

# Math 308, Differential Equations

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## 1 Course content and scope

Math 308 is a first course in differential equations and applications. The text is *Fundamentals of Differential Equations and Boundary Value Problems*, by Nagle, Saff, and Snider.

The official catalog description reads as follows

308. Differential Equations. (3-0). Credit 3. I, II, S Ordinary differential equations, solutions in series, solutions using Laplace transforms, systems of differential equations. Prerequisites: MATH 251 or equivalent; knowledge of computer algebra system.

As it happens, (truth in advertising), the course as currently organized does not include much about series solutions. The emphasis has shifted. We shall instead be spending relatively more time on ‘autonomous systems’, that is, systems in which the ‘rules’ do not depend on what ‘time it is’.

We cover part or all of the following chapters:

- Chapter 1: direction fields, first order differential equations, and Euler’s method.
- Chapter 2: First order equations.
- Chapter 4: Second order equations.
- Chapter 3: Applications.
- Chapter 7: The Laplace transform.
- Chapter 5: Systems and the phase plane.
- Chapter 12: Stability, linear systems, and nearly-linear systems.

## 2 Laws and Rules

The following statement is required by law to be included in this first day handout, and faculty are expected to abide by its requirements:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Disability Services Office, in Room B118 of Cain Hall or call 845-1637.

University policy requires the next statement to be included, and students are expected to abide by its requirements:

An Aggie does not lie, cheat, or steal or tolerate those who do.

Small groups (up to 3) may work together on homework provided all who worked on the homework acknowledge the contributions of the others who worked on it. During exams, on the other hand, no communication, inbound or outbound, of any information about the problems is permitted. No use may be made of any other students' work. For more information on the honor code, see the web site

<http://www.tamu.edu/aggiehonor>

Although these things are formally required, they are not mere formalities. Fairness is important, hence, the first statement. And hence also the second, for it is not fair that anyone have an unearned advantage.

## 3 Course schedule

We cover most of the first six chapters:

Week 1: Chapter 1.

Week 2: Chapter 2, sections 2.1-2.3

Week 3: Chapter 4, sections 4.1-4.4

Week 4: Chapter 4, sections 4.5-4.7

Week 5: Chapter 4, sections 4.8-4.9

Exam 1, Friday, Feb 15.

Week 6: Chapter 3, sections 3.1-3.4

Week 7: Chapter 7: sections 7.1-7.3 (Laplace transform)

Week 8: Chapter 7: sections 7.4-7.6

Week 9: Chapter 5: sections 5.1-5.3

Week 10: Chapter 9: sections 9.1-9.4

Exam 2, Friday March 28.

Week 11: Chapter 9: sections 9.5-9.6  
Week 12-end of course: Sections 12.1-? (12.6?)

## 4 Grading

Your grade will be based on homework, quizzes, and exams. Homework for a given week will be due the following Monday. The overall homework grade counts for 10% of your score. Quizzes (mostly on Fridays) will be 20 % of the grade. Both hour exams will count 20 % each, and the final will count 30 %. Some of the homework will involve using a computer algebra system; we will decide in the first week which system to use, Maple or Matlab.

## 5 Office Hours

Officially, Monday 2-4 and Tuesday 1-2. But if those times aren't convenient, send me an email or just ask after class and we'll find a time.