

Mathematics 307 — Linear algebra and its applications

Fall Term 1995

Section 103

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Text: None required, although you may want to look at *Linear algebra and its applications* by Gilbert Strang, which is the text for other sections. I will make up and hand out lecture notes from time to time. Since there is no text, it is important that you ask questions in class whenever you don't understand something.

Examinations: There will probably be one mid-term examination as well as a final examination. If performance on the mid-term is poor, I will give another. I do not know dates yet. *Examination grades will be counted proportionally to the length of time allotted to the examinations.* You are expected to use calculators in examinations.

Assignments: Homeworks will be due roughly every 1-2 weeks. They will not generally be accepted late, because usually answers will be discussed in class. The homework assignments are important. They will count about 10% of the total term grade, and examinations will be largely based on questions already asked in assignments. I do not object to your working together, nor to your finding the solutions to problems in books. But I ask that you tell me on the assignment that you have done so. *Unacknowledged collaboration will mean loss of credit for all parties concerned.*

Grading this course is difficult. To make it simpler, I will carry out this policy: *Partial credit will not be given for calculations.* In other words, if I ask you to calculate something and your answer is not recognizably correct, you will get no credit for it at all. Zip. Zero. This may seem like a harsh policy at first, but in addition to making the life of the grader acceptable, it has the admirable virtue of forcing you to think about correctness and figure out ways to check results. *This is the way it is in real life, as opposed to Mathematics books.* Examination policy will be somewhat less strict, taking into account the added pressure you are working under.

Outline: The subject of the course is linear algebra and its applications. More specifically we will cover most of these topics:

- ◊ the geometry of linear transformations in two and three dimensions
- ◊ application: moments of inertia
- ◊ solving systems of linear equations
- ◊ application: electric circuits
- ◊ matrices and linear transformations in several dimensions
- ◊ coordinate systems in several dimensions
- ◊ dot-products, orthogonal projections, rotations
- ◊ application: the shape of loaded beams
- ◊ volumes and determinants
- ◊ similarity and eigenvalues of symmetric matrices
- ◊ the singular value decomposition
- ◊ generalized eigenvalues and vibrations of loaded beams

Some of this material will be a review of material from earlier courses.

Computers in this section: I hope to have you use the Mathematics Department undergraduate computer laboratory for some assignments in order to see practical methods of doing calculations with matrices. *This part of the course will be somewhat experimental.* The emphasis in this course is on theory rather than

practice, but much of the theory is closely connected with problems of calculation.

My idea at the moment is to have you use a kind of software calculator specifically tailored to deal with vectors and matrices. It will run on Mathematics Department computers, and you will also be able to get it on floppy disk or from the Internet to run it on PC's.

Computer use in this section will not be intensive, but if you strongly dislike working with computers you might find another section of this course more congenial.

Since you are not required to buy a textbook, you save about \$60.00. It seems therefore reasonable to ask for a 'laboratory and notes' fee of \$10.00. It will be payable at any time up to the end of next week.