

# Math 427K: Advanced Calculus for Applications I

## *Engineering Honors*

**Unique Number 56900**

Spring Semester 2009

### **Where am I?**

You are in Associate Professor Dan Knopf's Math 427K *Engineering Honors* class.

Your TA is Sean Bowman.

Lectures meet 11:00–11:50 Mondays, Wednesdays, and Fridays in CPE 2.206.

Problem sessions meet 1:00–1:50 Tuesdays and Thursdays in RLM 7.104.

### **Why am I here?**

Ordinary and partial differential equations are fundamental tools that modern science and engineering use to model physical reality. In these disciplines, the main applications of differential equations are to model complex physical phenomena. Consequently, it is seldom enough merely to know that a differential equation has solutions. It is more important to know when these solutions are unique and how to understand and approximate their behaviors, so that one can gain insight into the physical processes the differential equation is supposed to model. This course will introduce you to a variety of important techniques used to find and qualitatively analyze solutions of differential equations, with emphasis on those that arise in applications.

Because this is an *Engineering Honors* course, we will study differential equations in greater breadth and depth than in a usual section of M427K. To achieve this, we will devote more class time to new material and less time to review. Consequently, you should plan to attend problem sessions regularly and devote extra time outside of class to supplemental study.

### **What are the prerequisites for this course?**

The prerequisite is Math 408D or 408L (or equivalent) with a grade of at least C. This course is restricted to Engineering Honors students.

### **What materials should I have?**

*Elementary Differential Equations and Boundary Value Problems*, Eighth Edition, by William E. Boyce and Richard C. DiPrima. John Wiley & Sons, Inc. ISBN 0-471-43338-1.

### **How can I get extra help?**

- Assignments and announcements will be posted on BLACKBOARD. A discussion board will be provided there for you to post questions. Your TA and I will check this frequently and answer your questions as promptly as possible.
- You are also encouraged to ask for individualized help at any time. You may contact us as follows:

| <i>Name</i> | <i>E-mail</i>            | <i>Office</i> | <i>Phone</i> | <i>Office hours</i>            |
|-------------|--------------------------|---------------|--------------|--------------------------------|
| Dan Knopf   | danknopf@math.utexas.edu | RLM 9.152     | 471.8131     | M&F 2:30–4:00                  |
| Sean Bowman | sbowman@math.utexas.edu  | RLM 10.142    | 475.9148     | Tu&Th 2:00–3:30, W&F 1:00–2:00 |

- Contact information for the Mathematics Advising Center may be found at

<http://www.ma.utexas.edu/dev/math/Undergrad/Advising.html>

- The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471.6259 or 471.6441 (TTY). **If you fall under the University’s Learning Disability Policy, it is your responsibility to present the Dean of Student’s certification of that fact to me prior to the first exam.**

## How will the course be graded?

There will be homework, two midterm exams, and a cumulative final.

- **Homework:** There will be ten homework assignments. (See schedule below.) Each homework will be posted on BLACKBOARD approximately one week before it is due.
  - **The lowest two homework scores will be dropped**, to allow for illness, emergencies, and other valid nonacademic excuses.
  - **The remaining eight scores will be averaged to determine 15% of your overall grade.**
  - **A late assignment counts as a missed assignment.** Late homework is not accepted under any circumstances. (The sole exception is a conflict with a religious holy day, in which case you must contact me in advance.)
  - **Your assignments must be legible, neat, and stapled.**
- **In-class exams:** There will be two in-class exams. (See schedule below.) Each will count for **25%** of your overall grade.
  - **No exam scores are dropped.**
  - **If you miss an exam, you must contact me before the exam and provide a written excuse to be allowed to take a make-up.**
- **Final exam:** The final exam time is set by the Registrar. (See schedule below.) The final will determine **35%** of your overall grade.
  - If you have a schedule conflict with the final, contact me at least two weeks in advance.

Your overall grade will be computed according to this scale:  $\left\{ \begin{array}{ll} \text{A} & 90\text{--}100 \\ \text{B} & 80\text{--}89 \\ \text{C} & 70\text{--}79 \\ \text{D} & 60\text{--}69 \\ \text{F} & 0\text{--}59 \end{array} \right.$

## Can you give me some tips for the course?

- **Do the homework.** No students, no matter how talented, can learn mathematics without working examples themselves. The most important component of success in virtually every math course is diligence in doing practice exercises.
- **Attend problem sessions.** Problem sessions are valuable resources for learning and review. Note in particular that the problem session immediately before an exam reviews the exam topics, while the problem session immediately after an exam reveals the correct exam answers.
- **Read the text.** To get the most benefit from the lectures and problem sessions, you should read relevant sections of the text as they are covered in class.

- **Study together.** You are encouraged to study together with your peers enrolled in the class. In particular, you should make arrangements to share notes in case you miss class due to illness. However, the work on your written homework must always be your own.
- **Be proactive.** Take advantage of all resources we provide to help you learn (e.g. office hours and problem sessions)
- **Be honest.** Any academic dishonesty will be severely penalized. In this regard, please note:

**No books, notes, calculators, or cell phones are allowed during exams.**

### What is the lecture schedule?

The following lecture schedule may be altered for pedagogical reasons. **It is your responsibility to be aware of any changes announced in class.**

**Wednesday, January 21** Introduction

**Friday, January 23** Sections 1.1, 1.2

**Monday, January 26** Sections 1.3, 2.1

**Wednesday, January 28** Section 2.2

**Friday, January 30** Section 2.3

**Monday, February 2** Section 2.5     **(Homework 1 due)**

**Wednesday, February 4** Section 2.6     *(Last day to drop with a possible refund)*

**Friday, February 6** Sections 3.1, 3.2

**Monday, February 9** Section 3.3     **(Homework 2 due)**

**Wednesday, February 11** Section 3.4

**Friday, February 13** Section 3.5

**Monday, February 16** Section 3.8     **(Homework 3 due)**

*(Last day to drop without possible academic penalty)*

**Wednesday, February 18** Section 3.7

**Friday, February 20** Section 3.9

**Monday, February 23** Sections 4.1, 4.2     **(Homework 4 due)**

**Wednesday, February 25** Sections 7.1, 7.2

**Friday, February 27** Section 7.3

**Monday, March 2**     Exam I (at regular class time in BUR 212)

**Wednesday, March 4** Section 7.5

**Friday, March 6** Section 7.6

**Monday, March 9** Section 9.1    **(Homework 5 due)**

**Wednesday, March 11** Section 9.2

**Friday, March 13** Section 9.3

**March 16 – March 20**    **Spring Break — no class**

**Monday, March 23** Section 9.4

**Wednesday, March 25** Sections 5.1, 5.2

**Friday, March 27** Section 5.3

**Monday, March 30** Sections 5.4, 5.5    **(Homework 6 due)**    *(Last day to drop for academic reasons)*

**Wednesday, April 1** Section 5.6

**Friday, April 3** Section 5.7

**Monday, April 6** Section 10.1    **(Homework 7 due)**

**Wednesday, April 8** Section 10.2

**Friday, April 10** Sections 10.3, 10.4

**Monday, April 13**    **Exam II (at regular class time in BUR 212)**

**Wednesday, April 15** Section 10.5 (Appendix A)

**Friday, April 17** Sections 10.5, 10.6

**Monday, April 20** Section 10.7 (Appendix B)    **(Homework 8 due)**

**Wednesday, April 22** Section 10.7

**Friday, April 24** Section 10.8

**Monday, April 27** Section 10.8    **(Homework 9 due)**

**Wednesday, April 29** Section 6.1

**Friday, May 1** Section 6.2

**Monday, May 4** Section 6.3    **(Homework 10 due)**

**Wednesday, May 6** Sections 6.4, 6.5

**Friday, May 8** Section 6.6

**Monday, May 18**    **Final Exam (9:00–12:00 in WEL 2.304)**