

Department of Mathematics, Computer & Information Science

DIFFERENTIAL EQUATIONS

MA4360 SYLLABUS FALL 2007

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Office Hours **MW 3:30 – 4:30 pm**

Course Web Page

TEXTBOOK: Differential Equations with Boundary Value Problems, 6th Edition by Dennies G. Zill and Michael R. Cullen, Brooks/Cole Publishing Company, 2001.

Prerequisite: Calculus & Analytic Geometry II - MA 2320

COURSE DESCRIPTION: The course will cover the topics such as Methods of solving first order differential equations including separation of variables, exact equations, linear equations and substitutions; Methods for higher order differential equations including homogeneous and non-homogeneous equations, reduction of order, undetermined coefficients, and variations of parameters; Systems of differential equations, Boundary value problems; Applications to electrical, mechanical and chemical systems.

COURSE OBJECTIVES: To become proficient in solving ordinary differential equations and to study some of their applications.

COURSE EVALUATION & GRADING: Your grade for the course will be based on your homework chapter tests (60%) and a comprehensive final exam (40%). The grading scale is as follows:

A = [93, 100] A⁻ = [90, 92]	B⁺ = [87, 89]	C⁺ = [77, 79]	D⁺ = [67, 69]	F = [0, 59]
	B = [83, 86]	C = [73, 76]	D = [63, 66]	
	B⁻ = [80, 82]	C⁻ = [70, 72]	D⁻ = [60, 62]	

TUTORIAL: Drop-in tutorial is available in the mathematics learning center, Room **A118**.

TOPICS TO BE COVERED

Textbook Differential Equations with Boundary Value Problems, 6th Edition by Dennies G. Zill and Michael R. Cullen, Brooks/Cole Publishing Company, 2001.

1. INTRODUCTION TO DIFFERENTIAL EQUATIONS

- 1.1 Definitions and Terminology
- 1.2 Initial Value Problems Divisibility

2. FIRST-ORDER DIFFERENTIAL EQUATIONS

- 2.2 Separable variables
- 2.3 Linear Equations
- 2.4 Exact Equations
- 2.5 Solution by substitutions

3. MODELING WITH FIRST-ORDER DIFFERENTIAL EQUATIONS

- 3.1 Modeling: Linear equations
- 3.2 Nonlinear equations
- 3.3 System of Linear equations

4. HIGHER-ORDER DIFFERENTIAL EQUATIONS

- 4.1 Preliminary Theory: Linear Equations
- 4.2 Reduction of Order
- 4.3 Homogeneous Linear Equations with constant coefficients
- 4.4 Undetermined coefficients – Superposition Approach
- 4.5 Undetermined Coefficients – Annihilator Approach
- 4.6 Variation of Parameters
- 4.7 Cauchy – Euler Equations
- 4.8 System of Linear Equations
- 4.9 Nonlinear Equations

5. MODELING WITH HIGHER-ORDER DIFFERENTIAL EQUATIONS

- 5.1 Modeling: Linear equations with initial values
- 5.2 Modeling: Linear equation with boundary values
- 6.1 Solutions about ordinary points

7. LAPLACE TRANSFORM

- 7.1 Definition of the Laplace Transform
- 7.2 Inverse Transform and Transforms of Derivatives
- 7.3 Operational property I
- 7.4 Operational property II

8. SYSTEMS OF LINEAR FIRST-ORDER DIFFERENTIAL EQUATIONS

- 8.1 Preliminary Theory
- 8.2 Homogeneous Linear Systems with constant coefficients
- 8.3 Non-homogeneous Linear Systems