Instructor: Isidora Milin
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Office Hours: TBA, starting 2nd week of class - in 337 Illini Hall (and by appointment)
Class Meeting Time: MTuWTh at 1PM, Henry Admin Bldg room 156
Webpage: http://math.illinois.edu/~imilin/teaching/math286.html

Textbook: *Differential Equations and Boundary Value Problems: Computing and Modeling, Fourth Edition*, by C.H.Edwards and D.E.Penney. (NOTE: *The U of I custom edition of this textbook does not include chapter 5 - which we shall cover in great detail in this course.*)

1 Course Content and Goals

Any physical law can (generally) be encoded as a differential equation - thus, understanding (and having a working knowledge of) differential equations is critical to understanding almost all of the material you will encounter in your subsequent science and engineering classes (and careers!). In fact, you can think of your study of differential equations in this course as one of the crucial steps in learning the mathematical language of engineering and science.

Given a real world problem, (after perhaps making some simplifying assumptions), you create a mathematical model of it by translating it into a differential equation (or a system of equations), analize this model and then interpret the results of your analysis in terms of the real world context you started off with. As you will see in this course, the mathematical analysis involved in this middle step - which is our main focus in this course - is usually more than a simple matter of following some universal prescription/algorithm, and there is quite a bit to it!

1.1 Course Outline

We will begin by studying first order differential equations, and look at some examples of problems modeled by such equations. This is covered in Chapter 1 as well as parts of Chapter 2 in the textbook. Then we'll spend quite a bith of time with linear equations of higher order - covering Chapter 3 in the textbook in quite a bit of detail. This material is (roughly) what the first in-class exam will include.

Unlike Math 285, Math 286 does cover linear systems of differential equations - in fact, we'll spend about a month studying this material, covered in Chapter 5. We'll continue by discussing Fourier series and their applications to differential equations - this corresponds to Chapter 9 in the textbook. This material is (roughly) what the second in-class exam will include.

As time permits, we shall also discuss selected topics from Chapter 10 (Sturm-Liouville problems and natural frequences) and Chapter 7 (Laplace transform methods).

1.2 Prerequisites

It is assumed you have taken a calculus sequence (including Calculus III). For the initial phase of the course (as soon as possible) you should review basic differentiation and integration techniques, so that they are fresh in your mind, as we'll use plenty of them right from the start. Vector calculus will come up fairly soon as well, when we start discussing systems of differential equations.

2 Course Requirements and Grading

2.1 Homework Problems

Written problem sets will be assigned weekly, and collected at the beginning of class each Thursday. Late homework is not accepted, but the lowest homework score will be dropped. If you are prevented from attending a Monday lecture, you can submit your homework by leaving it in my mailbox in 250 Altgeld Hall prior to our class meeting time. Some weeks only a subset of the assigned problems will be graded, but I will not in advance disclose which ones, and you are expected to submit solutions to all assigned problems.

- You are welcomed (encouraged!) to discuss the homework problems with other students in the class, but you must *write your own solutions.* Any notes created during a discussion with another student should be put away when you write up solutions you are going to submit for grading.
- If your solutions resulted from discussions with another student in the class, please list their names at the end of your submitted assignment - *give credit where credit is due.*
- Submitted solutions should be written clearly and legibly, with your name and class section prominently on the front page. If you are submitting more than one sheet, *please staple your homework.*

2.2 Exams

There will be two in-class exams (50 minutes each) and a three-hour final exam. The final exam will cover material from the entire course. The dates are as follows:
Exam 1: Thursday 03/04 in class (tentative)
Exam 2: Thursday 04/22 in class (tentative)
Final: Wednesday 05/12, 1:30-4:30PM

2.3 How to Compute Your Grade

Your final grade will be computed according to the following formula:

- Homework 20%
- Each in-class exam 20%
- Final exam 40%

In this course, there are no pre-determined percentages corresponding to particular letter grade cutoffs. After each in-class exam is graded and returned, I will indicate how to (approximately) interpret your percentage score as a letter grade.