Syllabus
Linear Methods
Math 107, section 1, CRN 18183
Fall 2007

Instructor:	Eric Gottlieb	**Meeting Place:**	216 Buckman
Office:	317 Ohlendorf	**Meeting Time:**	MWF 8:00-9:15
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Course description: Linear algebra is a powerful subject with applications to many problems that arise in human endeavors. We will study some methods that have been developed to address these problems and examine some of their theoretical foundations. The problems and examples we will consider come from subjects like business, economics, and politics. We will use Excel throughout the course.

We will begin with a brief review of (systems of) linear equations. Then, we will learn how to solve linear systems using Gauss-Jordan elimination. We will discuss matrix algebra with applications to input-output analysis and Markov processes. Input-output analysis is used to determine how interdependent producers should behave. Markov processes are used to predict long term values of interdependent quantities that vary probabilistically.

Next, we will talk about linear programming (LP) problems. An LP problem is one in which you seek to maximize some linear function, such as profit, subject to certain linear constraints, such as budgetary or workforce limitations. You will learn to solve LP problems geometrically, using the simplex method, and by computer.

Integer and 0-1 programming problems, which are closely related to LP problems, are too labor-intensive to solve by hand. We will learn how to solve them using Excel. We will touch briefly on the subject of computational complexity.

We will conclude with a look at game theory, the study of strategic interactions between competing interests. We will explore the connection between game theory and LP problems.

Material to be covered, in chronological order, includes Chapter 2 (systems of linear equations and Gauss-Jordan elimination), Chapter 3 (matrix algebra) except Section 3.4, Section 7.7 (Markov processes) together with some course notes on this subject, Chapter 4 (linear programming), and Section 3.4 together with some notes on the connections between linear programming and game theory. I will assume that you are familiar with the material covered in Chapters 0 and 1; it would be a good idea to review those chapters on your own.

In some cases, the methods I teach in class may be different from those in your text. I recommend learning both ways and using the one you like best.

Calculators are permitted on exams. I expect you to perform higher-order tasks (like computing inverses of matrices or solving systems of equations) on your own and to show your work, but you may use your calculator to check your answer.

Class participation: After explaining new material, I may have you work problems in class to help you solidify your understanding. At these times, you are encouraged to work quietly with

your nearby classmates. I will call on you to solve problems. Participation in these activities may be used in deciding borderline grades.

Homework and quizzes: Homework for each section we cover is given in the attached sheet. I expect you to do the homework, but I will not collect it. I will give around eleven short in-class quizzes, tentatively scheduled for 28 August; 4, 11, and 25 September; 2, 9, and 23 October; 6, 20, and 27 November; and 4 December. Advance notice will be given if dates change. The lowest quiz grade will be dropped, and there will be no makeup quizzes. There will usually be two problems on each quiz, and they will come from lecture or the reading or be similar to problems from the homework. For this reason and others, it is in your interest to read the book carefully, to do the homework, and to review your notes. I may give pop quizzes, especially if attendance is low on a given day.

Project: There will be one writing project concerning an application of LP. This problem will be more substantial than those that we consider in class and will require the use of Excel. The project is intended to help you to recognize LP problems in real-world settings, to familiarize you with a tool for solving them, and to develop your ability to communicate technical concepts in writing. I intend to distribute the project on 25 October and collect it on 1 November, but these dates may change (with notice) depending on our progress. Late submissions will be declined or reduced in score at my option.

Exams: There will be three in-class midterm exams and a comprehensive final exam, scheduled as shown below. The dates are firm but the material to be covered depends on our pace.

Exam	Date	Material to be covered
1	Tuesday18 September	Chapters 2 and 3 except 3.4
2	Thursday 11 October	Markov Processes
3	Thursday 8 November	Chapter 4
Final	Tuesday 11 December 1:00 PM – 3:30 PM	Comprehensive with added emphasis on material not covered on earlier exams

How I grade: The score you receive on a quiz, exam, or project is based on my assessment of your understanding, which is determined by the work you show. Therefore, simply producing the right answer does not guarantee a good score. Full credit will be granted when you show all of your work, when you get the right answer, and when I can read and understand what you have written. Your grade may also suffer if you include extraneous material, use poor grammar, or write so messily that I cannot follow your work.

If the Honor Council finds that a student has committed an Honor Code violation in my class, the student will receive no credit for that assignment. I reserve the right to fail anyone convicted of an honor code violation in my class.

Attendance is not a formal part of your grade. However, poor attendance often predicts poor performance, so I will take roll. I may use attendance to decide borderline grades. If you miss more than four classes without adequate justification, I may ask the Provost to drop you from the class. If attendance is low on a particular day, I may give a pop quiz. Pop quizzes contribute towards your quiz average in the same way that scheduled quizzes do.

Your final grade is determined as follows:

Midterm Exams:	18% each
Quiz average:	18%
Project:	8%
Final Exam:	20%

The letter equivalent of your number grade is determined as follows:

93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	<59
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

If you get stuck: Students are often reluctant to reveal confusion to their professors. I understand this sentiment, but I hope you won't take such an approach with me. As I see it, you wouldn't be in my class if you already knew the subject. I expect confusion from time to time; it is a natural, perhaps even necessary part of the learning process. I prefer to see you confused in my office, where I may be able to help, than to see you do poorly on an exam. Seeing you move from confusion to understanding is one of the most satisfying parts of my job.

The moral is, don't be shy! Office hours are best time to see me, but if these are inconvenient, you may stop by any time. I try to keep an open door policy, but I can't guarantee that I will be available outside of office hours. You can contact me by phone or email as well, but I find that the most effective and efficient way to work is face to face.

I encourage you to study with your fellow students. However, you should do so judiciously. For example, it would be a mistake to study another student's homework solutions and then go away feeling that you are prepared to work similar problems on your own. You must be able to work problems independently, as you will be required to do this on the exams.

Finally, I encourage you to work with the peer tutors assigned to this class in the Math Support Center (MSC). The MSC is located in the math library on the eastern end of the third floor of Ohlendorf. Once the peer tutors are chosen and their hours are established, I will make this information known to you. The peer tutors have taken linear methods and have achieved a high level of success, so are well equipped to advise you.

The Honor Code: I take the Rhodes Honor Code seriously, and it is diligently enforced in my classes. All graded work must comply with the Rhodes Honor Code. If the Honor Council finds that a student has committed an Honor Code violation in my class, the student will receive no credit for that assignment. I reserve the right to fail anyone convicted of an honor code violation by the Honor Council.