Oxford College of Emory University
Mathematics 221
Linear Algebra
Spring, 2001

Instructor: Dr. Robert E. Bailey (oxmaeb@emory.edu)
Ext - 4-8398

Office: Seney 116 A

Office Hours: 8:00 - 10:00 MWF, also by appointment.

Class Hours: 10:05 - 10:55 - MWF - Seney

Text: Linear Algebra and its Applications, 2nd edition by David C. Lay.

Materials: Programming Calculator (TI-82, 83, 85, 86 or TI-92) will be extremely helpful.

Course Objective: This course presents the main concepts and terminology of linear algebra that play an essential role in mathematics and in many technical areas of modern society, such as computer science, engineering, physics, environmental science, economics, statistics, business management and the social sciences.

Grading: Grades will be determined by student performance on four Problem Sets, two application projects, and a final exam:

4 Problem Sets	@ 125 points	500 points
2 Projects	@ 125 points	250 points
1 Final	@ 250 points	250 points
	Total	1000 points

In general,

A:	900 to 1000 points
B:	800 to 899 points
C:	700 to 799 points
D:	600 to 699 points
F:	Below 600 points

Note: **All Problem Sets will be given out in class - To receive a Set, one must be present in class.**

Dates of Interest:

Problem Set 1	Out: 2/2	Due: 2/9
Problem Set 2	Out: 2/28	Due: 3/9
Problem Set 3	Out: 3/30	Due: 4/6
Problem Set 4	Out: 4/20	Due: 4/27

Experiment 1 - Assigned - 2/12	Due - 2/19
Experiment 2 - Assigned - 4/9	Due - 4/16

Final Exam - May 4, 2000 - 9:00-12:00 - Seney

General Notes:

1) No late submission will be accepted without prior approval.

2) All Problem Sets are to be considered the work on the student. You may not consult with any other person in this class or anyone else with some mathematical and computational expertise about the Problem Set. (i.e. previous students of the course)

3) All materials must be neatly written or typed, and either stapled or kept together with a paper clip.

Date	Assignment
1/17	Section 1.1 Systems of Linear Equations Page 10 - 1, 5, 13, 17, 21, 23, 29, 31, 33-36.
1/19	Section 1.2 Row Reduction and Echelon Forms Page 25 - 1, 3, 5, 9, 15, 17, 19, 23, 24 29, 35, 36
1/22	Section 1.3 Vector Equations Page 36 - 1 - 25 odd, 28, and 29
1/24	Section 1.4 The Matrix Equation $\mathbf{Ax} = \mathbf{b}$ Page 46 - 1 - 29 Odd, 30, 39-44
1/26	Section 1.5 Solution Sets of Linear Systems Page 55 - 1 - 21 Odd, 22, 39.
1/29	Section 1.6 Linear Independence Page 64 - 1 - 25 Odd, 28, 37-40.
1/31	Section 1.7 Introduction to Linear Transformations Page 73 - 1-23 Odd, 24. Section 1.9 Linear Models Page 92 - 1 - 11 odd, 12.
2/2	Problem Set One Assigned Sections - 1.1 - 1.7, 1.9 Review of homework Problems
2/5	Section 1.8 the Matrix of a Linear Transformation Page 83 - 1 - 23 Odd, 24, 25 - 36.
2/7	Section 2.1 Matrix Operations Page 107 - 1 - 25 Odd
2/9	Section 2.2 the Inverse of a Matrix Page 117 - 1 - 23 Odd, 29 - 36 The Return of Problem Set One
2/12	Section 2.3 Characterizations of Invertible Matrices Page 123 - 1 - 24 Odd Project 1 - Assigned

2/14	Section 2.4 Partitioned Matrices Page 130 - 1 - 17 Odd
2/16	Section 2.7 the Leontief Input-Output Model Page 153 - 1 - 13 Odd
2/19	Section 2.8 Applications to Computer Graphics Page 163 - 1 - 17 Odd Return of Project 1
2/21	Section 3.1 Introduction to Determinants Page 185 - 1 - 39 odd, 40.
2/23	Section 3.2 Properties of Determinants Page 193 - 1 - 27 odd, 28
2/26	Section 3.3 Cramer's Rule, Volume, and Linear Transformations Page 204 - 1 - 29 Odd.
2/28	Review of homework Problems Sections 1.8, 2.1 - 2.4, 2.7, 2.8, 3.1 - 3.3 Problem Set Two - Assigned
3/2	Section 2.3 Characteristics of Invertible Matrices (Part 2) Page 124 - 33 - 40.
3/5	Section 4.1 Vector Spaces and Subspaces Page 217 - 1 - 23 Odd, 24, 26 - 28.
3/7	Section 4.2 Null Spaces, Column Spaces, and Linear Transformations Page 228 - 1 - 25 Odds, 26, 29, 33, 37-40.
3/9	The Return of Problem Set Two

Mid-Semester Break --- March 12 to 16

3/19	Section 4.3 Linearly Independent Sets; Bases Page 237 - 1 - 21 Odd, 22, 23, 24.
3/21	Section 4.4 Coordinate Systems Page 248 - 1 - 15 Odd, 16, 27 - 33 Odd.
3/23	Section 4.5 the Dimension of a Vector Space Page 255 - 1 - 19 Odd, 20, 29
3/26	Section 4.6 Rank Page 263 - 1 - 17 odd, 18.
3/28	Section 4.7 Changes in Basis Page 270 - 1 - 15 Odd, (17, 18 - Optional)
3/30	Section 4.9 Applications to Markov Chains Page 290 - 1 - 17 odd, 21. Problem Set Three - Assigned Sections 2.3, 4.1 - 4.7, 4.9
4/2	Section 5.1 Eigenvectors and Eigenvalues Page 302 - 1 - 21 Odd, 22, 35-38.
4/4	Section 5.2 the Characteristic Equation Page 311 - 1 - 21 Odd, 22, 25, 27, 30
4/6	Section 5.3 Diagonalization Page 319 - 1 - 21 Odd, 22, 31 - 34 Return of Problem Set Three
4/9	Section 5.4 Eigenvectors and Linear Transformations Page 327 - 1 - 21 Odd, 30 - 32. Project 2 - Assigned
4/11	Section 5.6 Discrete Dynamical Systems Page 346 - 1 - 17 Odd.
4/13	Section 6.1 Inner Products, Length, and Orthogonality Page 376 - 1 - 19 Odd, 20, 29.
4/16	Section 6.2 Orthogonal Sets Page 386 - 1- 23 Odd, 24, and 29. The Return of Project 2

4/18	Section 6.3 Orthogonal Projections Page 395 - 1 - 21 odd, 22.
4/20	Section 6.4 the Gram-Schmidt Process Page 402 - 1 - 17 odd, 18 Problem Set Four -- Assigned Sections 5.1 - 5.4, 5.6, 6.1 - 6.4
4/23	Section 6.5 Least-Squares Problems Page 411 - 1 - 17 odd, 18.
4/25	Section 6.6 Applications to Linear Models Page 420 - 1 - 13 Odd.
4/27	Section 7.1 Diagonalization of Symmetric Matrices Page 448 - 1 - 25 Odds, 26, 37, 39. Section 7.2 Quadratic Forms Page 457 - 1 - 21 odd, 22. Return of Problem Set Four
4/30	Section 7.4 the Singular Value Decomposition Page 475 - 1 - 17 Odd.

5/4 **Final Exam -- Seney 209 -- 9:00 - 12:00**
Sections - 1.1-1.9, 2.1-2.4, 2.7, 2.8, 3.1-3.3, 4.1-4.7, 4.9, 5.1-5.4, 5.6, 6.1-6.6, 7.1, 7.2, 7.4.