C-ID Descriptor
Ordinary Differential Equations

Descriptor Details

- **Descriptor Title**: Ordinary Differential Equations
- **C-ID Number**: 240
- **Units**: 3.0
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General Description

The course is an introduction to ordinary differential equations including both quantitative and qualitative methods as well as applications from a variety of disciplines. Introduces the theoretical aspects of differential equations, including establishing when solution(s) exist, and techniques for obtaining solutions, including, series solutions, and singular points, Laplace transforms and linear systems.

Prerequisites

Single Variable Calculus II ()or one year of Single Variable Calculus

Corequisites

No information provided

Advisories

Three semesters of calculus for science, mathematics, and engineering.

Content

1. Solutions of ordinary differential equations;
2. First order DE including separable, homogeneous, exact, and linear;

3. Existence and uniqueness of solutions;
4. Applications of first order differential equations such as circuits, mixture problems, population modeling, orthogonal trajectories, and slope fields;
5. Second order and higher order linear differential equations;
6. Fundamental solutions, independence, Wronskian;
7. Nonhomogeneous equations;
8. Applications of higher order differential equations such as the harmonic oscillator and circuits;
9. Variation of parameters;
10. Laplace Transforms;
11. Series Solutions; and
12. Systems of Ordinary differential equations

Lab Activities

No information provided

Objectives

Upon successful completion of the course, students will be able to:

1. Create and analyze mathematical models using ordinary differential equations;
2. Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations;
3. Apply the existence and uniqueness theorems for ordinary differential equations;
4. Find power series solutions to ordinary differential equations;
5. Determine the Laplace Transform and inverse Laplace Transform of functions; and
6. Solve Linear Systems of ordinary differential equations.

Evaluation Methods

Tests, examinations, homework or projects where students demonstrate their mastery of the learning objectives and their ability to devise, organize and present complete solutions to problems.

Textbooks

A college level textbook designed for science, technology, engineering and math majors, and supporting the learning objectives of this course.