

# Math 427K: Advanced Calculus for Applications I

## *Math Honors*

**Unique Number 56370**

Spring Semester 2013

### Where am I?

You are in Associate Professor Dan Knopf's *Math 427K Honors* class. Your TA is Rahul Shah. Lectures meet 9:30–10:45 Tuesdays and Thursdays in RLM 6.104. Problem sessions meet 4:00–4:50 Mondays and Wednesdays in CPE 2.210.

### Why am I here?

Ordinary and partial differential equations are fundamental tools with utility in pure mathematics as well as scientific and engineering applications. Those disciplines use differential equations to model complex physical phenomena. Whether in pure or applied math, 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. In applications, such understanding gives insight into the physical processes the differential equations are supposed to model.

This course will introduce you to a variety of important techniques used to find and qualitatively analyze solutions of ordinary and partial differential equations. Because this is a *Math 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 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 minimal prerequisites are Math 408D or 408L (or equivalent) with a grade of at least C. However, this is an honors course, so registration is restricted.

### What materials should I have?

*Elementary Differential Equations and Boundary Value Problems*, Ninth Edition, by William E. Boyce and Richard C. DiPrima; John Wiley & Sons, Inc.

### How can I get extra help?

- The contact information for your professor and TA is below. We encourage you to come to us for individualized help if needed!

<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	1:30–3:30 Tuesdays
Rahul Shah	rshah@math.utexas.edu			

- This course will use BLACKBOARD. Class announcements will be posted there, and we will maintain a discussion board, called *MathChat*, where you may submit questions and share answers. Your TA and I will check these frequently, answering your questions as promptly as possible.

- The syllabus may be updated during the semester. A current version will always be available on Blackboard, as well as through a link from my home page:

[www.ma.utexas.edu/users/danknopf](http://www.ma.utexas.edu/users/danknopf)

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

[www.ma.utexas.edu/academics/undergraduate/advising/](http://www.ma.utexas.edu/academics/undergraduate/advising/)

## How will the course be graded?

There will be homework, quizzes on homework, and three midterm exams. There will not be a final exam.

This course carries the *Quantitative Reasoning* flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

- **Homework:** There will be eleven homework assignments. Each assignment will be posted on BLACKBOARD approximately one week before it is due. Assignments will be due on most Wednesdays; see schedule below. Homework assignments will consist of two types of problems: *learning problems* and *honors problems*. The learning problems will not be collected, but you are expected to complete them (see below). The honors problems will be collected and graded; they will determine **15%** of your 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 holiday, in which case you must notify me in advance; see below.)
  - **Your assignments must be legible, neat, and stapled.**
- **Quizzes:** There will be a short quiz during discussion session each Wednesday that homework is due. *Each quiz will consist of one or two learning problems from that week — verbatim.* So if you have worked diligently on the homework, you will be well prepared to get good quiz grades.
  - **There will be no make-up quizzes.** A missed quiz counts as a zero. (The sole exception is a conflict with a religious holiday, in which case must notify me at least two weeks in advance.)
  - **The lowest two quiz scores will be dropped,** to allow for illness, emergencies, and other valid excuses. The remaining nine scores will be averaged to determine **10%** of your grade.
- **In-class midterm exams:** There will be three in-class midterm exams. (See schedule below.) Each will determine **25%** of your grade.
  - **No exam scores are dropped.**
  - If you miss an exam, you must contact me beforehand and provide a valid written **serious** excuse in order to be allowed to take a make-up exam. I reserve the right to give oral make-ups.

Your overall grade will be computed according to a scale at least as generous as this:

F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A
0–50	51–55	56–63	64–65	66–67	68–75	76–77	78–79	80–87	88–89	90–91	92–100

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

- **Attend problem sessions.** Because I must introduce new concepts during lectures, there simply isn't time to work as many examples as would be pedagogically ideal. Problem sessions offer many more opportunities to learn from examples, clarify ideas, and practice using new concepts. Problem sessions are valuable resources for learning and review. Note in particular that the problem session immediately before each exam reviews the upcoming exam topics.

- **Ask questions** — in lecture, during problem sections, and on BLACKBOARD.
- **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.
- **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. Because this is an honors course, you should expect to review basic concepts like series and complex numbers by reading on your own.
- **Come to office hours.** Office hours offer valuable opportunities to reinforce concepts, clarify confusing issues, work more examples, and get individualized feedback. Both your TA and I are happy to see students in our office hours.
- **Study together.** You are encouraged to study together with your peers enrolled in the class. Get to know your classmates, and make arrangements to share notes in case you miss class due to illness.
- **Participate in PLUS.** This class is supported by PLUS (Peer-Led Undergraduate Studying). PLUS study groups provide opportunities to collaboratively practice skills and knowledge useful for success in this course. You are free to attend any PLUS study group at any point in the semester. Information on meeting times and locations will be available through Blackboard and class announcements. To learn more about PLUS, visit [wikis.utexas.edu/display/PLUS](http://wikis.utexas.edu/display/PLUS) or find PLUS on Facebook.
- **Learn to work problems either with or without a calculator.** You may use a calculator on homework problems but not during quizzes or exams.
- **Be honest.** Any academic dishonesty will be severely penalized. In this regard, please note: **no books, notes, calculators, or mobile phones are allowed during quizzes or 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.** You should attend problem sessions each Monday and Wednesday, even though Mondays are generally not listed on the schedule below.

**Tuesday, January 15** Introduction, Sections 1.1, 1.2

**Wednesday, January 16** *First problem session — no quiz*

**Thursday, January 17** Sections 1.3, 2.1

**Monday, January 21** *Martin Luther King holiday: no problem session.*

**Tuesday, January 22** Sections 2.2, 2.4

**Wednesday, January 23** *Quiz 1*

**Thursday, January 24** Sections 2.3, 2.5

**Tuesday, January 29** Sections 2.6, 2.8

**Wednesday, January 30** *Quiz 2 (Twelfth class day: last day to drop with a possible refund)*

**Thursday, January 31** Sections 3.1, 3.2

**Tuesday, February 5** Section 3.3

**Wednesday, February 6** *Quiz 3*

**Thursday, February 7** Section 3.4

Tuesday, February 12 Section 3.6  
 Wednesday, February 13 *Quiz 4*  
 Thursday, February 14 ♡ Sections 3.7, 3.8  
 Tuesday, February 19 Sections 4.1, 4.2  
 Wednesday, February 20 *Quiz 5*  
 Thursday, February 21 Sections 7.1, 7.3  
 Tuesday, February 26 Sections 7.4, 7.5  
 Wednesday, February 27 *No quiz — exam review*  
 Thursday, February 28 Exam I — during regular class time in RLM 6.104  
 Tuesday, March 5 Sections 7.6, 7.8  
 Wednesday, March 6 *Quiz 6*  
 Thursday, March 7 Sections 9.1, 9.2  
 Monday, March 11 – Friday, March 15 *Spring break: no classes*  
 Tuesday, March 19 Sections 9.3, 9.4  
 Wednesday, March 20 *Quiz 7*  
 Thursday, March 21 Sections 9.5, 9.6  
 Tuesday, March 26 Sections 5.1, 5.2  
 Wednesday, March 27 *Quiz 8*  
 Thursday, March 28 Sections 5.3, 5.4  
 Monday, April 1 (*Last day to drop*)  
 Tuesday, April 2 Sections 5.5, 5.6  
 Wednesday, April 3 *No quiz — exam review*  
 Thursday, April 4 Exam II — during regular class time in RLM 6.104  
 Tuesday, April 9 Section 10.1  
 Wednesday, April 10 *Quiz 9*  
 Thursday, April 11 Sections 10.2–10.4  
 Tuesday, April 16 Section 10.5 (Appendix A)  
 Wednesday, April 17 *Quiz 10*  
 Thursday, April 18 Section 10.6  
 Tuesday, April 23 Sections 10.7 (Appendix B)  
 Wednesday, April 24 *Quiz 11*  
 Thursday, April 25 Section 10.8  
 Tuesday, April 30 Further topics in PDE  
 Wednesday, May 1 *No quiz — exam review*  
 Thursday, May 2 Exam III — during regular class time in RLM 6.104

## Policies

**Academic integrity** Any academic dishonesty will be severely penalized. Your assignments, quizzes, and exams must be your own work.

**Accommodations** The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Division of Diversity and Community Engagement, Services for Students with Disabilities (phone 471.6259, video phone 866.329.3986). Their website is:

[www.utexas.edu/diversity/ddce/ssd/](http://www.utexas.edu/diversity/ddce/ssd/)

If you fall under the University's Learning Disability Policy, it is your responsibility to deliver the SSD certification of that fact to me as early in the semester as possible, and no later than one week prior to the first exam.

**Religious holidays** By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holiday. If you must miss a class, an assignment, a quiz, or an examination in order to observe a religious holiday, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

**Safety recommendations** Please note the following guidelines:

- Occupants of buildings on the University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and reassembling outside.
- If you require assistance in evacuation, please inform me of this fact in writing during the first week of class.
- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- In the event of an evacuation, follow the instruction of faculty or instructors.
- Do not re-enter a building unless given instructions by one the following: Austin Fire Department, the University of Texas at Austin Police Department, or a Fire Prevention Services officer.
- If you have concerns about yourself or a classmate, you may contact the *Behavior Concerns Advice Line* at 512.232.5050.
- For further information, see [www.utexas.edu/emergency](http://www.utexas.edu/emergency) or contact the Office of Campus Safety and Security, [www.utexas.edu/safety/](http://www.utexas.edu/safety/), 512.471.5767.