MATH 700 **Fall, 2005**

Linear Algebra

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Text. Required: *Linear Algebra* by S. H. Friedberg, A. J. Insel, L. E. Spence, Prentice Hall, 4th ed., 2003.

Prerequisite. You should have already completed an undergraduate course in linear algebra or matrix theory, be familiar with Gauss-Jordan row reduction for solving systems of linear equations and finding matrix inverses, know how to compute determinants, and be familiar with the vector spaces $\mathbf{R}^2$ and $\mathbf{R}^3$.

Overview. You may find that this course is very different from the corresponding undergraduate course. We will be less concerned with the mechanical aspects of computation, and more concerned with why we want to do these calculations, and the theory that underlies them. We will not restrict ourselves to finite dimensional spaces, but where we can, we will consider the extent to which results hold true in the infinite dimensional case as well. We will carefully define terms, and prove almost all results, sometimes in class, and sometimes in the homework. To accomplish this, solutions must be communicated effectively, both in writing and orally, and you will get a lot of practice doing this.

Course content. We will follow the book rather closely, at least up until the last chapter, when a more general and sophisticated approach is perhaps preferable. Chapter 3 will be done quickly, and I suggest that you read the computational material as we begin the course. To ensure that we have sufficient time for chapter 7, we will omit chapter 6 and only come back to it if time permits (much of this material will be covered in MATH 706, for those going into applied mathematics; however, it is also crucial for functional analysis, and so it will be worth making an effort to at least touch on this chapter).

Grades. Two major tests will be given, each worth 100 points, on Wednesday, September 21 (day 9) and Wednesday, November 16 (day 25). There will be a few quizzes at the beginning on the prerequisite material; these are for your information only. There will be at most five short quizzes to be sure you are keeping up with the material (and attending class); I will count the best three. **No make-ups will be given for exams or quizzes**, but part of your score on your final will replace your lowest exam score. There will be a comprehensive final exam on Wednesday, December 7 at 5:30 pm., worth 150 points. **No exemptions will be granted**. Though comprehensive, it will emphasize the latter part of the course more heavily, as this is the part that is generally emphasized on the Admission to Candidacy (Qualifying) Exam. Homework will be collected regularly and selected problems will be graded. Each problem will be graded on the scale: 4 perfect; 3 minor error, gap, or "wandering around"; 2 significant progress, but major error or gap; 1 just a start in the right direction; 0 insufficient, wrong, or incoherent. Notice that a mathematically correct solution may not receive full credit if the writing is not "clean":

you should say everything that has to be said, but no more, and in the correct order. Some of you have had some of this material before and will be tempted to write "Obviously" or "Clearly", etc. Resist this temptation; in this class ALL significant theoretical details must be shown (it is not necessary to show arithmetic details). When in doubt, ask! A total of 500 points may be earned:

Exams	200	
Final	150	
Quizzes	30	(best three)
Homework	120	(scaled score)

Letter grades will be announced separately for each exam, for the final, and for the overall homework and quiz totals. They will generally fall close to the scale 85–100 A, 75–84 B, 65–74 C, 55–64 D, below 55 F, but will vary up or down. Note that the deadline to drop this course without a grade of WF is Thursday, September 29; you should have a pretty good idea before then how you are doing.

Collaboration. One of the goals of this course is to learn how to communicate mathematical ideas. You will be expected to work with one another on the homework! We will have an optional, informal, student run, problem session, on Fridays at 3:30 (concluding in time for the traditional Math department graduate student "Happy Hour") that I will attend as a sort of coach. However, you will have to take the exams individually, so don't get too dependent upon one another. You will find that many of the exams in the graduate program are not proctored. According to the USC Student Handbook code of student academic responsibility, "**the first law of academic life is intellectual honesty.**" I expect this of all of you. If you are ever in the least bit uncertain about the ground-rules, ask for clarification!

Attendance. Regular attendance is crucial for success in this course. Ten bonus points will be awarded for perfect attendance and 5 for only one absence. No excuses will be considered in this regard. This class has 29 meetings; university policy states that if more than 10% of the meetings are missed, whether excused or unexcused, then the instructor may impose a penalty. I intend that this be a very rich and varied class, and not all topics will be in the text. If you feel that a class is nothing more than a series of exams and some assignments to be turned in, with attendance optional, then this is not the class for you. If you miss 5 or more class sessions, I will lower your grade by half a grade point (from an A to a B+, or a C+ to a C, for example), and if you miss 7 or more classes, your grade will drop by a full grade point. If you do miss a class, you can find homework and a very brief synopsis on the class home page `http://www.math.sc.edu/~miller/700`. Be aware that I often take attendance silently: if you don't turn in a quiz, or I pass back a quiz or exam and you do not pick it up, I will assume you were not in class; so if you come in late you should always check to see if I have marked you absent.