MATH 240 Elementary Differential Equations

Required of ARE, BAE, CE, CHE, CMPEN, EE, ME

Catalog Description: (4) I, II, S. Elementary techniques for solving ordinary differential equations and applications to solutions of problems in science and engineering.

Prerequisites: C or better in MATH 222

Textbook: *Elementary Differential Equations*, Andrew G. Bennett: Notes, Kansas State University (Varney's).

Course Objectives: To teach students how to solve differential equations, how to graph solutions, and how to interpret solutions expressed in either algebraic or graphical form.

Sessions: Two 50 minute lectures, one 50 minute recitation, and one 50 minute lab per week.

Chapter	Topics	Sessions
1	Separable Equations, Initial Value Problems, and Exact Equations	4
	Lab 1 – Slope Fields	1
	Linear Equations and Change of Variables	3
	Lab 2 – Numerical Methods of Approximating Solutions	1
	Long Term Behavior of Solutions, Population Models, and Theory of First Order Equations	3
	Lab 3 – Errors in Numerical Methods 1	1
2	Complex Variables, Geometry of Complex Functions, and Alternate Forms for Trignometric Functions	3
	Lab 4 – Harvesting Models	1
	Theoretical Considerations	2
	Homogeneous and Inhomogeneous Equations	3
	Lab 5 – Geometry of Complex Functions	1
	Variation of Parameters, Boundary Value Problems and Partial Differential Equations	3
	Lab 6 – Free Motion	1
	Forced Motion and Energy of a Spring-Mass System, and System of Equations	2
3	Laplace Transforms	2
	Solving Differential Equations with Laplace Transforms and Impulse Functions	3
	Lab 7 - Numerical Methods	1
	Convolutions and Systems of Equations	2
	Lab 8 – Stability and Laplace Transforms	1
4	Power Series	1
	Series Solutions and Radius of Convergence	3
	Lab 9 – Taylor Series	1
	Euler Equations	2
	Regular Singular Points and Series Solutions and Convergence about Regular Singular Points	3
	Lab 10 – Radius of Convergence	1
Reviews		12
Total		61