

COLLEGEWIDE COURSE OUTLINE OF RECORD

MATH 264, DIFFERENTIAL EQUATIONS

COURSE TITLE: Differential Equations

COURSE NUMBER: MATH 264

PREREQUISITES: MATH 212 Calculus II

SCHOOL: Arts Sciences and Education

PROGRAM: Math

CREDIT HOURS: 3

CONTACT HOURS: Lecture: 3

DATE OF LAST REVISION: Fall, 2016

EFFECTIVE DATE OF THIS REVISION: Fall, 2017

CATALOG DESCRIPTION: An introductory course to ordinary differential equations and methods for their solution. Topics include first-order equations, second and n 'th order linear equations with constant coefficients, nonhomogeneous equations, undetermined coefficients, variation of parameters, linear systems of equations, and solutions by Laplace transform. The course will also explore some elementary numerical methods and bifurcation analysis.

MAJOR COURSE LEARNING OBJECTIVES: Upon successful completion of this course the students will be expected to know how to:

1. Classify differential equations by order, type, and linearity.
2. Identify bifurcation values for first- and second-order 1-parameter differential equations.
3. Solve first-order differential equations using:
 - a) Separation of variables
 - b) Method of integrating factor
 - c) Exact equations
4. Implement elementary numerical methods including Euler's and an introduction to Runge-Kutta.
5. Model with first and second-order differential equations.
6. Solve homogeneous differential equations with constant coefficients.
7. Solve nonhomogeneous differential equations with constant coefficients using:
 - a) Method of undetermined coefficients – Superposition Approach
 - b) Variation of parameters
8. Solve differential equations using the method of Laplace transform.
9. Solve linear systems of first-order differential equations.
10. Perform stability analysis for linear systems.

COURSE CONTENT: Topical areas of study include –

Initial-Value Problems

Solution Curves for first-order differential equations

First order Separable Equations

First order and Higher order Linear Equations

First order Exact Equations
Runge-Kutta numerical method
First order Linear Models
First order Non-linear models
Higher order Homogeneous Linear Equations with Constant Coefficients
Higher order Undetermined Coefficients – Superposition and Annihilator Approaches
Higher order Variation of Parameters
Higher order Linear Models – Initial-Value Problems
Laplace Transform, Inverse Transforms and Transforms of Derivatives
Operational Properties
Systems of Linear First-Order Differential Equations (Homogenous and Non-Homogenous Linear)
Autonomous Systems of Nonlinear First-Order Differential Equations
Stability of Linear Systems of Nonlinear First-Order Differential Equations
Bifurcation analysis for first- and second-order 1-parameter linear differential equations with constant coefficients.

CURRENT STATEWIDE GRADING SCALE

A 90-100
B 80-89
C 70-79
D 60-69
F 0-59

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