

AMPA 0340 METHODS OF APPLIED MATHEMATICS II

Lectures: MWF 12-12:50, B&H 157

Instructor: Dr. Shun Zhang

- Office: 180 George Street, room 018
- Email: Shun_Zhang@brown.edu
- Webpage: <http://www.dam.brown.edu/people/shzhang/AM34.html>
- Office hours: Wednesday and Friday 1:00 -1:50 pm in Room 102A, 180 George St.
- Office hours are subject to change; changes will be announced in class and posted on the above website. Please make an appointment if you wish to meet with the instructor outside of office hours.

Teaching Assistant: Hong Zhang, hong_zhang@brown.edu

- Recitations: 2:00-4:00 Wednesday, 101 Thayer Street, Room 116B
- Office hours: 1:00-3:00pm Friday, 101 Thayer Street, Room 116B

Textbook: Elementary Differential Equations and Boundary Value Problems, 9th edition, by W.E. Boyce and R.C. DiPrima.

Purpose of the course: To introduce students to standard analytical techniques of solving systems of first order linear, and nonlinear ordinary differential equations, numerical methods for differential equations, as well as an introduction to partial differential equations

Assessment:

Grade	A	B	C	
Percentage to aim for	89-100%	77-88%	65-76%	
Work to be graded	Homework		Midterm	Exam
Weight	40%		20%	40%

- You will not be graded on the curve, i.e. I shall not determine your grade based on how well your performance compares with that of other students. However, grades are subject to adjustment, especially in borderline cases; adjustments may take into account class participation and improvements in performance over the semester. Minimum percentages for grade cut-offs will be approximately as (and no higher than) in the tentative scale above.
- Exams will NOT be given for individuals at times other than the scheduled slots, except in cases of illness, emergency or some other crisis; documentation verifying the excuse will be required, such as a note from your doctor. You must contact me as soon as you can, before the exam whenever possible, if a serious conflict arises.
- Homework assignments can be found on the website and will be handed out on Friday in the classroom. Completed homework will be handed back in class on Friday. The homework may include theoretical as well as computational exercises, i.e., some computer programming/MATLAB is expected as part of some homework.

- Late homework assignments will NOT be accepted, as they cause considerable inconvenience for the TAs. No credit will be given for late work unless you have a legitimate excuse (illness/emergency), together with verification.
- We strongly encourage questions during lectures, and/or recitation sessions, or via email. Questions concerning lecture material (& exams) should be directed mainly to Shun Zhang; questions concerning homework can also be directed to the TA.

Course Content:

Overview of AM33, analysis of simple differential equations §2 and §3

Chapter 7 Systems of first order linear equations

- §7.1 Introduction
- §7.2 Review of matrices
- §7.3 Linear Algebraic equations, eigenvectors and eigenvalues
- §7.5 Homogeneous linear systems with constant coefficients
- §7.6 Complex eigenvalues
- §7.7 Fundamental matrices
- §7.8 Repeated eigenvalues

Chapter 8 Numerical methods

- §8.1 The Euler and tangent line method
- §8.2 Improvements on the Euler method
- §8.3 The Runge-Kutta method

Midterm exam

Chapter 9 Nonlinear differential equations and stability

- §9.1 Phase plane analysis
- §9.2 Autonomous systems and stability
- §9.7 Periodicity and limit cycles
- §9.3-8 Various applications

Chapter 10 Partial differential equations and Fourier series

- §10.1 Two-Point boundary value problems
- §10.2-4 Fourier series methods
- Time permitting:
- §10.5-6 Heat equation
- §10.7 Wave equation

Final exam