

Math 0280 - Introduction to Matrices and Linear Algebra

Student Guidelines and Syllabus

Course Objectives: Students who complete Math 0280 are expected to have mastered the fundamental ideas of linear algebra and to be able to apply these ideas to a variety of practical problems. More specifically, in Math 0280 you will be expected to:

- explore and learn the core concepts, which include systems of linear equations, matrices, vectors, determinants, linear transformations, orthogonality, and eigenvalues/eigenvectors;
- begin to think abstractly about certain of these topics; and
- understand how these ideas can be used to solve problems and compute things.

Textbook: *Linear Algebra, a Modern Introduction, Third Edition.* By David Poole.

Prerequisite: Math 0220 or equivalent, with a grade of C or better.

Homework/quizzes/written assignments: Each week you will be assigned a selection of problems to write up and hand in, chosen from the practice problems listed at bottom. Some will be graded and all returned. At the instructor's discretion there may be quizzes or written assignments.

Grades: Your course grade will be determined as follows:

- Homework/quizzes/written assignments, 20%.
- Two midterm exams, 40%. (20% each)
- Final exam, 40%.

Some sections may deviate slightly from this formula. Your instructor will describe any variation at the beginning of the term.

Calculators: Calculators are NOT allowed on quizzes, midterms, or the final exam.

Final Exam: All sections will take a departmental final exam at a time and place to be scheduled by the registrar. You MUST attend the final exam.

Final Grade Policy: Your course grade will not exceed your final exam grade by more than one letter.

Exam Dates: See the class schedule for the dates of the two midterm exams and the final. The room of the final exam will be announced by your instructor.

Tutoring: Walk-in tutoring is available in the Math Assistance Center (MAC), in Room 215 of the O'Hara Student Center. See <http://www.mathematics.pitt.edu/resources/mac-center.php>

Office Hours: Your instructor will announce office hours.

Disability Resource Services: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability

Resources and Services, 140 William Pitt Union, as early as possible in the term. For more information see <http://www.studentaffairs.pitt.edu/drsabout>

Academic Integrity: Cheating will not be tolerated. A student suspected of violating the University of Pittsburgh Policy on Academic Integrity will incur a minimum sanction of a zero score for the assignment, quiz, or exam in question. Additional sanctions may be imposed, depending on the severity of the infraction. On homework, you may work with other students or use library resources, but each student must write up solutions independently. Copying solutions from other students will be considered cheating and handled accordingly.

Class Schedule

Week 1 (1/7) Section 1.1. The geometry and algebra of vectors.

Section 1.2. Length and angle. The dot product.

Week 2 (1/14) Section 1.2, continued.

Section 1.3. Lines and planes.

Section 2.1. Introduction to systems of linear equations.

Week 3 (1/21) Section 2.2. Direct methods for solving linear equations.

Week 4 (1/28) Section 2.3. Spanning sets and linear independence.

Chapters 1 and 2 review. Applications.

Week 5 (2/4) Section 3.1. Matrix operations.

Section 3.2. Matrix algebra.

Week 6 (2/11) Section 3.3. The inverse of a matrix.

Review.

Week 7 (2/18) Review and midterm I.

Section 3.5. Subspaces, basis, dimension and rank.

Week 8 (2/25) Section 3.5, continued.

Section 3.6. Introduction to linear transformations.

Week 9 (3/4) Section 3.6, continued.

Chapter 3 review. Applications.

Spring Break (3/11)

Week 10 (3/18) Section 4.1. Introduction to eigenvalues and eigenvectors.

Section 4.2. Determinants.

Week 11 (3/25) Review and midterm II.

Section 4.3. Eigenvalues and eigenvectors of $n \times n$ matrices.

Week 12 (4/1) Section 4.4. Similarity and diagonalization.

Section 5.1. Orthogonality.

Week 13 (4/8) Section 5.1, continued.

Section 5.2. Orthogonal complements and orthogonal projections.

Section 5.3. The Gram-Schmidt process.

Week 14 (4/15) Section 5.4. Orthogonal diagonalization of symmetric matrices.

Review

Final Date, time and location TBA

Practice Problems

These cover the material that you will be responsible for knowing. Homework assignments will be drawn from them, and exam questions may be modeled on some.

Section 1.1: 1–28

Section 1.2: 1–52, 61–67

Section 1.3: 1–15, 18–24

Section 2.1: 1–38

Section 2.2: 1–18, 23–46

Section 2.3: 1–42

Section 3.1: 1–22

Section 3.2: 1–28

Section 3.3: 1–40, 47–59

Section 3.5: 1–48

Section 3.6: 1–45

Section 4.1: 1–18

Section 4.2: 1–52, 57–65

Section 4.3: 1–18

Section 4.4: 1–45

Section 5.1: 1–21

Section 5.2: 1–22

Section 5.3: 1–14

Section 5.4: 1–24