Math 427K: Advanced Calculus for Applications I
Math Honors

Unique Number 55610

Spring Semester 2012

Where am I?

You are in Associate Professor Dan Knopf's *Math 427K* class. Your TA is Michael Kelly.
Lectures meet 9:30–10:45 Tuesdays and Thursdays in RLM 6.104.
Problem sessions meet 11:00–11:50 Mondays and Wednesdays in BUR 224.

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!

Name	E-mail	Office	Phone	Office hours
Dan Knopf	danknopf@math.utexas.edu	RLM 9.152	471.8131	1:30–3:30 Tuesdays
Michael Kelly	mkelly@math.utexas.edu	RLM 9.128	475.9135	10:00–11:00 M., 4:00–5:00 T., 9:00–10:00 W.

- 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 will be updated during the semester as exam room scheduling becomes known. A current version will always be available on Blackboard, as well as through a link from my home page:

$$http://www.ma.utexas.edu/users/danknopf$$

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

$$http://www.ma.utexas.edu/academics/undergraduate/advising/$$

- 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:

$$http://www.utexas.edu/diversity/ddce/ssd/$$

  If you fall under the University's Learning Disability Policy, it is your responsibility to deliver the SSD certification of that fact to me at least one week prior to the first exam.

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.

By UT Austin policy, if you must miss an assignment or exam in order to observe a religious holy day, you must notify me at least two weeks prior to that day. You will be given an opportunity to complete the missed work within a reasonable time after your absence.

- **Homework:** There will be eleven homework assignments. Each assignment will be posted on BLACK-BOARD 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 holy day, in which case you must contact me in advance; see above.)
  - **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 holy day, in which case must contact 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.

- **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 that **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 not listed on the schedule below.

Tuesday, January 17 Introduction, Sections 1.1, 1.2

Wednesday, January 18 *First problem session — no quiz*

Thursday, January 19 Sections 1.3, 2.1

Tuesday, January 24 Sections 2.2, 2.4

Wednesday, January 25 *Quiz 1*

Thursday, January 26 Sections 2.3, 2.5

Tuesday, January 31 Sections 2.6, 2.8

Wednesday, February 1 *Quiz 2*   *(Twelfth class day: last day to drop with a possible refund)*

Thursday, February 2 Sections 3.1, 3.2

Tuesday, February 7 Section 3.3

Wednesday, February 8 *Quiz 3*

Thursday, February 9 Section 3.4

Tuesday, February 14 ♡ Section 3.6

Wednesday, February 15 *Quiz 4*

Thursday, February 16 Sections 3.7, 3.8

Tuesday, February 21 Sections 4.1, 4.2

Wednesday, February 22 *No quiz — exam review*

Thursday, February 23 Exam I — during regular class time in RLM 6.104

Tuesday, February 28 Sections 7.1, 7.3

Wednesday, February 29 *Quiz 5*

Thursday, March 1 Sections 7.4, 7.5

Tuesday, March 6 Sections 7.6, 7.8

Wednesday, March 7 *Quiz 6*

Thursday, March 8 Sections 9.1, 9.2

Monday, March 12 – Friday, March 16 *Spring break: no classes*

Tuesday, March 20 Sections 9.3, 9.4

Wednesday, March 21 *Quiz 7*

Thursday, March 22 Sections 9.5, 9.6

Tuesday, March 27 Sections 5.1, 5.2

Wednesday, March 28 *Quiz 8*

Thursday, March 29 Sections 5.3, 5.4

Monday, April 2 *(Last day to drop)*

Tuesday, April 3 Sections 5.5, 5.6

Wednesday, April 4 *No quiz — exam review*

Thursday, April 5 Exam II — during regular class time in RLM 6.104

Tuesday, April 10 Section 10.1

Wednesday, April 11 *Quiz 9*

Thursday, April 12 Sections 10.2–10.4

Tuesday, April 17 Section 10.5 (Appendix A)

Wednesday, April 18 *Quiz 10*

Thursday, April 19 Section 10.6

Tuesday, April 24 Sections 10.7 (Appendix B)

Wednesday, April 25 *Quiz 11*

Thursday, April 26 Section 10.8

Tuesday, May 1 Further topics in PDE

Wednesday, May 2 *No quiz — exam review*

Thursday, May 3 Exam III — during regular class time in RLM 6.104