HOSTOS COMMUNITY COLLEGE DEPARTMENT OF MATHEMATICS

MAT 360:	DIFFERENTIAL EQUATIONS
CREDIT HOURS:	3.0
EQUATED HOURS:	3.0
CLASS HOURS:	3.0
PREREQUISITES:	Math 310 Calculus III with C or higher
REQUIRED TEXTS:	Boyce/DePrima: <u>Elementary Differential Equations and</u> <u>Boundary Value Problems,</u> Second Edition, John Wiley Publisher
REFERENCE TEXTS;	Rainville: <u>Elementary Differential Equations</u> 8 th Edition, Prentice Hall
	Ross: <u>Differential Equations</u> , Second Edition, Xerox Publisher
DESCRIPTION:	The student will formulate and solve differential equations of the first and and higher order linear equations with constant coefficients, undetermined coefficients, variation of parameters, applications; Euler's equation, Laplace Transforms, series solutions, linear systems; elementary partial differential equations and separation of variables; Fourier series.
EXAMINATIONS:	A minimum of four partial tests and a comprehensive final examination.
GRADES:	A, A ⁻ , B ⁺ , B, B ⁻ , C ⁺ , C, D, I, F

MAT 360

COURSE OUTLINE

I. INTRODUCTION

- a. Examples of differential equations
- b. Definitions (order, degree, linear, non-linear, ordinary, partial etc)
- c. Elimination of arbitrary constants
- d. Historical Remarks

II. FIRST ORDER DIFFERENTIAL EQUATIONS

- a. Method of separation of variables
- b. Exact Equations
- c. Equations with homogeneous co-efficients
- d. Integrating Factors
- e. Elementary applications to chemistry and physics

III. HIGHER-ORDER LINEAR DIFFERENTIAL EQUATIONS

- a. Higher-Order Linear Differential Equations
- b. Linear Independent and Dependent Functions
- c. The Wronskian
- d. Linear Equations with constant coefficients, Euler's equation
- e. Homogeneous Equations where the Auxiliary Equation contains:
 - 1. Distinct Roots
 - 2. Repeated Roots
 - 3. Imaginary Roots
- f. Non-Homogeneous Equations Soved by:
 - 1. Method of Undetermined co-efficients
 - 2. Inspection
- g. Variation of Parameters
- h. Reducation of Order

IV. APPLICATION OF HEGHER-ORDER LINEAR DIFFERENTIAL EQUATIONS

- a. Vibration of a Spring
- b. Undamped Motion
- c. Damped Motion
- d. Resonance Phenomena
- e. Electric Circuit Problems

V. LAPLACE TRANSFORM

- a. Definition of the Laplace Transform and Transform of Elementary Functions
- b. Inverse Transform and the Convolution Integral
- c. Solution of Simple Boundary Value Problems
- d. Solution of Elementary Integral Equations
- e. The Gamma Function
- f. Solution of Systems of Linear Equations

VI. SERIES SOLUTION OF LINEAR DIFFERENTIAL EQUATIONS

- a. Linear Equations and Power Series
- b. Convergence of Power Series (ordinary points and singular points)
- c. Solutions near and ordinary Pint
- d. Regular Singular Points
- e. Solutions About Singular Points; The Method of Frovenius

VII. FOURIER SERIES AND PARTIAL DIFFERENTIAL EQUATIONS

- a. Fourier Series: An Expansion Theorem
- b. Examples of Fourier Series
- c. Fourier Sine and Cosine Series
- d. Solution of Partial Differnetial Equations by means of Separation of Variables
- e. Solution of the Heat Equation (1 dimensional) (*optional)
- f. Solution of the Wave Equation (1 dimensional) (*optional)