

**Math 320 - Linear Algebra
Spring 2012**

Syllabus

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Office Hours: M 4:00 - 5:00, Tu 2:30 - 4:00, and by appt
Class Meetings: MW 2:30 - 3:50
Final Exam: Monday May 21, 2012, 2:00 - 4:00

Administration

Textbook

Introduction to Linear Algebra by Strang.

Prerequisites

Math 160 - Math I Logic
Math 250 - Calculus III

Academic Integrity

Please be aware of the academic integrity policy of this University. Cheating and plagiarism are serious offenses and will be treated seriously. Although I encourage you to study together, unless specifically designated as a group assignment all work you hand in should be your own. Do not discuss any aspect of any exam in this class with anyone at all, until all exams are returned. Do not discuss the final exam with anyone at all, until next semester.

The World Wide Web contains a wealth of information for anyone who can use a search engine, and you are encouraged take advantage of this resource. However, it is imperative that you fully cite with author and URL any materials you find on the Web. Also, if you choose to use anything verbatim, you must provide additional thoughtful comments, critiques and edits to what you find.

Email

I will be sending lots of email this semester to your USD email address. If you have a second email address that you prefer to read, you should set your USD account to forward your email to that address. To set your student email to forward, go to <https://www.sandiego.edu/ac/accounts/>, click \emph{Forwarding and Vacation Replies}, login to the SENDMAIL server and EDIT MAIL FORWARDING LIST. If you need help with any of this, contact the Computing Help Desk

(260-2400).

Learning Outcomes

There are several distinct aims for this course.

1. Broaden your foundation in math, especially techniques and theorem of linear algebra. In particular, you will be introduced to the study of linear systems, their solution, and geometric interpretations offered by the study of eigenvalues and eigenvectors
2. You will learn to analyze mathematical arguments and construct correct mathematical proofs.
3. You will learn to select and correctly apply common mathematical algorithms and calculations.
 - Gaussian elimination and LU decomposition; determinants; finding eigenvalues and vectors
 - Matlab (Freemat)
4. You will use intuition, creativity, guessing, and the experience gained through the study of particular examples and mathematical models to successfully solve problems, including applications outside of mathematics.
 - selected applications from least squares approximation, graph theory and Fourier series.
5. You will clearly explain mathematical ideas, both orally and in writing, using correct mathematical terminology and proper mathematical notation.

Structure of the Course

The course is based on a beautiful textbook by Prof. Gilbert Strang of MIT. You can find [his lectures](#) on the same material online. I strongly suggest that you check this out, generally ahead of the time I will be covering the same material. Then you will be prepared to call me out when I goof!

As with any three-unit college course, you should expect to spend a minimum of six hours per week outside of lecture on work for this class. This course is no exception, and in fact will likely demand more than that in case your preparation is not strong. Do not fall behind. If you find yourself lost or confused please come see me at once so that you can get back on track. You are encouraged to work with fellow students, but the final work you hand in must be written by you alone

The course (both book reading and class time) will depend heavily on Matlab, or a clone such as [Freemat](#). As a result of this you should be able to work much more difficult problems with much less computational effort. Beware, though, that while the course might be less tedious than you may be accustomed to, it will be more conceptual and difficult. In order to be a good user of the new tools you have, it will be even more important that you have a deep understanding of the material, and how to use the computer to achieve your aims.

In this course I assume that you are in possession of some "mathematical maturity", gained over

your long experience in the study, practice and application of mathematics. Some of the ideas presented depend on concepts which you should already know, but which may, in fact, be new to you. (Examples: mathematical induction, solving systems of equations, vector analysis.) Feel free to let me know when I have assumed you have seen something that you haven't, and I will try to help. Remember, however, that this is an advanced course, and it is your responsibility, not mine, to ensure that you are adequately prepared for it. This includes, indeed necessitates, the requirement that you take the initiative to find and learn whatever material you need to in order to keep up.

I am very excited about teaching this course this semester. The material is hard, the textbook is hard, and mastering it will take work from all of us. I encourage regular feedback from students to make sure that we are on track and making the best use of our time in this class. There will be written opportunities for anonymous feedback, and I will always be happy to hear your comments in person or by email on how the course is progressing.

Grading, Homework and Exams

Two in-class exams will be worth a total of 40% (20% each) of your final grade. These tests are tentatively scheduled for February 29 and April 11. Make-up tests will only be given in the event of a verifiable serious illness.

Written homework will count for a whopping 20% of your grade. Grades of 'A' have been won and lost in this course based on the homework performance. Most weeks there will be a homework assignment made which will usually be due at the beginning of class on the Wednesday of the week after it is assigned. All homework should be neat, easy to read (typed, if possible), and written in clear and concise English with complete sentences. Assignments more than one page in length must be stapled together. While I will be delighted to discuss homework problems during my office hours, I will spend only a limited amount of class time discussing homework, and I will not answer questions in class about homework due that day. I will not accept late homework.

I strongly encourage you to work in groups on your homework. However, what you hand in should be your own. I have instructed the reader to discount by 10% any homework assignments which are nearly identical.

I encourage you to type all work to be handed in. LaTeX is a free, excellent technical document preparation system you should consider for this. Word processing helps you to be more organized and precise in your thinking, and encourages iterative review of your work, which is when mathematical understanding grows the most. It fosters a sense of pride and professionalism.

A cumulative final exam worth 40% of your grade will be given. The exam date is noted on the first page of this syllabus.

Miscellany

Attendance is mandatory. If you miss class you are still responsible for all the material covered

in class that day, and for handing in on time all work assigned that day. You are responsible for all the material in the assigned sections of the text. Some of this material may not be discussed in detail in class. There may also be some material discussed in class which is not in the text. You are responsible for this material too.

Classroom decorum. Please remember that you are a professional, and this class is a professional commitment. Civility and computer lab regulations prohibit food or drinks in the classroom. It is distracting, inconsiderate of others and disturbs the flow of the class. The same goes for leaving the classroom early without obtaining my permission before class starts. Take care of any pressing personal needs you may have before coming to class. Finally, please arrive to class on time so that we can get the most out of our limited time together. Entering late - and with great fanfare - is obnoxious.

Practice, practice, practice. Mathematics is not a spectator sport. The only way to learn math is to do hard problems. Just as you cannot become a world-class gymnast by watching the Olympics on TV, you cannot expect to learn math by listening to others talk about it or reading other people's work. You should expect to spend lots of time on your homework for this class. Some of the problems I assign will be challenging, and you will probably not be able to solve every one. The goal is to think about and struggle with every problem. Once you get the solution to a problem, you should go back and practice it until you can do it easily without recourse to hints or notes. It does not help to practice with problems you can already do - you must pump neural iron on problems that are hard! It is through such struggles that you develop mathematical muscle.

Show your work. On all homework, quizzes and exams you must show all your work on each problem. This includes explaining what you are doing at each step, in words, where appropriate. No credit will be given for answers with no work shown - even if the answers are numerically correct. Partial credit will be given for work that is partially correct, even if the final answer is wrong. On the other hand, you will be penalized for incorrect or sloppy work, even if the final answer is correct.

Pass/Fail. If you are taking this class Pass/Fail, you need to have the equivalent of a C- to pass.

Incomplete. A grade of incomplete will only be given if you are doing passing work and some sort of extraordinary circumstance unrelated to the course prevents you from completing all of the course requirements. You will not receive an incomplete merely because you fall behind in the course.