ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE
MATHEMATICS DEPARTMENT
COMMON SYLLABUS DIRECTORY

PREFIX: MAT **NUMBER:** 285 **TITLE:** Differential Equations

CONTACT HOURS: 3 **CREDIT HOURS:** 3

CCL DESCRIPTION: This course provides an introduction to ordinary differential equations with an emphasis on applications. Topics include first-order, linear higher-order, and systems of differential equations; numerical methods; series solutions; eigenvalues and eigenvectors; Laplace transforms; and Fourier series. Upon completion, students should be able to use differential equations to model physical phenomena, solve the equations, and use the solutions to analyze the phenomena. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in natural science and mathematics.*

PREREQUISITE(S): MAT 272

COREQUISITE(S): None

TEXTBOOK: Edwards & Penny, Elementary Differential Equations, 4th Edition
ISBN 0-13-011290-9

DELIVERY METHOD: Traditional

GRADING POLICY: Quizzes (10%) Chapter Tests (65%) Final Examination (25%)

CONTENT OUTLINE:

1.1 Differential Equations and Mathematical Models
1.2 Integrals as General and Particular Solutions
1.3 Direction Fields and Solution Curves
1.4 Separable Equations and Applications
1.5 Linear First-Order Equations

1.6 Substitution Methods and Exact Equations
1.7 Population Models
1.8 Acceleration-Velocity Models
2.1 Introduction: Second-Order Linear Equations
2.2 General Solutions of Linear Equations
2.3 Homogeneous equations with Constant Coefficients
2.4 Mechanical Vibrations
2.5 Undetermined Coefficients and Variation of Parameters
2.6 Forced Oscillations and Resonance
2.7 Electrical Circuits
2.8 Endpoint Problems and Eigenvalues
4.1 Laplace Transforms and Inverse Transforms
4.2 Transformation of Initial Value Problems
4.3 Translation and Partial Fractions
4.4 Derivatives, Integrals, and Products of Transforms
4.5 Periodic and Piecewise Continuous Input Functions
4.6 Impulses and Delta Functions
5.1 First-Order Systems and Applications
5.2 The Method of Elimination
5.3 Matrices and Linear Systems
5.4 The Eigenvalue Method for Homogeneous Systems
5.5 Second-Order Systems and Mechanical Applications
5.6 Multiple Eigenvalue Solutions
5.7 Matrix Exponentials and Linear Systems
6.1 Numerical Approximation: Euler's Method
6.2 A Closer Look at the Euler Method
6.3 The Runge-Kutta Method
6.4 Numerical Methods for Systems

COMMENTS: Any policy concerning the possible acceptance of a late assignment or the possibility of a special arrangement that might be made with the student who missed a scheduled examination due to circumstances beyond his/her control is left to the discretion of the instructor.