Introduction to Differential Equations – Math 256

Syllabus and guidelines 2017

Instructor: Victor Ostrik; office Deady 10B,
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Class meets: MTWF 12:00-12:50pm, Deady 307.

Office hours: MW 10-11am (or by appointment), Deady 10B.

Text: *Elementary Differential Equations*, by William Boyce and Richard DiPrima, 10th edition. We will cover parts of chapters 1, 2, 3,4,7.

Class webpage:
http://pages.uoregon.edu/vostrik/math256winter17/index256.html

Exams: There will be 2 midterms at the end of week 4, and at the end of week 8. There will be a two hour final exam at the time scheduled by the registrar's final exam calendar.

Quizzes: We will also have 3-4 quizzes (usually on Fridays).

Problem Sets: There will be (mostly) weekly homework assignments, Homework will usually be due on Wednesday. We will usually devote Tuesdays to problem solving.

Grades: Each hour exam will count as 20% of your grade, the total homework will count as 15% of your grade, the total quizzes will count as 15%, and the final exam will count for 30%.

Learning Outcomes: in this class we will learn how to
• model simple physical, biological and economical systems with differential equations;
• solve some differential equations of first order using separation of variables, integrating factors, substitutions, and variation of parameters;
• reduce homogeneous linear equations with constant coefficients of second and higher order to algebraic equations;
• use Wronskian to solve some homogeneous linear equations with non-constant coefficients;
• use method of undetermined coefficients to solve nonhomogeneous linear equations;

- apply complex numbers to find real solutions of differential equations;
- use methods of linear algebra (matrices, eigenvalues and eigenvectors) to solve systems of linear equations;
- use Euler's method to solve differential equations numerically.

Guidelines: It is extremely important to study the relevant part of the text *before* the related lecture. This will make lectures easier to understand and give you a chance to ask questions that come up reading the text.

Doing the homework seriously is the most important thing you can do to succeed in this course. Start early, and do some every day. I encourage you to work together on homework, as long as the work you do is really your own.

Please do ask questions about the homework, or any other aspect of the course in class. I will always be happy to spend the first few minutes of class dealing with homework questions, or questions from previous lectures, so come prepared! In order to ask questions effectively, make notes to yourself as you review lectures (and discover points that are unclear to you), as you study the text (and notice things that you are not sure you understand), and as you work on homework and come to problems you have trouble with.

Approximate Schedule

Week 1: What are Differential Equations and how to solve them. 1.1-1.3, 2.1-2.2.

Week 2: More methods of solving and modeling with Differential Equations. 2.3, 2.5-2.6.

Week 3: Euler's method. General theory of second order linear equations. 2.7, 3.1-3.2.

Week 4: Characteristic Equation and complex numbers. 3.3. Midterm I.

Week 5: Repeated roots of characteristic equation; nonhomogeneous equations. 3.4-3.6.

Week 6: Vibrations. Higher order equations. 3.7-3.8, 4.1-4.2.

Week 7: Systems of linear equations and matrices. 7.1-7.4.

Week 8: Eigenvalues and eigenvectors. 7.5. Midterm II.

Week 9: Complex and repeated eigenvalues. Fundamental matrices. 7.6-7.8.

Week 10: Nonhomogeneous systems. 7.9. Review.

Week 11: Final exam on Monday, March 20, 10:15-12:15.