Calculus and Analytic Geometry I
MATH 180C
Spring 2009
MF 8:00–8:50 Thompson 381
TT 8:30–8:20 Thompson 381

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Course Overview This course begins the three-semester calculus sequence. Our goals for this course are

- to understand the relevant concepts of calculus,
- to develop facility with the computational techniques of calculus,
- to explore applications of calculus,
- to gain proficiency in reading and writing mathematical exposition, and
- to sharpen critical thinking and logical reasoning skills.

We start with a quick review of some background material, including topics from algebra, trigonometry, and the basics of functions. We then examine the fundamental idea in calculus, the *limit of a function*. The limit notion is central to all other concepts in calculus. The first such concept is *continuity of a function*.

Following our study of limit and continuity, we turn our attention to *the derivative of a function*. This concept and its applications will occupy the bulk of our time in the first semester. Many applications of calculus involve using a function and its derivative to model real-world phenomena. An example of this is the relation between position and velocity.

We will end the course with an introduction to *the definite integral of a function*. The second semester of the calculus sequence continues with further study of the integral and its applications.

Class sessions In class, we will discuss new material, handle questions from reading the text, and work through assigned problems on which there are difficulties. When we discuss new material, the focus will be on "the big picture." That is, we will look at new ideas in their simplest form and how these ideas fit together. Often, we will not consider details and variations in depth during a first pass through new material. Your mastery of the details will begin outside of class with a careful reading of the text and work on the assigned problems. We will address the details by responding to questions on the reading and problems that you bring to class. You are expected to participate in class by being present (and alert), by responding to questions I pose, and by asking the questions that you have. I will often ask for ideas on how to proceed in a given problem or in developing a new concept. You should develop the habit of contributing ideas even if you are not confident your idea will work out.

Text The text for this course is *University Calculus*, Joel Hass, Maurice Weir, and George Thomas, (Pearson, 2007). We will cover material from Chapter 1 through the first four sections of Chapter 5. Outside of class, you should carefully read the relevant sections of the text. This will generally include working through the reasoning of arguments and filling in steps that are omitted in calculations. You should keep a list of specific questions from the reading and find answers to those questions either in class, with me outside of class, with study partners, or with a tutor.

Homework The text is also a source of problems that are essential in building understanding and skill. I will assign homework problems from the textbook on which I expect you to spend considerable time and effort. You should not get in the habit of focusing only on the problems designated to be turned in. For most sections we cover, I will also designate several problems to be collected and evaluated. Generally, these problems will be among the more challenging of a given problem set. I will typically address questions from each assignment in the class period following the day I give the assignment. You will need to do and understand many problems in order to become facile with the concepts, techniques, and applications. The typical schedule for homework will be to get a new assignment one class meeting, address questions from that assignment in the following class meeting, and have a due date on the class meeting following that.

In doing homework problems, you should seek to go beyond mastering mechanical aspects (such as computational skills) to mastering concepts and ideas. For example, in doing homework problems, ask yourself "Do I understand the ideas and skills required to get a correct answer?" rather than merely "Did I get the correct answer?"

Projects Projects are a second type of assignment to be completed outside of class. The purpose of projects is to present challenges, often open-ended, that go beyond the routine of homework problems and to provide practice in technical writing. For each project, you will compose a written report. This should be done in complete sentences with enough detail for a reader to follow your reasoning and reconstruct your work. All graphs should be done on graph paper or with appropriate computer assistance. I encourage you to work on these projects in small groups. If you do work on a project with others, you must do your own write up of the results.

Due date policy Each problem set and project will have a due date. If you wish to turn an assignment in late, you must talk with me before the due date. Under reasonable circumstances, I will grant individual extensions for deadlines. If you submit an assignment after a deadline (or an extension we have agreed upon), I will assess a penalty equal to 10% of the assignment's maximum point value for each working day that the assignment is late.

Exams In order to assess your learning, we will have five exams and a final exam. Exams will be scheduled on Tuesdays or Thursdays in order to take advantage of the 80 minute time block that should be available. Very tentative dates for exams are

Thursday, February 12	Thursday, March 5	Thursday, March 31
Tuesday, April 21	Tuesday, May 5	

The final exam will be comprehensive. It is scheduled for 8:00-10:00 am on Monday, May 11. It is University policy that no exceptions can be made for taking a final exam at the scheduled time. Do not make travel arrangements that conflict with the scheduled final exam time.

I design exams so that approximately three-fourths of each exam is "straightforward" and the remainder involves more challenging problems. By this, I intend that a well-prepared student can do the "straightforward" problems without hesitation. These problems may be similar to assigned homework problems. The more challenging problems will involve applying, generalizing, or synthesizing relevant ideas. For the challenging problems, I give some credit for identifying ideas that might reasonably be useful and for reasonable approachs even if not complete.

Course grades To determine course grades, I drop your lowest exam score (not including the final exam) and then calculate a total course score according to the following weights:

Homework	10%
Projects	15%
Exams	60%
Final exam	15%

I assign a preliminary course grade based on an objective standard (93.3-100% for an A, 90.0-93.2% for an A–, 86.7-89.9% for a B+, 83.3-86.6% for a B, etc.). I then look at each student's performance subjectively. Occasionally I will assign a course grade that is higher than the objective standard. For example, if a student has a grade of B according to the objective standard but has shown steady improvement, I might assign a course grade of B+.

Office hours and appointments I am generally available in my office for help several hours each day. I am often in my office during the day in hours at which I do not have a scheduled class, meeting, or other activity. You can see my weekly schedule at

`www.math.ups.edu/~martinj/schedule.html`

Feel free to come look for me. To be (almost) guaranteed that I will be in, come during one of the hours labeled as an "office hour." You can also call, send e-mail, or stop me after class to schedule an appointment for a specific time.

Calculator You will need a calculator with the following capabilities: function graphing, numerical equation solving, numerical differentiation, and numerical integration. Among Texas Instrument calculuators, the TI-83, TI-84, TI-86, and TI-89 models have these features. Note that for some exams, I may forbid the use of symbolic computing features on calculators such as the TI-89.

Course web site A web site for this course is located at

`www.math.ups.edu/~martinj/courses/spring2009/m180C/m180C.html`

or go to `www.math.ups.edu/~martinj` and follow the obvious links. I will maintain a list of assignments and target dates on the main web page along with a list of daily topics and relevent sections of the text. I will also post announcements and comments about questions or issues that come up in class. You should check the web site for new announcements several times each week. Class handouts will be available to download as PDF files in case you lose your copy or miss class.

Important Dates for Spring 2009 Please note the following important dates:

Tuesday, January 27	Last day to add a course
Monday, February 2	Last day to drop a course without record
Monday, March 2	Last day to drop a course with an automatic W

Note that University policy mandates a grade of WF if you drop a course after Monday, March 2 unless "there have been exceptional circumstances beyond the student's control and the student's work has been of passing quality." For full details, see the Academic Handbook (available on-line at `www.ups.edu/x4716.xml`).