MATH 254: Introduction to Linear Algebra
Fall 2006 - Section 2 (TR 2-3:15pm, BA 340)

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 bad, 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.

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 (the solutions follow). Homework will not be collected, but any questions from the exercises can be asked (generally outside of class).

Chapter 0:
This supplement contains the most important definitions of the course. The ideas therein will be tested on every exam; students are strongly encouraged to know them thoroughly. The ideas will be expanded upon, and examples added, as the course continues.

Course Mechanics:
We will cover one chapter from the text each week, and take a brief (30 min.) chapter test on Tuesdays. 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. 5	Chapter 0	Oct. 10	Chapter 4	Nov. 14	Chapter 9
Sep. 12	Chapter 1	Oct. 17	Chapter 5	Nov. 21	Holiday
Sep. 19	Chapter 2a	Oct. 24	Chapter 6	Nov. 28	Chapter 10
Sep. 26	Chapter 2b	Oct. 31	Chapter 7	Dec. 5	Chapter 11
Oct. 3	Chapter 3	Nov. 7	Chapter 8	Dec. 12, 1-3pm	FINAL

Attendance:
Students are expected to attend every class. Makeup exams are not given; the lowest exam grade is dropped, to account for unexpected eventualities.

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

Grading:
The 12 exams will be 5% of the course grade each. Class participation will be 10% of the course grade. The final exam will be 30% of the course grade. 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, on Thursday, a corrected version of any one problem from Tuesday's exam. Their grade on this problem will be the average of the two grades. If multiple corrected problems are submitted, the most favorable one will count. No other forms of extra credit will be possible.

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