

APMA 0360: METHODS OF APPLIED MATHEMATICS II
SPRING SEMESTER 2012

Lectures: MWF 12:00–12:50pm, Watson (CIT) Center 227

Instructor information:

- Instructor: Toan Nguyen
- Office: Room 328 in 182 George Street
- Phone: (401) 863-2114
- Email: Toan_Nguyen@Brown.edu
- Webpage for this course:
<http://www.dam.brown.edu/people/tnguyen/Teaching/Spring2012/APMA0360.htm>
- Office hours: Mondays 9-10am and Fridays 10-11am
Office hours are subject to change; changes will be announced in class and posted on the above website.

Textbook:

- *Elementary Differential Equations and Boundary Value Problems*, by W.E. Boyce and R.C. DiPrima [9th edition], published by John Wiley & Sons Inc.

Purpose of the Course:

- This is the second course in the series APMA0350-0360 of elementary differential equations, which is intended primarily for students who desire a rigorous development of the mathematical foundations of the methods used, for those students considering one of the applied mathematics concentrations, and for all students in the sciences who will be taking advanced courses in applied mathematics, mathematics, physics, engineering, etc.

Teaching Assistants:

- The class will be split into two recitation sections: each TA will hold two hours of recitation sessions, two hours of office hours, and grade the homework for the class.
- Two TAs are TBA
- Recitation information will be announced later by email and on the course website.

Grading policy:

- Your grade will be based on
 - Weekly homework: **20%**
 - In-class Midterm 1: **20% on Friday, February 24th**
 - In-class Midterm 2: **20% on Wednesday, April 4th**
 - Final exam: **40% on Wednesday, May 9th from 9am to 12pm**
- “Grading on the curve” is not applied in this course.

Homework:

- Homework will be handed out on Fridays in class or can be downloaded directly from the main webpage of this course.
- Homework must be turned in by 4pm on Fridays in the designated Drop Box for this course in the Division of Applied Math (182 George street).
- There will be 11 HW assignments and your lowest two homework grades will be dropped.
- **Late homework will not be accepted.**

Additional help:

- Besides coming to my office hours, students are strongly encouraged to come to TA recitations, TA office hours, and the Math Resource Center for help (link: <http://www.math.brown.edu/mrc>).

Week-by-week schedule: For the tentative week-by-week schedule, visit the main webpage for the course.

Content of the course (following the textbook):

Chapter 7 Systems of First Order Linear Equations

- 7.1 Introduction
- 7.2 Review of Matrices
- 7.3 Systems of Linear Algebraic Equations
- 7.4 Basic Theory of Systems of First Order Linear Equations
- 7.5 Homogeneous Linear Systems with Constant Coefficients
- 7.6 Complex Eigenvalues
- 7.7 Fundamental Matrices
- 7.8 Repeated Eigenvalues
- 7.9 Nonhomogeneous Linear Systems

Friday, February 24th: 1st mid-term exam !

Chapter 9 Nonlinear Differential Equations and Stability

- 9.1 The Phase Plane: Linear Systems
- 9.2 Autonomous Systems and Stability
- 9.3 Locally Linear Systems
- 9.4 Competing Species
- 9.5 Predator-Prey Equations
- 9.6 Liapunov's Second Method
- 9.8 Chaos and Strange Attractors: The Lorenz Equations

Wednesday, April 4th: 2nd mid-term exam !

Chapter10 Partial Differential Equations and Fourier Series

- 10.2 Fourier Series
- 10.3 The Fourier Convergence Theorem
- 10.5 Separation of Variables; Heat Conduction in a Rod
- 10.6 Other Heat Conduction Problems
- 10.7 The Wave Equation: Vibrations of an Elastic String
- 10.8 Laplace's Equation

Chapter 11 Boundary Value Problems and Sturm-Liouville Theory

- 11.2 Sturm-Liouville Boundary Value Problems

Wednesday, May 9th: the final exam !