Goals for this Course

- Understand the basic concepts of differential equations.
- Be proficient at solving the following types of differential equations.
  - first order via separation of variables
  - single linear first order
  - linear second order equation with constant coefficients, including solution via the Laplace transform
  - first order systems with constant coefficients
- Understand the general theory of existence and uniqueness of solutions of differential equations, including the role of linearity.
- Be able to interpret the phase plane for an autonomous, nonlinear system of two differential equations.

Course Structure

This course meets four times a week for lectures, where the basic concepts will be introduced. There is also one conference section per week.

- Homework
  The homework assignments will be given in class and listed on the course web page. Completing these exercises is essential to your mastery of the material. Some of the assignments will be problems from the text and some will make use of the on-line WeBWorK server. Homework from the text will be collected in conference and selected problems will be graded. Late homework will not be accepted without prior arrangement with the instructor. Homework scores will count as 20% of your final grade.

Homework papers must include your name on the first page. Homework papers must be stapled. Answers without supporting work will not be graded.
About WeBWorK

WeBWorK is a web-based collection of programs for on-line submission of homework. It was developed at the University of Rochester. WeBWorK provides immediate feedback to students and gives them the opportunity to correct mistakes during the process.

- **Exams**
  
  There will be three exams during the term. Each of the first two will count 25% of your final grade. Tentative dates are November 13 and December 4. There will also be a comprehensive final exam in the last week of the course on Thursday, December 18. This exam will count as 30% of your final grade. All three exams will be given during our normal class time.

- **Academic Dishonesty**
  
  Any instances of academic dishonesty will be dealt with according to WPI policies. See the web site [http://www.wpi.edu/offices/policies/honesty/](http://www.wpi.edu/offices/policies/honesty/) for details.

- **Course Accommodations**
  
  If you need course accommodations, please see me as soon as possible. Any such accommodations must be coordinated through the Disability Services Office.

Material to be covered

The section numbers are from the text.

**Week 1** First order equations
  
  Secs. 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

**Week 2** Second order equations
  
  Secs. 2.1, 2.2, 2.3, 2.4, 2.5

**Week 3** Linearity, General linear differential equation
  
  Secs. 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2

**Week 4** Linear independence, Constant coefficient differential equations, Undetermined coefficients
  
  Secs. 3.7, 4.3, 5.1, 5.2, 5.3

**Week 5** More on undetermined coefficients, Laplace transforms
  
  Secs. 5.3, 6.1, 6.2

**Week 6** More on Laplace transforms, Systems
  
  Secs. 6.4, 6.5, 6.6, 6.7, 7.1, 7.2, 7.3, 7.4

**Week 7** More on systems
  
  Secs. 7.6, 7.7