Mathematics 212
Fall, 2016

Instructor: Michael Rogers
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Hours: **TBA.**

Textbook:
- Trench, W., *Elementary Differential Equations With Boundary Value Problems*, Free Edition 1.01, 2013, http://digitalcommons.trinity.edu/mono/9/

Mathematica:
The software *Mathematica* is available free from Emory Software Express.

References:
- *NIST Digital Library of Mathematical Functions*, `http://dlmf.nist.gov`
Contains many properties of special functions encountered in the solution of differential equations.

Course Content: Mathematics 212 is a first course on differential equations, primarily ordinary differential equations (ODEs). Topics include symbolic methods of solution for first-order equations, second-order linear equations, higher-order and systems of linear equations with constant coefficients; simple numerical methods of integration, an introduction to numerical issues, and an introduction to advanced numerical methods available in standard software such as *Mathematica*; existence and uniqueness of solutions, phase space, geometry of ODES including equilibria, stability, and substitution as diffeomorphism; separation of variables, boundary-value problems, Fourier series solutions; Laplace transform.

Course Goals: Upon completion of this course the student should
- be able to solve various differential equations by various methods;
- be familiar with and be able to apply the main points in the theory of ODEs;
- be able to investigate qualitative aspects of a given ODE.

Quizzes & class activities: Quizzes will normally be announced. There will also be in-class activities, whose products will be graded.

Problem sets: From time to time each student will be assigned a problem to solve and explain. In an essay the student is to teach the reader how to solve a certain type of problem. The essay is to explain what the problem is, how to approach solving the problem, the steps of the solution of the particular problem, and to generalize to a method of solving such types of problems. These are normally one to two pages long.

Tests & Exams: There will be **two tests**. A **final examination** will be given at the scheduled time.

Grading: Evaluation will be based on the following:

Problem sets (10 @ 20 pts)	200 points
Quizzes & class activities	100 points
Tests (2 @ 150 pts)	300 points
Final Exam	200 points
	800 points

The plus/minus system will be used with the following rough guide to letter grades:

A	700 points and up	D	400–499 points
B	600–699 points	F	below 400 points
C	500–599 points		

Ways of Inquiry: This course satisfies the INQ requirement. There are several ways in which this course is an introduction to the way of inquiry represented by the subject of differential equations. Through in-class activities, students will explore Through the problem essays the student becomes familiar with what questions need to be addressed when explaining a problem. Finally, the method of instruction, while occasionally resorting to telling the students a few facts or the statement of a problem, will primarily discussion in the Socratic fashion, in which through question and answer, the teacher leads the class to discover how to solve a problem.

Honor Code: The Honor Code of Oxford College applies to all work submitted for credit in this course. All such work will be pledged to be yours and yours alone. This is the case when you place your name on work submitted. The Honor Code applies to all tests, problem sets, and any other work you may submit.