

**MATH 254: Introduction to Linear Algebra**  
Fall 2008 - Section 1 (MWF 12-12:50pm, GMCS 214)

**Overview:**

Linear algebra is concerned with functions, equations, and transformations that are *linear*. This is a very special, simple case. By insisting on this restriction, very powerful tools can be developed that would not be available without it. These tools are of tremendous value in a variety of contexts in the physical and social sciences. The linear restriction is actually not that extreme, because nonlinear functions can sometimes be approximated by linear functions using calculus.

**Learning Objectives:**

Students will carefully state all definitions and theorems relevant to the course, including all conditions and exceptions (if any). A partial list of these definitions is available in Chapter 0.

Students will apply these definitions to objects and determine whether or not the definition applies. This will typically involve a calculation.

Students will have a ready supply of examples and non-examples to these definitions, and will be able to justify why these are examples or non-examples.

Students will learn how to determine the number of solutions (if any) to a system of linear equations. They will be able to find all solutions.

Students will master computational matrix algebra. This will include matrix addition, scalar multiplication, matrix multiplication, elementary row/column operations, diagonalization, transposition, finding inverses, finding determinants, change of basis, orthogonalization, finding eigenvalues/eigenvectors, and normal forms.

Students will visualize vector spaces geometrically. This will include dimension, inner products, orthogonality, norms, projections, rank, and nullity.

**Textbook:**

*Beginning Linear Algebra*, by Seymour Lipshutz, ISBN 0-07-038037-6

Students are expected to read the text; it is quite brief and easy to understand. It contains two types of exercises: solved problems, and supplementary problems. Students are expected to read (and work, if possible) all the solved problems carefully, and to work all the supplementary problems (brief answers follow). Homework will not be collected, and will generally not be discussed in class due to time constraints – please bring homework questions to office hours, or ask via email.

**Chapter 0:**

This supplement contains the most important definitions and ideas of the course. Students are strongly encouraged to know them thoroughly. The ideas will be expanded upon, and examples added, as the course continues.

*Every exam will contain some material explicitly from Chapter 0.*

**ID Code:**

Your code, listed above, is your unique identifier. Please memorize it, and sign everything you turn in with it. Among other benefits, it will allow you to access your course grade at any time on the instructor's website.

**Course Mechanics:**

We will cover one chapter each week, and take a brief (30 min.) chapter test on Mondays. The sole exception is Chapter 2, which will be split into two weeks. The first half is sections 2.1-2.4; the associated problems are 2.1-2.21, 2.70-2.78. The second half is sections 2.5-2.10; the associated problems are 2.22-2.69, 2.79-2.92. Test schedule:

Sep. 8	Chapter 0	Oct. 13	Chapter 4	Nov. 17	Chapter 9
Sep. 15	Chapter 1	Oct. 20	Chapter 5	Nov. 24	Holiday
Sep. 22	Chapter 2a	Oct. 27	Chapter 6	Dec. 1	Chapter 10
Sep. 29	Chapter 2b	Nov. 3	Chapter 7	Dec. 8	Chapter 11
Oct. 6	Chapter 3	Nov. 10	Chapter 8	Dec. 17	FINAL 10:30-12:30

**Attendance:**

Students are expected to attend every class. Makeup exams are not given under any circumstances; each student's lowest exam grade is dropped, to account for unexpected eventualities. Under extraordinary circumstances (e.g. hospitalization), a second exam grade might be dropped.

**Collaboration:**

Students are strongly encouraged to study together, and to work together to solve exercises. Exams must be taken without assistance, however.

**Grading:**

The 12 exams (after dropping one) will be worth 5% of the course grade each. Class participation will be worth 10% of the course grade, to be based on attendance (which will be checked at random). The final exam will be worth 30% of the course grade. Each submitted problem (and the exam as a whole) will be graded on a scale of 50%-100%: handing in a blank exam is worth 50 points, while missing the exam earns 0 points. The grading policy is as follows:  
A 92-100, B 82-87, C 72-77, D 62-67,  $\pm$  as obvious

**Extra Credit:**

Students are permitted to submit, no later than the start of class Wednesday, a corrected version of Monday's exam. Their revised grade will be the average of the two grades. Students are permitted to do this at most three times during the semester. No other forms of extra credit will be possible.

**Professor:**

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Office hours: Mon/Wed 11-11:50am, Tue/Thu 12:30-1:30pm, and by appt.