Virginia Western Community College
MTH 267
Differential Equations

Prerequisites
Completion of MTH 264 or equivalent with a grade of C or better.

Course Description
Introduces ordinary differential equations. Includes first order differential equations, second and higher order ordinary differential equations with applications and numerical methods.

Semester Credits: 3 **Lecture Hours: 3**

Required Materials
Textbook:
Elementary Differential Equations & Boundary Value Problems by Boyce, DiPrima, and Meade. 12th edition.
ISBN: 9781119777694
Other Required Materials:
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Course Objectives
- First Order Differential Equations
  - Classify a differential equation as linear or nonlinear.
  - Understand and create a directional field for an arbitrary first-order differential equation.
  - Determine the order, linearity or nonlinearity, of a differential equation.
  - Solve first order linear differential equations.
  - Solve Separable differential equations.
  - Solve initial value problems.
- Numerical Approximations
  - Use the Euler or tangent line method to find an approximate solution to a linear differential equation.
- Higher Order Differential Equations
  - Solve second order homogenous linear differential equations with constant coefficients including those with complex roots and real roots.
  - Determine the Fundamental solution set for a linear homogeneous equation.
  - Calculate the Wronskian.
  - Use the method of Reduction of order.

  - Solve nonhomogeneous differential equations using the method of undetermined coefficients.
  - Solve nonhomogeneous differential equations using the method of variation of parameters.
- Applications of Differential Equations, Springs-Mass-Damper, Electrical Circuits, Mixing Problems
  - Solve applications of differential equations as applied to Newton's Law of cooling, population dynamics, mixing problems, and radioactive decay. (1st order)
  - Solve springs-mass-damper, electrical circuits, and/or mixing problems (2nd order)
  - Solve application problems involving external inputs (non-homogenous problems).
- Laplace Transforms
  - Use the definition of the Laplace transform to find transforms of simple functions
  - Find Laplace transforms of derivatives of functions whose transforms are known
  - Find inverse Laplace transforms of various functions.
  - Use Laplace transforms to solve ODEs.
- Systems of First-Order Linear Differential Equations
  - Find the eigenvalues and eigenvectors of a matrix
  - Solve systems of first-order linear differential equations with constant coefficients where the eigenvalues are unique, complex, or repeated.

ADA Statement (PDF)
Title IX Statement (PDF)

Textbook Topical Description

Topic	Chapter	Sections
Introduction to Differential Equations	1	1.1-1.3
First-Order Differential Equations	2	2.1-2.7
Second-Order Linear Differential Equations	3	3.1-3.8
Higher-Order Linear Differential Equations	4	4.1-4.3
The Laplace Transform	6	6.1-6.5
Systems of First-Order Linear Equations	7	7.1-7.8

Notes to Instructors

A comprehensive final exam will be given.