MA 341 Applied Differential Equations I

Lecture details

Section 001	Course lectures are available to watch at http://wolfware.ncsu.edu
Instructor:	Leslie Kurtz
Office:	SAS 3240
Email:	lakurtz@ncsu.edu
Phone:	919.513.2111
Office Hours:	In-person SAS 3240: M-F: 9:30-10:30am or by appointment
Moodle page:	https://wolfware.ncsu.edu
WeBWorK:	https://wolfware.ncsu.edu

Course text

Fundamentals of Differential Equations and Boundary Value Problems, by Nagle, Saff, and Snider, 7th Edition, Addison-Wesley.

Catalog Description

Prerequisite: MA 242 or (MA 132 and MA 231)
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.

Learning Objectives

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

- Determine if a given function is a solution to a particular differential equation; apply the theorems for existence and uniqueness of solutions to differential equations appropriately;
- Distinguish between
  (a) linear and non-linear differential equations;
  (b) ordinary and partial differential equations;
  (c) homogeneous and non-homogeneous differential equations;
- 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
- Determine particular solutions to differential equations with given initial conditions.
- Analyze real-world problems such as motion of a falling body, compartmental analysis, free and forced vibrations, etc.; use analytic technique to develop a mathematical model, solve the mathematical model and interpret the mathematical results back into the context of the original problem.
- Apply matrix techniques to solve systems of linear ordinary differential equations with constant coefficients.
- 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.

Grading Policy

The grading will be assigned on a 10-point scale: **A: 90 − 100, B: 80 − 89, C: 70 − 79, D: 60 − 69, F:** ≤ 60

The cutoffs for the +/- grades are determined at the end of the semester. Your final grade in this course will be determined by marks earned on the final exam, three term tests, online homework assignments, and in-class quizzes. The weighting of these components are as follows:

Homework = 15 %
Two term tests = 50 %
Final Exam = 35 %

Term Tests 50%

There will be two closed book, closed notes tests. Calculators of any kind are not permitted on tests or the final exam. If you are ill on a test day, you will need to present a doctor's note to reschedule.

Test 1: May 30
Test 2: June 13

Attendance will be recorded every day. If you have no more than 3 unexcused absences and have taken all the tests, your lowest test grade will be replaced by your final exam grade assuming it is higher.

Final Exam 35%
The final exam is mandatory and cumulative. It will be on June 18. The only way to take the final exam at another time is to request a change through the Department of Registration and Records, 1000 Harris Hall.

Homework Assignments will be completed on-line using an Internet-based homework service called WeBWorK. I will send out reminders when you have upcoming assignments.

Corrections to the grading
The responsibility for grading tests resides with the Grader for this section. After the tests are returned, you have 3 days to look them over and compare them to the solutions online. If you believe an error has been made in grading on a test, you need to notify me within those 3 days. Grade changes will not occur outside of this timeframe. Do not alter the original work!

Students with disabilities
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services: https://dro.dasa.ncsu.edu Please let me know how I can better accommodate you.

Academic Integrity Statement and Academic Dishonesty
I assume that anything turned in with your name on it is your own work. Each time you submit a test, homework, quiz, or WebWork assignment, you affirm the honor pledge, "I have neither received unauthorized aid nor given aid on this assignment." The minimum penalty for cheating is a grade of zero on the assignment; violators will be reported to the Academic Integrity Board, which can impose additional sanctions. The code of student conduct can be found at: https://policies.ncsu.edu/policy/pol-11-35-01

Non-Discrimination Policy
NC State prohibits discrimination, harassment, and retaliation that are based upon a person's race, color, religion, sex, national origin, age, disability, gender identity, sexual orientation, or veteran status. If you feel that you have been the subject of prohibited discrimination, harassment, or retaliation, you should contact the Office for Institutional Equity and Diversity (OIED) at 919-515-3148.

NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://oied.ncsu.edu/divweb.

MA341 Tentative Schedule

Week	Sections	Topics
May 14–16	1.1–1.2	Solutions & Initial Value Problems
	1.3	Direction Fields and Phase Line Supplement
	2.2	Separable Equations
	2.3	Linear First Order Equations
May 19-23	3.2,3.3	Applications
	2.4	Exact Equations
	4.2-4.3	Homogeneous Linear Eqs. Constant Coefficients
	4.4-4.5	Undetermined Coefficients
	4.6	Variation of Parameters
May 26		**Memorial Day: No Class**
May 27-29	4.9-4.10	Springs
	7.2-7.3	Laplace transform: definition and properties
	7.4	Inverse Laplace Transform
May 30		**Test 1: 1.1-4.10**
Jun. 2–6	7.5	Solving IVPs with Laplace transforms
	7.6	Transforms of Discontinuous Functions
	9.1-9.3	Systems of Differential Equations and Linear Algebra
	9.4	Linear Systems in Normal Form
Jun 9–12	9.5-9.6	Linear Systems with Constant Coefficients
	9.7	Nonhomogeneous Linear Systems
	9.7	Applications: Interconnected Tanks
	5.4	Phase Plane
Jun 13		**Test 2: 7.1-9.7, Interconnected Tanks**
Jun. 16–17	12.2	Linear Systems in the plane
	12.3	Almost Linear Systems
		Review
Jun. 18		**Final Exam: 8:30-11**

Good Luck!