

Math 310 Applied Linear Algebra

CRN: 37842

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Office Hours: MWF 11am-12pm

Class Meeting: MWF 2:00-2:50pm

Location: 140 BSB

COURSE DESCRIPTION

Matrices, Gaussian elimination, vector spaces, LU-decomposition, orthogonality, Gram-Schmidt process, determinants, inner products, eigenvalue problems, diagonalization of symmetric matrices, applications to differential equations and Markov processes.

Credit is not given in both Mathematics 310 and 320.

TEXTBOOK

David C. Lay, Steven R. Lay, Judy J. McDonald, Linear Algebra and its Applications, Addison-Wesley 5th edition.

PREREQUISITE: Grade of C or better in Math 210.

HOMEWORK

Homework will be assigned after each lecture, and will be post on course website, or blackboard. Homework is not collected.

QUIZZES

There will be weekly 20-25 minutes quizzes on Friday. Quizzes will start from week 2, and will cover the material of 3-4 classes before the date of the quiz. See the online course schedule for the detailed information. There are no makeups for missed quizzes, but two lowest or missing grades for quizzes will be dropped from the final grade. There is no quiz on Midterm weeks. Totally 12 quizzes in the whole semester, best 10 will be calculated for final letter grade.

HOW TO PREPARE FOR QUIZZES

Quizzes will contains exercises similar to the homework assignments of the relevant sections. Thus, although the homework won't be collected, you are still very much advised to complete the homework before the quiz.

GRADES

Quizzes: 20%; Midterm 1: 20%; Midterm 2: 20%; Final: 40%.

Letter Grades will be determined by totally 90% A, 80% B, 70% C, 60% D.

CALCULATORS

The use of any electronic devices with computing capabilities is prohibited during exams and quizzes.

EXAM DATES

The midterms will take place on Friday, February 17th (week 6) and Friday, April 7th (week 12), during the lecture. The final two-hour exam will be determined later.

DISABILITY POLICY

Students with disabilities who require accommodations for access and participation in this course must be registered with the Office of Disability Services (ODS).

TENTATIVE SCHEDULE

- Week 1. § 1.1 Linear Systems
§ 1.2 Row Reduction and Echelon Forms
§ 1.3 Vector Equation
- Week 2. Martin Luther King Day
§ 1.4 The Matrix Equation $Ax=b$
§ 1.5 Solution Sets of Linear Systems
- Week 3. § 1.5 Solution Sets of Linear Systems
§ 1.6 Applications of Linear Systems
§ 1.7 Linear Independence
- Week 4. § 1.8 Linear Transformations
§ 1.9 Matrix of a Linear Transformation
§ 2.1 Matrix operations
- Week 5. § 2.2 Inverse of a Matrix
§ 2.3 Characterization of Invertible Matrices
§ 2.5 Matrix Factorization
- Week 6. § 3.1 Introduction to Determinants
Review and Exam 1
- Week 7. § 3.2 Properties of Determinants
§ 3.3 Cramer's Rule, Volume and Linear Transformations
- Week 8. § 3.3 Cramer's Rule, Volume and Linear Transformations
§ 4.1 Vector spaces and subspaces
§ 4.2 Null Spaces, Column Spaces, and Linear Transformations
- Week 9. § 4.3 Linearly independent sets; Bases
§ 4.4 Coordinate System
§ 4.5 The Dimension of a Vector Space
§ 4.6 Rank
- Week 10. § 4.7 Change of basis
§ 5.1 Eigenvectors and Eigenvalue
§ 5.2 The Characteristic Equation
- Week 11. § 5.3 Diagonalization
§ 5.4 Eigenvectors and Linear Transformations
§ 5.5 Complex Eigenvalues
- Week 12. § 5.6 Applications to Discrete Dynamical Systems
Review and Exam 2
- Week 13. § 6.1 Inner product, length and orthogonality
§ 6.2 Orthogonal Sets
§ 6.3 Orthogonal Projections
- Week 14. § 6.4 The Gram-Schmidt Process
§ 6.5 Least-Squares Problems
§ 6.6 Applications to Linear Models
- Week 15. § 6.7 Inner Product Spaces
Review for the final exam