

Differential Equations
MATH 301
Spring 2011
MTWF 11:00–11:50 Thompson 374

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Course Overview This course centers on solving and analyzing *ordinary differential equations* (as opposed to *partial differential equations*, the subject of Math 302). After successfully completing this course, a student should be able to

- analyze various types of differential equation problems including first order differential equations, systems of first order of differential equations, and linear second-order differential equations; and
- use differential equations in modeling real-world phenomena.

Prerequisites Calculus through multivariate and linear algebra are prerequisites for this course.

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 on 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 course text is *Differential Equations*, 3rd edition, Paul Blanchard, Robert Devaney, and Glen Hall, 2006.

Outside of class, you should read the relevant sections of the text carefully. 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, or with study partners.

Homework The study of differential equations includes a significant computational component. Working on problems is 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. I will occasionally designate problems to submit. Since you should already have a lot of experience with mastering new computational techniques, I will primarily evaluate homework problems that have some focus on modeling or proof. For full credit, the work you submit for these homework problems should be complete, clear, correct, and organized. You should not get in the habit of working only on the problems designated to be turned in. You will need to demonstrate mastery of computational techniques, modeling, and theory on exams.

Modeling projects Differential equations can be used in modeling a wide range of real-world phenomena. To give you practise in the modeling process, I will assign three or four modeling projects. For each project, you will submit a carefully written report. I will give more specific requirements with each project.

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 We will have four exams during the semester. These will be a combination of in-class and take-home. I will give you at least one week notice before any in-class exam. The last exam given or due (if take-home) in the final exam period scheduled for this course: 12-2 pm on Wednesday, May 11.

Course grades To determine course grades, I calculate a total course score with the following weights: homework problems at 5%, modeling reports at 40%, and exams at 55%. 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+.

Course web site A web site for this course is located at www.math.ups.edu/~martinj/courses/spring2011/m301/m301.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 relevant 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. Other handouts will be available only on the course web site.

Computing technology We will make use of computing technology for visualization and computation. We will have in-class demonstrations of various tools. You will then be free to use an appropriate tool of your own choice.

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.

Important dates for Spring 2011 Please note the following important dates:

- Tuesday, January 25 Last day to add a course
- Monday, January 31 Last day to drop a course without record
- Monday, February 28 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, February 28 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).