1.3,1.4,1.5	New functions from Old, Graphing Calculators, Exponential Function	1.3(1,3,5,7,15,17,23,29,31,37,39,47,48, 51,57), 1.4(1,8,11,15,19,21,25,27), 1.5(5,9,11,13,15,21,23)
9/17-9/19	1.6,1.7,2.1 No quiz	Inverse Functions, Logs, Parametric Curves, Tangents and Velocity	C(29,35,41,43,44), 1.6(1,3,7,8,13,17,19,20,24,27,31,33,37,40, 43,47,51,58), 1.7(4,7,15,17,20,27), 2.1(1,3)
9/24-9/26	2.2, Test1, 2.3 No Quiz	Limits, Limit Laws	2.2(1-3,6,9,13), 2.3(1,2,7,8,9,11,13,15,19,21,25,33,41)
10/1-10/3	2.4, 2.5, 2.6	Continuity, Limits at Infinity, Rates of Change	2.4(2,3,5,7,9,15,26,29,33,35), 2.5(1,2,3,7,15,19,23,31,35,39,43), 2.6(1,3,11,13,14,16,21)
10/8-10/10	2.7, 2.8	Derivatives, the Derivative Function	2.7(3-5,9,11,15,23,25,28,31), 2.8(1,3,8,9,13,17,30,31,37,48)
10/15-	2.9, 2.10, 3.1	Linear Approximations, Relationship between	2.9(1,5,7,10,13), 2.10(1,4-6,8,19,25,27), 3.1(2,5,9,15,17,19,26,31,39,41,44,45)

10/17		 and f , Derivative formulae	
10/22-10/24	3.2, Test 2, 3.3	Product and Quotient Rules, Applications	3.2(2,9,14,17,21,26,29,31,33,35,42), 3.3(1,9,15,21,22,23),
10/29-10/31	3.4,3.5 No Quiz	Trig Derivatives, Chain Rule, Project Introduction	3.4(3,5,9,13,25,30,33,39,40), 3.5(3,5,9,19,23,27,39,41,49,58,59,73)
11/5-11/7	3.6(omit trajectories), 3.7, 3.8	Implicit Differentiation, Log Derivatives, Differentials	3.6(1,3,11,17,23,27,34,35), 3.7(1,3,5,11,17,19,22,25,27,33), 3.8(5,9,11,17,22)
11/12-11/14	4.1,4.2	Related Rates, Taylor Polynomials, Max/Min	4.1(2,5,14,15,19,25,33), 4.2(1,2,5,7,9,11,13,25,31,37,39,55)
11/19-11/21	4.3 4.5, 4.6	Shapes of Curves, L'Hopital's Rule, Optimization	4.3(2-7,11,19,21,25,27,29), 4.5(1,4,7,9,12,17,25,27,33,41,53), 4.6(3,7,8,9,16,19,23,24,32,36), 4.7(15)
11/26	Test 3		
11/30-12/5	4.8, 4.9	Newton's Method, Antiderivatives	4.8(1,3,4abc,5,7,9), 4.9(3,5,7,10,19,24,27,29,33,34,37,41,49)
12/7	No Quiz	Review	