Math 2280-001: Differential Equations
Course Outline

Instructor: Nat Smale, smale@math.utah.edu
Office: LCB 203
Office Hours: W,F 11:45AM-12:35PM, or by appointment. I am often around, so feel free to stop by my office; if I am not busy, I will be happy to answer questions.
Classroom: AEB 350
Class time: M,W,F 8:05-9:25AM. Note: There is an additional hour scheduled on Tuesdays 8:35-9:25. This will only be used when needed, for review sessions and attendance is optional. I will let you know before hand, if we will be meeting on a particular Tuesday.
Class Web Page: Homework assignments, reading assignments, course announcements and review problems will be posted on the course web page. Go to my homepage math.utah.edu/~smale/ and click on the link for the class. This should be checked regularly.
Prerequisites: A grade of at least a "C" in Math 2270, Linear Algebra.
Text: Differential Equations and Boundary Value Problems, 5th edition, by Edwards and Penney. ISBN number: 978-0-321-79698-1.
Course Content: This is an introductory course in differential equations, together with some applications in the sciences (particularly physics and biology). We will start off with first order equations, slope fields, analytic and numerical solutions (chapters 1 and 2). We then study higher order linear equations, with applications to mechanical vibrations (chapter 3). This will use linear algebra developed in 2270. Next will be a study of linear systems of differential equations with more applications to vibrations (chapter 5). This involves the use of eigenvalues and eigenvectors of certain matrices. After this, we will study the qualitative behavior of nonlinear first order systems in the plane, together with applications to biological models of competing species, and predator/prey (chapter 6). Finally, there will an introduction to PDE's (partial differential equations) and the topic of Fourier series used to study them (chapter 9). If there is time, we will study Laplace transforms (chapter 7). This roughly corresponds to the following sections of the text:
1. First Order Differential Equations: 1.1-1.5, 2.1-2.4.
2. Linear Equations: 3.1-3.6.
3. Systems of Differential Equations: 4.1, 5.1-5.4,5.7.

4. Nonlinear Systems, and Equilibrium Solutions: 6.1-6.4.
5. Fourier Series and PDE's: Chapter 9 (we may not cover all sections).
6. Time permitting, the Laplace Transform: 7.1-7.3.
   There could be slight changes in this program.

Course Grade and Homework: There will be regularly assigned homework (about once every 7 to 10 days), which will be collected and graded. Some class time will be spent going over homework problems. There will be two in class exams and a comprehensive final exam. The dates of these are as follows: Exam 1: Wednesday, September 30. Exam 2: Wednesday, November 11. Grades will be recorded on canvas.The Final Exam is comprehensive and will be on Wednesday, December 16 from 8:00-10:00AM. All of the exams are in the regular classroom.

The course grade will be determined as follows:

Homework: 25%

Exam 1: 20%

Exam 2: 20%

Final Exam: 35%

NOTE: To get at least a "C" in the class, you must get at least a "C" on the final exam.