

Mathematics 2111: Differential Equations

Fall 2012-2013

PREREQUISITES: Math 1160, Math 1180, math 1152 or math 1172

INSTRUCTOR: T. Miao **OFFICE:** RB 2013 **PHONE:** 346-7722

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LECTURES: 3 hours per week

Monday, Wednesday and Friday 2:30 pm - 3:30 pm RB 2024

TEXT: **Differential Equations with Boundary-Value Problems**
by Zill (**Eighth Edition**)

COURSE OUTLINE: The topics to be covered are, tentatively, the following:

- (1) All of Chapter 1.
- (2) Sections 2.2, 2.3, 2.4, and 2.5 of Chapter 2.
- (3) Sections 3.1, and 3.2 of Chapter 3.
- (4) All of Chapter 4, except Sections 4.8, 4.9 and 4.10.
- (5) All of Chapter 5, except Sections 5.3.
- (6) All of Chapter 6, if time permits.
- (7) Section 12.3, if time permits.

OFFICE HOURS: Monday and Wednesday 11:30 am - 12:30 noon.

If these hours do not fit your schedule you are welcome to consult with me whenever you find me in my office. You may also make appointments through the Secretary of the Department of Mathematical Sciences in RB 2012; the phone number is 343-8469.

MARK DISTRIBUTION:

Your mark for the course will be calculated according to the following formula:

- (a) 15% from homework assignments.
- (b) 30% from the mid-term test and 55% from the final exam, OR, 85% from the final exam, whichever is the best. The mid-term test will be on Friday, October 26, 2012. The final exam may cover both the first half and the second half of the course. **Note this date is subject to change.**

HOMEWORK ASSIGNMENTS:

Homework assignments are given as topics are covered in class. Some of the questions are required to be handed in for marking; others are there for you to practise. The assignments are to be deposited into the assignment box marked **Math 2111** on the second floor foyer of the Ryan Building. **No late assignments will be accepted.**

Overview of the Course

- (1) Three methods of solving first order de.
 - separable equations
 - exact equations
 - linear equations
- (2) Applications of first order de.
- (3) Solution of higher order linear de, particularly with constant coefficients and second order.
 - (a) Solution of a non-homogeneous equation.
 - Complementary solution;
 - Particular solution.
 - (b) Solution of the associated homogeneous equation to get the complementary solution.
 - linearly independent of solutions and the Wronskian;
 - how to find the fundamental set;
 - reduction of order to find additional solution;
 - convert solution to phase-angle form.
 - (c) Equations of order higher than 2.
 - (d) Methods of finding particular solutions.
 - annihilator method;
 - variation of parameters.
 - (e) Cauchy-Euler equation.
- (4) Application of second order linear de.
 - vibrating spring;
 - RLC-circuit.
- (5) Series solutions of linear equations
 - solution about ordinary points;
 - solution about singular points;
 - Bessel's equation;
 - Legendre's equation.
- (6) Boundary-value problems
 - Sturm-Liouville problems;
 - Fourier series;
 - diffusion equation.