

Math 540 Honors Linear Algebra, Spring 2013: Syllabus

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Course website: <http://math.brown.edu/~ckottke/540/>

Office hours: Mon. 3:00-3:45, Wed. 11:15-12:00 (shared with Math 1530), or by appointment.

Text: *Linear Algebra Done Right*, by Sheldon Axler, 2nd Ed (ISBN: 0-387-98259-0 hardcover, 0-387-98258-2 softcover).

Exams:

- Midterm 1: Wednesday Feb. 27, in class.
- Midterm 2: Wednesday Apr. 3, in class.
- Final: TBA

Description:

Linear algebra is the study of vectors and linear maps. It is a foundational subject in mathematics, and of extremely wide use in fields such as economics, physics, biology, computer science, engineering. Math 540 is the honors version of the class, and is fast-paced and theoretically oriented. We'll be covering lots of interesting material, but you should be prepared to spend a lot of time on this course.

Linear algebra is a very important subject, both for its use in theoretical mathematics and for its applicability in the real world. The computational side of linear algebra is quite important, but due to time constraints, computations will not be the primary focus of the lectures in this course. Homework sets will consist of two different sorts of problems. Some problems will be theoretical, and you'll learn to construct your own proofs. These will generally build on material that we've covered in class. Other problems will ask you to gain familiarity with computational aspects of linear algebra that we discuss only briefly in class.

We will use the same exams and (mostly the same) homework problems as Section 1 (taught by Joe Silverman), and will try to keep to more or less the same schedule.

Topics list:

Lectures	Topic
1-4	Vector Spaces
5-8	Finite-Dimensional Vector Spaces
9-12	Linear Maps
13-16	Polynomials
17-20	Eigenvalues and Eigenvectors
21-24	Inner-Product Spaces
25-28	Operators on Inner-Product Spaces
29-32	Operators on Complex Vector Spaces
33-36	Trace and Determinant

Course Policies:

- **Grading:** Your final grade will depend on weekly homework assignments and three exams (2 midterms and a cumulative final). Your lowest 2 homework scores will be dropped. Letter grades will be awarded on a curve based on your total numerical score computed using the percentages below.

Homework	15%
Midterm 1	25%
Midterm 2	25%
Final Exam	35%

- **Homework:** Homework problems will be assigned with every lecture and collected weekly. You should attempt the problems as soon as possible, to solidify the material covered in lecture. If you wait until the last minute to start doing the homework problems, you will be setting yourself up to do poorly in this class. Completed assignments may be handed in during class, or turned in to the appropriate box in the math department mailroom, by 4pm on the due date. Collaboration on homework assignments is allowed, and indeed encouraged. This means discussing problems, solution techniques, and comparing individual answers, not copying answers. Each student must write up their own homework individually. **Please cite your collaborators and references used (apart from the textbook) on your homework assignments.**
- **Missed/Late assignments and exams:** Late homework will not be permitted, except in cases of emergency accompanied by a note from the Dean's office. If you have a conflict, please arrange to turn in your assignment early, or use it as your lowest homework score to be dropped. A missed exam may be made up only in the case of an emergency; the make up will be an oral exam and may be more difficult than the original.
- **Grade disputes:** Please check over your exams and assignments when they are returned to you for any grading mistakes (they happen!) and I will be glad to correct them. **Grade disputes will be considered for one week following the return of an assignment.** After one week, the grade is set.

Tips for success:

- **Read the relevant material before class.** I will post a reading assignment on the website corresponding to each lecture. which should be completed *before* coming to class. You don't need to fully understand everything, but you'll find that having some familiarity with the subject before hearing the lecture is extremely helpful, and you are guaranteed to get more out of each class this way.
- **Start homework problems early.** Learning abstract mathematics takes time and above all, practice. The homework assignments are your chance to practice the material and develop your skills and intuition. Make an attempt at the homework problems as soon as possible after each lecture, then let them roll around in your head for a while if you don't get them right away. Sometimes the best mathematical insights come while you're walking down the street (or in the shower!) after you've put a problem in the back of your mind.
- **Be your own teacher.** You are the person in the best position to identify which things you understand well and which things you feel a little hazy about. Try taking the role of instructor and see if you can explain the material to someone else (or yourself) and you'll quickly find out which things you are confused about. While confusion is a (the?) natural state of learning mathematics (if you're not confused about something you probably aren't trying hard enough), don't let it persist — work to become 'unconfused'! (That way you can move on to be confused about something new...)
- **Come to office hours.** This is an invaluable time to get unconfused. Identify those things you don't understand very well, and ask me about them — professors like to explain things! I'm also happy to discuss mathematics in general or anything else.