

Linear Algebra

MA 52, Spring 2006

Section 1

MWF 12:00–12:50pm (E hour)

B&H 157

Instructor: Alina Bucur

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Office hours: TBA

Text: Otto Bretscher, *Linear Algebra with Applications*, Pearson Prentice Hall, 3rd edition.

Course material on the web: <http://www.math.brown.edu/~alina/ma52>

Grading Breakdown: 10% Homework, 30% Midterm, 60% Final

I reserve the right to lower your grade by up to 5% if you habitually disrupt the learning of other students during lecture (i.e. talking, arriving late). That includes cell phone use!

Homework: Homework will be assigned in class on Fridays, and should be turned in the following Friday at the beginning of class. Your lowest homework grade will be dropped and be replaced by the grade for HW 0 (the questionnaire given the first week of class).

Do your homework as it is assigned, and not at the last minute. You are only done with a problem when you understand **why** the methods you used have worked. If all you are doing is blindly applying formulas and mimicking examples, get extra help. The assigned problems are those you hand in; you are expected to do additional problems on your own until you understand the material.

Submitting the homework: Please prepare your homework according to the following rules:

1. Write your name clearly at the top of every page.
2. Put the problems in order, indicating clearly what you have skipped.
3. **Staple** your homework. Paper clips, folded corners, etc. are not acceptable.
4. Turn in assignments on time. No late homework will be accepted.
5. Write clearly. If your homework is too messy, a grader may choose not to grade it.

Collaboration: You can talk each other about any of homework problems, but when you write up the problems to be handed in, *you must work alone*.

Quizzes: I do not plan to give regular quizzes, but I reserve the right to give a quiz (announced or unannounced) at any time.

Exams: The midterm exam is tentatively scheduled for **Wednesday, March 8th, 7-9 pm**. The final exam is scheduled by the registrar for **Thursday, May 18th, 2-5 pm**.

There are no excuses other than incapacitating illness or family emergency for missing an exam. In such cases you should contact the course coordinator to arrange an **oral** make-up exam. No calculators are allowed on exams.

Resources: If you don't understand something, there are plenty of ways to go: questions are welcome in class. For a longer conversation, I have regular office hours. It may be possible to make an appointment for another time if you need to; email me. The Math Resource Center, staffed by math grad students and offering help in all calculus courses, is open Monday through Thursday, 8:00–10:00pm. Information at <http://www.math.brown.edu/mrc/>. Or you can hire a private tutor by calling the Math Department at 863 2708. More suggestions are available at the course webpage.

Courseload: Come to every class. Work at a steady pace throughout the semester. I expect you to read the relevant portions of the textbook **before and after** the corresponding lecture. Also, **review your notes** after class. I expect you to work the problems gradually as the material is covered, not at the last minute. If you are confused about the material, do not avoid the issue. It's normal to be temporarily bewildered sometimes while learning mathematics. Seek help!

And remember: office hours are not replacements for missing classes.

List of topics to be covered (*tentative*):

Linear Equations: Solution of n equations in n unknowns, matrices. Gauss-Jordan elimination, row operations, elementary matrices.

Linear Transformations and Matrices: Linear Transformations: a geometric interpretation of matrices. Matrix multiplication. Inverse of a linear transformation, calculating the inverse of a matrix.

Vector Spaces (also called Linear Spaces): General definitions: vector space, subspace, isomorphism, linear independence, basis, dimension. Examples of vector spaces: column vectors, matrices, polynomials, functions. Kernel and image of a linear transformation. Rank of a matrix.

Geometry of Vector Spaces: Lengths (norms), dot products, angle between vectors. Orthogonality, orthogonal projections, least squares. Gram-Schmidt orthogonalization.

Determinants: Definition of Determinant and properties, geometric aspects. Formulas for calculating determinants.

Eigenvalues and Eigenvectors: Visualizing a linear transformation. Calculating eigenvalues and eigenvectors. Diagonalization, Jordan normal form. Applications: difference equations, differential equations, etc.

Additional Topics (as time allows): Inner products and bilinear forms. Symmetric, hermitian, unitary matrices. Quadratic forms.