Instructor:

Assist. Prof. Dr. Alper SISMAN
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Couse schedule: Thursday 9-12 (MB244)/ Friday 9-12 (MB244). Office Hours: Thursday 14-16

Course Overview

This course covers

- Basic mathematical techniques
- Analyzing methods of n-dimensional engineering problems
- Matrix theory and linear algebra, emphasizing topics useful in other disciplines (especially in electrical engineering).
- Introductory basic linear system theory concepts

Course Goals

After successfully completing the course, you will have a good understanding of the following topics and their applications:

- Systems of linear equations
- Row reduction and echelon forms
- Matrix operations, including inverses
- Block matrices
- Linear dependence and independence
- Subspaces and bases and dimensions

Orthogonal bases and orthogonal projections

- Gram-Schmidt process, vector orthogonalization
- Function spaces, orthogonal functions, basics of fourier transform, function orthogonalization
- Linear models and least-squares problems
- Determinants and their properties
- Cramer's Rule
- Diagonalization of a matrix
- Eigenvalues and eigenvectors
- Linear transformations

Textbook

Strang, Gilbert. Introduction to Linear Algebra. 4th ed. Wellesley, MA: Wellesley-Cambridge Press, February 2009. ISBN: 9780980232714.

Teaching Methods

Theoretical lectures, problem sessions.

Evaluation Tools

Final Exam 40%
Midterm Exam 40%
Pop Quizzes %20
Exam Rules: All exams and quizzes are open book and notes. All students must show their own efforts, cheating is strictly forbidden. All the answers must be clearly explained, clear explanation of the answer is the responsibility of the student. The instructor will help to solve the questions in QUIZZES ONLY. In QUIZZES ONLY, students can ask reasonable questions to the instructor.

Weekly Plan

1	Vectors&vector ops., vector representation in lin. alg, the relation of vectors and linear equations. The geometrical examination of linear equations
2	Solving the Ax=b equation, Gauss jordan rule, echelon form and pivots. Elimination with matrices, elimination matrices and permutation matrices.
3	Matrix multiplication, inverses, singular and non singular cases and relation between inverse matrices and linear equations.
4	Factorization using gauss elimination and LU factorization. Vector spaces, subspaces and fundamental subspaces
5	Solving Ax=b for different types of A matrix and examination of echelon form. Free variables, particular and special solutions.
6	Linear indépendance, spanning a space, basis for a vector space, four fundamental subspaces and their rank, basis and dimension relations.
7	Vector spaces formed by matrices and their rank, basis and dimension relations. Graphs and application to electrical circuits, kirshoffs law
8	Midterm
9	Orthogonality, othogonal vectors, subspaces and basis. Projections and least squares method.
10	Gram-Schmidt Orthogonalization process for vectors, normalization, QR factorization, orthonormal vectors and functions,
11	Determinant operation and its properties. Cramers rule, volume and area calculations.
12	Eigen values and eigen vectors, introduction, properties of eig. Values, diagonalization, effects of diagonalizable and non-diagonalizable matrices
13	Power series, stability, discrete dif. Equations and their solutions using eig. value and eig. vectors. Continious dif. equations,
14	Linear transformations.
15	Final sınavı