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: Elementary Differential Equations and Boundary Value Problems, Second Edition, John Wiley Publisher**
REFERENCE TEXTS;	**Rainville: Elementary Differential Equations 8^{th} Edition, Prentice Hall** **Ross: Differential Equations, 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)