San Bernardino Valley College
Curriculum Approved: 09/12/02 (Preview)
Last Updated: May 14, 2002

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Science and Math
Department: Mathematics
Course ID: MATH 266
Course Title: Ordinary Differational Equations
Units: 3
Lecture: 3 Hours
Laboratory: None
Prerequisite: MATH 251
Departmental Advisory: MATH 252 taken concurrently

B. Catalog and Schedule Description:

An introduction to differential equations that compliments advanced courses in Calculus. Topics include first-order differential equations and applications, linear differential equations and some applications of second order linear differential equations, linear systems, an introduction to series solutions and the Laplace Transform.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course the student should be able to:

A. Solve first-order differential equations by a variety of methods and apply first-order differential equations to problems concerning growth and motion;
B. Solve homogenous linear equations, apply them to springs;
C. Solve nonhomogeneous linear equations using variation of parameters and the method of undetermined coefficients
D. Set up and solve some constant-coefficient systems of equations;
E. Apply the methods of Laplace Transforms and power series to some differential equations.

IV. COURSE CONTENT:

A. First order equations
   1. Separation of variables and applications
   2. Linear and rational substitutions
   3. Exact equations and integrating factors
   4. Homogeneous and nonhomogeneous linear equations
   5. Direction fields
B. Homogeneous linear equations
   1. General theory
   2. Constant-coefficient equations
   3. Applications to springs, pendulums or electrical circuits
   4. Cauchy-Euler equations
C. Nonhomogeneous linear equations
   1. General theory
   2. Variation of parameters
   3. Operators and annihilators
   4. Method of undetermined coefficients
D. Systems of Differential Equations
   1. Linear systems, normal form
   2. Matrices and determinants in linear systems

3. Constant-coefficient systems

E. Laplace transforms and power series
   1. Basic Laplace transforms
   2. Inverse and a shifting theorem
   3. Laplace transforms of derivatives and integrals, applications to differential equations
   4. Series solution, the basic method

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor, but may include:

A. Lecture, discussion, small group projects
B. Student assignments outside of class will be equivalent to 6 hours per week and may include reading, solving problems and study group discussions

VI. TYPICAL ASSIGNMENTS:

A. At the end of each section there is a set of problems that require the student to recognize and apply the principles covered in the section. The problems then graduate into these requiring the application of two or more principles and the student must recognize the principles to apply and the correct order in which to apply them. Typical problem sets end with application mathematical symbols and analyze which principles must be applied. The student must then formulate and apply a solution strategy.
B. Written Assignments include solutions of various problems illustrative of the appropriate mathematical concepts and processes.

VII. EVALUATION(S):

A. Methods of evaluation will vary from instructor to instructor, but may include objective tests, true-false tests, homework and/or quizzes.
B. There is a final examination

VIII. TYPICAL TEXT(S):

Lial Steffensen Johnson, Essentials of Geometry for College Students, Harper Collins

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None