

**NVCC COLLEGE-WIDE COURSE CONTENT SUMMARY  
MTH 291 - DIFFERENTIAL EQUATIONS (3 CR.)**

**Course Description**

Introduces first order differential equations, linear differential equations, numerical methods and applications. Lecture 3 hours per week.

**General Course Purpose**

This course is primarily for the student in mathematics, engineering, the sciences and other areas requiring strong mathematical backgrounds. The purpose is to give the student a basic understanding of the techniques for solving ordinary differential equations.

**Entry Level Competencies**

Prerequisite is MTH 174 - "Calculus with Analytic Geometry II" or equivalent.

**Course Objective**

As a result of the learning experience provided in this course, the student should be able to:

- A. display a working knowledge of the terminology of differential equations,
- B. solve first order differential equations using standard techniques,
- C. solve homogeneous and non-homogeneous linear differential equations with constant coefficients,
- D. solve systems of linear differential equations using eigenvalues,
- E. solve applied problems such as growth and decay, oscillatory motion, and electric circuits.

**Major Topics To Be Included**

- A. Techniques of solving first order differential equations
  - 1. Separation of variables
  - 2. Exact equations
  - 3. Linear equations
  - 4. Numerical solutions
  - 5. Optional topics
    - a. Homogeneous equations
    - b. Integrating factors
    - c. Bernoulli equations
    - d. Substitution
- B. Homogeneous and non-homogeneous linear differential equations with constant coefficients.
- C. Systems of linear differential equations using eigenvalues
- D. Applied problems, to include selections from
  - 1. Growth and decay
  - 2. Orthogonal trajectories
  - 3. Geometrical uses
  - 4. Mixing of solutions
  - 5. Vibrating systems
  - 6. Electric circuits

**Extra Topics (optional)**

Qualitative analysis of systems of ODE's - phase plane and stability.

