

**640:250 Introduction to Linear Algebra, Fall 2009**  
TF2 10:20A-11:40 SEC-203 BUS

**Lecturer:** Chris Woodward, Prof in Mathematics

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**Text:** Spence, Insel & Friedberg *Elementary Linear Algebra: A Matrix Approach*, Second Edition. ISBN # 978-0-13-187141-0, Prentice-Hall, Upper Saddle River, NJ 07458.

**Course Web Page:** <http://www.math.rutgers.edu/courses/250>).

**Exams, Homework, and Grades:** There will be two midterm exams and a final exam (all exams will be closed book), in addition to weekly quizzes or problem sets. Your final course grade will be determined on the following 500-point basis:

each midterm exam: 100 points

quizzes/problem sets: 100 points

final exam: 200 points

**Attendance** is required, with the usual exceptions for illness etc., in which case you should let me know by e-mail. I will semi-regularly take attendance. If you will miss an exam because of illness, you must me know before hand by e-mail and bring medical documentation on return.

**Academic Honesty:** The work you submit should be your own; do not copy other students assignments and exams, or allow your assignments/exams to be copied by others. If have/have not taken the exam, do not discuss the exam with someone who has not/has taken it, even if it is a different version. For example, do not discuss the exam with students from the other section. Note that Rutgers policy on academic integrity has recently been revised, see <http://ctaar.rutgers.edu/integrity/policy.html#Integrity>, and the sanctions are now more serious. Formula sheets and calculators are not allowed in exams.

### Syllabus

Lecture	Reading	Topics
9/1	1.1, 1.2	Matrices, Vectors, and Linear Combinations
9/4	1.3	Systems of Linear Equations
9/11	1.4	Gaussian Elimination
9/15	1.6	Span of a Set of Vectors
9/18	1.7	Linear Dependence and Linear Independence
9/22	1.7, 2.1	Homogeneous Systems, Matrix Multiplication
9/25	2.1	Matrix Algebra
9/29	2.3	Invertibility and Elementary Matrices
	App. E	Uniqueness of Reduced Row Echelon Form
10/2	2.4	Inverse of a Matrix
	2.5	Partitioned Matrices and Block Multiplication
10/6	2.6	<i>LU</i> Decomposition of a Matrix
10/9	3.1	Determinants; Cofactor Expansions
10/13	<b>Midterm Exam #1</b>	
10/16	3.2	Properties of Determinants
10/20	4.1	Subspaces
10/23	4.2	Basis and Dimension
10/27	4.3	Column Space and Null Space of a Matrix
10/30	5.1	Eigenvalues and Eigenvectors

11/3	5.2	Characteristic Polynomial
11/6	5.3	Diagonalization of a Matrix
11/10	5.5	Examples of Diagonalization; Complex Eigenvalues
11/13	6.1	Geometry of Vectors; Projection onto a Line
11/17	<b>Midterm Exam # 2</b>	
11/20	6.2	Orthogonal Sets of Vectors; Gram-Schmidt Process; $QR$ factorization
11/24	6.3	Orthogonal Projection; Orthogonal Complements
12/1	6.4	Least Squares; Normal Equations
12/4	6.5, 6.6	Orthogonal Matrices; Diagonalization of Symmetric Matrices
12/8	6.6	Diagonalization of Quadratic Forms Spectral Decomposition for Symmetric Matrices
12/11	Catch up and review	

12pm Dec 22 8am **Final Exam**

**Second Edition Homework Problems (TF = true-false questions)**

- 1.1 : 1, 3, 5, 9, 17, 19, 23, 25, **TF** : **37** – **56**, 71, 75, 79, 81, 82
- 1.2 : 1, 3, 9, 15, 17, 19, 29, 31, 35, 37, 39, **TF** : **45** – **63**, 67, 68, 75, 76, 77, 78
- 1.3 : 1, 3, 7, 9, 11, 23, 25, 39, 41, 43, 45, 47, 49, 51, 53, 55, **TF** : **57** – **76**, 81
- 1.4 : 1, 3, 5, 7, 11, 13, 17, 19, 23, 27, 35, 37, 43, **TF** : **53** – **72**, 74 – 78, 81 – 84, 87 – 91
- 1.6 : 1, 3, 17, 19, 21, 23, 25, 27, 29, 31, 33, 39, 43, **TF** : **45** – **64**, 70, 72
- 1.7 : 1, 5, 13, 15, 23, 25, 29, 33, 39, 41, 51, 53, 57, **TF** : **63** – **82**, 87, 89
- 2.1 : 5, 7, 9, 11, 13, 15, 17, 19, 22, 23, 25, 27, 29, 31, **TF** : **33** – **50**
- 2.3 : 1, 3, 9, 11, 13, 17, 19, 23, 25, 29, 31, **TF** : **33** – **52**, 54, 59, 61, 67, 69, 71, 83
- 2.4 : 1, 3, 7, 9, 19, 27, 29, **TF** : **35** – **54**, 64
- 2.5 : 1, 3, 9
- 2.6 : 1, 3, 5, 9, 11, 13, **TF** : **33** – **41**, 42, 43, 44, 45, 46
- 3.1 : 1, 3, 9, 11, 13, 14, 15, 21, 23, 27, 29, 31, 37, 43, **TF** : **45** – **63**
- 3.2 : 5, 6, 7, 8, 11, 13, 17, 21, 27, 33, **TF** : **39** – **58**, 59, 63, 67, 69 – 75
- 4.1 : 1, 3, 5, 9, 11, 13, 19, 21, 27, 29, 33, **TF** : **43** – **51**, **57** – **62**, : 67, 69, 72, 73, 74, 78, 81, 83, 85, 89, 93
- 4.2 : 1, 3, 5, 7, 17, 19, 21, 25, 27, **TF** : **33** – **50**, 53, 54, 59, 63, 65
- 4.3 : 1, 3, 5, 7, 9, 11, 15, 17, 19, 25, 27, **TF** : **41** – **57**, **59** – **60**, 63, 65, 69, 73 – 78, 83
- 5.1 : 1, 3, 7, 9, 13, 17, 23, **TF** : **41** – **46**, **55** – **60**, : 63, 64, 66, 67, 68, 69, 72, 73, 74
- 5.2 : 1, 5, 9, 11, 13, 15, 17, 19, 21, 41, **TF** : **53** – **72**, 77, 79, 81, 85, 86
- 5.3 : 1, 3, 5, 7, 11, 15, 17, 19, **TF** : **29** – **48**, : 49, 51, 55, 57, 61, 63, 65, 73, 77, 78, 81, 82, 83, 85
- 6.1 : 3, 5, 7, 9, 11, 13, 15, 17, 25, 29, 33, 37, 43, 49, 51, 53, **TF** : **61** – **80**, 95, 97, 98
- 6.2 : 1, 3, 7, 9, 13, 17, 21, 25, 29, 33, 37, **TF** : **41** – **52**, 55
- 6.3 : 1, 5, 9, 11, 17, 19, 21, **TF** : **33** – **56**, 59, 61, 67, 69, 71, 73, 75
- 6.4 : 1, 5, 17, 21, **TF** : **28** – **32**
- 6.5 : 3, 7, 9, 11, **TF** : **17**, **21** – **29**
- 6.6 : 3, 5, 13, 15, 17, 19, **TF** : **21** – **40**