



Course Title: Differential Equations

Course No. MAT 234

Class Hours: 4

Laboratory Hours: 0

Credit Hours: 4

Department Head Approval: _____
Maria DeLucia, Ph.D.

Date: 2006 - 2007

Dean Approval: _____
Reginald Luke, Ph.D.

Prerequisite:

MAT-233 or approval of mathematics department chairperson.

Textbook of Course:

<u>Author</u>	<u>Title</u>	<u>Publisher</u>
Zill	<u>Differential Equations with Modeling Approach, 8th edition</u>	Brooks/Cole

Catalog Course Description:

An introduction to differential equations for students interested in mathematics and sciences – both physical and social sciences. Covers first-and second-order ordinary differential equations and systems of first-order equations, both linear and non-linear. Qualitative and numerical analysis are emphasized along with analytic techniques such as Laplace transforms and matrix methods. Applications and modeling of real phenomena are discussed throughout the course.

Objectives of Course:

1. To master elementary methods for solving first-order linear ordinary differential equations, and second-order linear ordinary differential equations with constant coefficients.
2. To apply differential equations in solving such problems of the physical and engineering sciences as those of elementary mechanics, growth and decay phenomena, and oscillation theory.
3. To introduce the theoretical background of differential equations in the terms of linear algebra and matrices.

4. To learn numerical and graphical methods for solving differential equations by the use of methods such as Euler to Runge-Kutta.
5. To be able to handle systems of first order linear equations.
6. To be familiar with alternative methods to solve differential equations including Laplace transforms and infinite series.

Differential Equations, Zill

<u>Chapter</u>	<u>Topic</u>	<u>Time (weeks)</u>
1	Definitions, terminology, examples of differential equations, family of curves, initial-value problems.	0.5
2	First Order Methods: Separable, homogeneous, exact, linear.	2.0
3	Modeling with First Order DE's: Growth & Decay, Cooling and mixtures, Circuits, Nonlinear Models, systems of DE's.	1.0
4	Higher Order Linear: Linear Theory, Reduction of Order, Homogeneous with Constant Coefficients, Variation of Parameter.	3.0
5	Second Order Applications: Simple Harmonic Motion, Damped Motion, Forced Motion	1.5
6	Variable Coefficients: Power series solutions about ordinary points and singular points	1.0
7	Laplace Transforms: Definitions, Inverse Transforms, Properties Applications	2.0
8	Systems of linear first order DE's, Matrix Solutions of Homogeneous Linear Systems (Eigenvalues and Eigenvectors)	2.0
9	Numerical Methods: Euler, Runge-Kutta, Direction fields (Section 2.1).	1.0