
Pre-requisite: Math 222.

Credit toward the math major may not be received for both Math 320 and Math 340.

Professor: Leslie Smith, Departments of Mathematics and Engineering Physics, Office Hours in Van Vleck 825 MW 2:30-4:30, lsmith@math.wisc.edu, http://www.math.wisc.edu/~lsmith.

Teaching Assistants:
Mohamed Abou Dbai, Office Hours W 10:00-11:00 & R 9:50-10:50 in Van Vleck 101
Yoosik Kim, Office Hours T 2:30-3:30 & R 11:00-12:00 in Van Vleck 718
Kyriakos Sergiou, Office Hours W 11:00-12:00 & R 9:50-10:50 in Van Vleck 716

Exams: There will be two evening exams: **Tuesday February 23 and Tuesday, April 5**, during the time 7:15-8:30 PM. Please plan accordingly. Each exam is 25% of the final grade.

Final Exam: **Tuesday May 10**, 12:25-2:25 PM, 30% of grade.

Quizzes During Section Meetings: There will be 3 quizzes in section meetings during the weeks of February 8, March 14 and April 25. Quizzes will be graded on a scale of 0-4 and will count for 5% of the overall grade. There will be no make-up quizzes.

Piazza: There will be a Piazza course page to facilitate peer-group discussions. The course instructors will check-in M, T, W, R after 4 PM to answer selected questions as appropriate. Please consider this resource mainly as a discussion among students.

Piazza Sign-Up Page: piazza.com/wisc/spring2016/math320
Piazza Course Page: https://piazza.com/wisc/spring2016/math320/home

Weekly Problem Sets: Homework is due at the beginning of class, normally on Friday. Homework will be available on-line at www.math.wisc.edu/~lsmith approximately one week prior to the due date. Roughly 15 problems will be assigned each week (most of the time from the book, but not always).

Please write your name and section number clearly on each homework set, stapled please! Unstapled homework will not be accepted.

Grading of Homework: The TAs and/or a grader will grade a subset of the homework problems given out each week, with some points also given for completeness. Typically (but not necessarily always), there will be 2 problems graded on a scale of 0-4, with 2 points for completeness. The homework scores will count for 15% of the grade. The lowest homework score will be dropped.

Late Policy: Homework turned in after the beginning of class will be considered late and will be graded at 80% credit. Late homework will be accepted until 5 PM on the due date.
(no credit thereafter, no exceptions). The policy is intended to keep everyone as current as possible.

Please email your TA directly to make arrangements regarding late homework submission.

**Calculators:** Calculators and/or computer software may be used to help with homework problems but are not permitted during exams.

**Grading Scale for Final Grade:** 92-100 A, 89-91 AB, 82-88 B, 79-81 BC, 70-78 C, 60-69 D, 59 and below F

**Course description:** Differential equations are the fundamental tools that scientists and engineers use to model physical reality. The importance of differential equations to science and engineering cannot be over-emphasized. A distinct subject in its own right, linear algebra is a part of mathematics concerned with the structure inherent in mathematical systems. We shall study these subjects together for three reasons: (1) The viewpoint of linear algebra is immensely helpful in uncovering the order underlying the topic of differential equations; it helps us understand the “why” and not just the “how” of our calculations; (2) Linear algebra is essential to the theory of differential equations; (3) Linear algebra is crucial to the computer approximations which are often the only way to solve the most challenging differential equations.

Throughout this course, we will seek to answer the following basic questions:

- When does a differential equation have a solution? When is that solution unique?

- Can one construct the (unique) solution of a differential equation in terms of elementary functions? If not, can one approximate its solution numerically and/or understand it qualitatively?

- How does one choose the differential equation(s) used to model a physical system? What are the strengths and limitations of such models? Specifically, what is the significance of linearity in our models and applications?

**Course outline:** The course covers material in Chapters 1-8 of the text. The topics are listed below with corresponding chapter.

Chapter 1: First-Order ODEs (continuing from 221/222 with some review).


Chapter 3: Linear Systems and Matrices.

Chapter 4: Vectors Spaces.

Chapter 5: Higher-Order Linear ODEs.

Chapter 6: Eigenvalues and Eigenvectors (sections 6.1-6.2).

Chapter 7: Homogeneous Linear Systems of ODEs.

Chapter 8: Nonhomogeneous Linear Systems of ODEs (sections 8.1-8.2).