Math 5525  
Introduction to Differential Equations  
Spring 2017  
11:15 - 12:05, MWF  
Vincent 211

Instructor  M. Keel  
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Office  Vincent 222  
Office Hours  M,W 12:15 - 1:15 and by arrangement.

Prerequisites  : Please consult the University catalog for more information about the prerequisites which are: one of 2243 or 2373 or 2573; and one of 2283 or 2574 or 3283.

Texts  We have two required texts:


We will follow parts of each of these for much of the course. There will be some material in the course that is not included in either of these books.  

Broadly speaking, the class aims to study systems of first order ordinary differential equations (ODEs). We will discuss ways to compute (analytically) solutions to such systems in the linear case and the existence of solutions in the nonlinear case (where we usually will not be able to solve them analytically). We will also aim to cover some geometric approaches to a qualitative analysis of nonlinear systems - topics here include stability analysis of equilibria of nonlinear systems, and other conclusions we can draw from the nonlinear system using its linearization.

Course Material  We aim to cover topics from the first four chapters of the Braun text and the first seven chapters of the text of Hirsch, Smale, and Devaney. (Topics from chapters 8,9, and 10 of H-S-D will be included as time allows.). We will include topics from other texts as well (and students will receive handouts on all such material.) Numerical methods will not be included - note that there is an excellent sequence
of courses that cover such methods offered in the Mathematics Department at both the undergraduate and graduate level.

**Homework** There will be approximately 8 - 10 homeworks assigned this semester. They will be assigned on a Friday, and due 7 days later, at the beginning of class. The first homework will be assigned on Friday, January 20. **Homework will not be graded or collected, but will be the basis for the quizzes and the exams.** Despite the fact that the homework will not be collected, you are encouraged in the strongest terms to write up your solutions for each assignment as though they were going to be collected.

In addition to the homework, you are encouraged to read ahead in the text so that the material in lecture is not entirely new to you. You are **ENCOURAGED** to talk with each other and the instructor about the homework, but you should really write up the solutions yourself, using your own words. This is the single best way to learn the course material.

**Quizzes** There will be a weekly quiz each Monday after the Friday when homework is due. This quiz will take 5-10 minutes and will consist of problems similar to homework problems. If you can do the homework, you will be able to do the quizzes. Your lowest quiz score will be dropped before calculating the final grade (this will allow you to miss a quiz, or to do poorly on a quiz).

**Exams** There will be three midterm exams, each given in class. The dates of the midterm exams will be Wednesday, February 22; Wednesday April 5; and Friday May 5th (the last day of class).

**NO MAKEUP EXAMS CAN BE GIVEN.** If you need to miss a midterm exam, you should get the instructor’s permission, in writing, ahead of time - but such permission will be given only in the most serious of circumstances. Absences from a midterm exam not discussed ahead of time will result in the score of 0 for that exam.

**Grading** Course grades are computed as follows: 25% quizzes, 75% midterm exams (25% each).