

MATH 211:**Ordinary Differential Equations and Linear Algebra****Summer 2009**

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Overview: The differential equation (DE) is one of the most powerful tools available for modeling and understanding systems. While traditional calculus techniques can tell us a lot about problems involving change, even very simple systems cannot be described by equations solvable through integration or differentiation. Here, DEs give us much more flexibility in defining models, and give us more tools for finding solutions. It is this flexibility that makes understanding DEs and dynamical systems theory such an important tool for traditional applications like chemistry and physics, as well as more contemporary uses such as finance and biology.

Furthermore, while many classes of differential equations are solvable using elementary techniques, the solution (or even just approximation) of more general differential equations is still very much an open problem, and an active area of research in pure and applied mathematics.

Goal: This course is intended to introduce students to the study of differential equations, and to describe techniques for solving a large class of differential equations. In particular, we will study first-order and higher-order ordinary differential equations (ODE) and their solutions, numerical solution methods, some basic linear algebra, and systems of ODEs. Since the application of ODEs is as much a part of their usage as their solution, we will be spending a considerable amount of time on using ODEs to model systems.

Since this is a summer course, we will have only seven weeks to cover what is normally covered in fourteen or fifteen weeks during the regular school year. Therefore, students should be focused and willing to ask questions and actively learn the material. Attendance at each class lecture and completion of the homework will be critical.

Text: *Differential Equations - 2nd Ed.*, Polking, Boggess & Arnold, Pearson Prentice Hall, 2006.

Homework: As is true for most math courses, homework will be the most important method of learning the course materials. While the lectures will serve to introduce concepts and techniques, the only way of gaining an understanding and facility with mathematics is to actually work through problems. The compressed schedule of the course means that students will be expected to spend a considerable amount of time outside of class on homework.

Homework assignments will be posted on the web page. Late homework will not be accepted.

Homework will be graded for correctness and clarity, so please provide justification for each problem and write legibly. Students are encouraged to work together in solving homework problems, but each student must write up solutions independently.

Students should also read or at least skim the book before each class to familiarize themselves with the lecture material. You are also encouraged to work on the other problems in the book, and to see me in office hours if you have any questions on the homework or other materials.

Exams: There will be 2 midterm exams and a final exam. The first midterm will be on June 19, and the second will be on July 10. We will have a 3 hour take-home final exam, to be distributed on the last class and due July 27.

Grades: Grades will be based on homework, midterms, and the final exam, with the following point distributions:

Homework	30%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%

Disability Support: It is the policy of Rice University that any student with a disability receive fair and equal treatment in this course. If you have a documented disability that requires academic adjustments or accommodations, please speak with me as soon as possible. All discussions will remain confidential. Students with disabilities will also need to contact Disability Support Services in the Ley Student Center.