MATH 3065 Elementary Differential Equations Lec. 3 Lab. 0 Cr. 3

Effective Date: Fall 2005-2006

Course Description

Prerequisite: MATH 1552. A beginning course in ordinary differential equations with emphasis on the solving of linear equations. (A grade of "C" or better is required to advance to any higher numbered mathematics course.)

Course Objectives

The student will:

1. Understand the fundamentals of elementary differential equations as presented in the topical outline.
2. Develop critical thinking and problem solving skills.

Procedures to Evaluate these Objectives

1. In-class problems after concept presentation
2. In-class exams
3. Cumulative final exam

Use of Results of Evaluation to Improve the Course

1. Student responses to in-class problems will be used to immediately help clarify any misunderstandings and to later adjust the appropriate course material.
2. All exams will be graded and examined to determine areas of teaching which could use improvement.
3. All evaluation methods will be used to determine the efficacy of the material presentation.

Detailed Topical Outline

1. Classification of differential equations.
2. First order differential equations including:
   a. Linear equations.
   b. Separable equations.
   c. Autonomous equations.
   d. Exact equations.
3. Numerical methods to solve differential equations, including Euler's method.
4. Existence and uniqueness theorems.
5. Higher order differential equations including:
   a. Homogeneous equations with constant coefficients.
   b. Equations with complex roots (of the characteristic polynomial).

c. Equations with repeated roots.
d. Nonhomogeneous equations using the methods of:
    1. Undetermined coefficients.
    2. Variation of parameters.

6. Theoretical importance of:
    a. Fundamental solution.
    b. Linear independence.
    c. Computing the Wronskian.
7. Solving second order linear equations using power series near:
    a. Ordinary points.
    b. Regular singular points.
8. Laplace transforms.
9. Modeling application problems using differential equations.