Applied Differential Equations I

MA 341

Section: 601

Semester: 2026 Fall Term

Course Description

Differential equations and systems of differential equations. Methods for solving ordinary differential equations including Laplace transforms, phase plane analysis, and numerical methods. Matrix techniques for systems of linear ordinary differential equations. Credit is not allowed for both MA 301 and MA 341

Student Learning Outcomes

1. Determine if a given function is a solution to a particular differential equation; apply the theorems for the existence and uniqueness of solutions to differential equations appropriately.
2. Distinguish between:
    a. Linear and nonlinear differential equations
    b. Ordinary and partial differential equations
    c. Homogeneous and non-homogeneous differential equations
3. Solve ordinary differential equations and systems of differential equations using:
    a. Direct integration
    b. Separation of variables
    c. Methods of undetermined coefficients and variation of parameters
    d. Laplace transform methods.
4. Determine particular solutions to differential equations with given initial conditions.
5. Analyze real-world problems such as the motion of a falling body, compartmental analysis, free and forced vibrations, etc.; use the analytic technique to develop a mathematical model, solve the mathematical model, and interpret the mathematical results back into the context of the original problem.
6. Apply matrix techniques to solve systems of linear ordinary differential equations with constant coefficients.
7. Find the general solution for a first-order, linear, constant coefficient, homogeneous system of differential equations; sketch and interpret phase plane diagrams for systems of differential equations.

Student Performance Assessment

Your final grade in the course will be determined by marks earned on the final exam, three term tests, and online homework assignments. The weighting of these components is as follows:

Homework=15%
Three term tests=50%
Final exam=35%

We will use NC State's standard letter grading:

Low	Letter	High
97 ≤	A+	≤ 100
93 ≤	A	< 97
90 ≤	A-	< 93
87 ≤	B+	< 90
83 ≤	B	< 87
80 ≤	B-	< 83
77 ≤	C+	< 80
73 ≤	C	< 77
70 ≤	C-	< 73
67 ≤	D+	< 70
63 ≤	D	< 67
60 ≤	D-	< 63

0 ≤	F	< 60

Attendance
Attendance will be measured by timely video completion. If you have no more than 3 absences and have taken all the tests, then your lowest test grade will be replaced with your final exam grade assuming it is higher.

Course Materials Required to Purchase

ISBN: 9780321977106
Title: FUNDAMENTALS OF DIFFERENTIAL EQUATIONS
Author: NAGLE, R KENT
Edition: 7
Required: REQUIRED

This course engages diverse scholarly perspectives to develop critical thinking, analysis, and debate and inclusion of a reading does not imply endorsement.

Students are responsible for reviewing the NC State University Policies, Rules, and Regulations (PRRs), which pertain to their course rights and responsibilities, including, but not limited to:

- POL 04.25.05 Equal Opportunity and Non-Discrimination Policy Statement
  - REG 02.20.01 Academic Accommodations for Students with Disabilities
- POL 11.35.01 Student Conduct
  - REG 11.35.05 Code of Student Conduct
  - REG 11.35.02 Student Discipline Procedures
- REG 02.20.03 Attendance Regulations
- REG 02.50.03 Grades and Grade Point Average
- REG 02.20.15 Credit-Only Courses
- REG 02.20.04 Audits
- REG 08.00.11 Online Course Material Host Requirements