

BROOME COMMUNITY COLLEGE
Binghamton, New York

COURSE TITLE DIFFERENTIAL EQUATIONS W/LINEAR ALGEBRA MAT 282

CLASS LECTURE HOURS 4 LAB HOURS 0 CREDIT HOURS 4

DIVISION DEAN Julia Peacock

DEPT. CHAIRPERSON Mary Woestman DATE September, 1998

PREREQUISITE: MAT 182 Calculus II or equivalent.

Learning objectives of Course:

The student should be able to:

1. Recognize and solve first and second order differential equations.
2. Extend the methods for first and second order differential equations to nth order differential equations, where applicable.
3. Solve a system of linear equations using elementary row operations and, when it exists, the inverse matrix for the system.
4. Understand the concept of a vector space and subspace.
5. Determine if a set of vectors is linearly independent.
6. Calculate and use the Wronskian.
7. Calculate eigenvalues and find the associated eigenvectors.
8. Use eigenvalues and matrix methods to solve a system of linear differential equations.
9. Use Laplace transforms to solve nth order linear initial-value problems and systems of linear differential equations.
10. Use power series to solve differential equations.

CATALOG COURSE DESCRIPTION:

First and second order differential equations. Matrices, determinants, eigenvalues and eigenvectors, and systems of linear equations. Linear independence, the Wronskian, and differential operators. Homogeneous and nonhomogeneous linear differential equations with constant coefficients. Methods of undetermined coefficients, and variation of parameters. Systems of linear differential equations, Laplace transforms, and power series solutions.

4 class hours: Prerequisite: MAT 182 Calculus II or equivalent.

MAT 282

Differential Equations W/Linear Algebra

Course Outline

- I. First Order Differential Equations
 - A. Separable variables
 - B. Homogeneous coefficients
 - C. Exact equations
 - D. Linear equations

- II. Linear Algebra
 - A. Addition and scalar multiplication of matrices
 - B. Matrix multiplication
 - C. Determinants
 - D. Matrix inverses
 - E. Eigenvalues and eigenvectors
 - F. Solving systems of linear equations
 - G. Vector spaces and subspaces

- III. Linear Differential Equations
 - A. The Wronskian
 - B. Homogeneous equations
 - C. Nonhomogeneous equations
 - D. Reduction of order
 - E. Constant coefficients
 - F. Undetermined coefficients
 - G. Variation of parameters

- IV. Laplace Transforms
 - A. Definitions and derivations of formulas
 - B. n th order linear differential equations with constant coefficients
 - C. Systems of first order linear differential equations
 - D. Shift, periodicity, and unit step function

- V. Systems of Linear Differential Equations
 - A. Linear operators
 - B. Laplace transforms
 - C. Eigenvalues and eigenvectors
 - D. Undetermined coefficients
 - E. Variation of parameters

- VI. Differential Equations with Variable Coefficients
 - A. Cauchy-Euler equation
 - B. Power series solutions
 - C. Method of Frobenius
 - D. Bessells equation and Legendre's equation