

Math 220: Matrices
Syllabus - Sections 5 and 9

Fall 2004

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Office Hours: W 4:00 - 5:00pm, and by appointment.

Course Description: Systems of linear equations, matrix algebra, determinants, eigenvalues and eigenvectors.

Prerequisite: Math 110 or 140.

Textbook: *Linear Algebra and its Applications*, third edition, by David Lay, published by Addison Wesley Longman.

Calculators are **not allowed on exams**.

Midterm: An evening examination will be held on Tuesday, October 19, 2004 from 6:30 to 7:45 PM.

Final Exam: A comprehensive final examination, covering all the content of the course, will be given. The final exam period will begin on Monday, December 13, and will end on Friday, December 17. **Students should not make plans to leave University Park before Saturday, December 18, 2004.** Students must bring their student identification cards to all examinations.

Conflict and Makeup Exams: Only students with official University conflicts, or a valid, documented excuse, will be permitted to schedule conflict or late makeup examinations with no penalty. Students who miss exams (without a documented excuse) may take a makeup, but will receive a mandatory 20-point deduction on their score. Students must sign up for conflict or makeup exam at least 48 hours in advance of the exam date.

Grading Policy: Grades will be assigned on the basis of 350 points distributed as follows:

100 points for homework and quizzes

100 points for the midterm examination

150 points for the final examination

Quizzes: Approximately twice a month, there will be a short in-class quiz. The lowest quiz grade will be dropped.

Homework: Homework assignments will be collected in class every Thursday. *No late homework will be accepted.* Correct answers without supported work will not receive credit. The two lowest homework grades will be dropped.

Academic Integrity: All Penn State and Eberly College of Science policies regarding academic integrity apply to this course.

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic sanctions range from a warning to removal from the academic program, and include deductions of points or alterations in grades.

See <http://www.science.psu.edu/academic/Integrity/index.html> for details.

Course outline:

(The number after each section is the approximate number of class periods).

LINEAR EQUATIONS IN LINEAR ALGEBRA

- 1.1 Systems of Linear Equations (1)
- 1.2 Row Reduction and Echelon Forms (1.5)
- 1.3 Vector Equations (1.5)
- 1.4 The Matrix Equation $Ax = b$ (1)
- 1.5 Solution Sets of Linear Systems (1)
- 1.7 Linear independence (1)
- 1.8 Introduction to Linear Transformations (1)
- 1.9 The Matrix of a Linear Transformation (1)

MATRIX ALGEBRA

- 2.1 Matrix Operations (1)
- 2.2 The Inverse of a Matrix (1)
- 2.3 Characterizations of Invertible Matrices (1)
- 2.8 Linear Subspaces (1.5)
- 2.9 Dimension and Rank (1.5)

DETERMINANTS

- 3.1 Introduction to Determinants (1)
- 3.2 Properties of Determinants (1)

EIGENPROBLEMS

- 5.1 Eigenvalues and Eigenvectors (2)
- 5.2 The Characteristic Equation (1)
- 5.3 Diagonalization (1)
- 5.4 Eigenvectors and Linear Transformations (1)

ORTHOGONALITY AND LEAST-SQUARES

- 6.1 Inner Product, Length, and Orthogonality (1)
- 6.2 Orthogonal Sets (1)
- 6.3 Orthogonal Projections (1)
- 6.4 The Gram-Schmidt Process (no QR Factorization) (1)

SYMMETRIC MATRICES

- 7.1 Diagonalization of Symmetric matrices (Spectral Theorem) (1)