

**NVCC COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 292 - TOPICS IN DIFFERENTIAL EQUATIONS (3 CR.)**

Course Description

Presents power series solutions, Fourier Series, Laplace Transforms, partial differential equations and boundary value problems. 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 use of Laplace Transforms to solve ordinary differential equations and to introduce the topic of partial differential equations with applications.

Entry Level Competencies

Prerequisite is MTH 291 - "Differential Equations"

Course Objective

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

- A. solve differential equations using infinite series,
- B. use Laplace transforms, Fourier series, and other techniques previously learned to solve physical problems involving the heat equation, the wave equation, and the Laplace equation,
- C. display a working knowledge of the properties of the solutions to Bessel's and Legendre's equations.

Major Topics To Be Included

- A. Series solutions
 - 1. Cauchy-Euler
 - 2. ordinary points
 - 3. singularities
 - 4. Bessel's equation
 - 5. Legendre's equation
- B. Laplace transforms
 - 1. Definition and properties
 - 2. Conditions for existence
 - 3. Computation
 - 4. Inverse transforms
 - 5. Application to ordinary differential equations
 - 6. Convolution
- C. Fourier series
 - 1. Definition
 - 2. Convergence
 - 3. Computation
- D. Partial Differential Equations--Separation of Variables
- E. Boundary Value Problems
 - 1. The heat, wave, and Laplace equations
 - 2. Techniques: Fourier series and Laplace transforms