Engineering Linear Algebra (공학선형대수학)

IE-15570–066, Spring 2022

Mon/Wed 10:30–11:45

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Textbook 공학 선형대수학 (저자: 김상일, 김준교, 김현민, 윤지훈, 이동희, 이창익, 정일효, 천정수, 허찬, 히라사카). (주)교문사. (2021). ISBN13: 9788936322212

Web Page https://AppliedStat.GitHub.io/teaching

Software *R Language* (http://www.r-project.org).

Prerequisite The expectation is that you have already been exposed to the basic high-school-level algebra.

Description and Learning Objectives

– Engineering Linear Algebra will focus on basic concepts and theories of linear algebra with engineering applications.

– Basic topics covered in this class include basic vector and matrix representations, determinant, solution of a system of linear equations, independence/dependence concepts, vector space/subspace, etc.

– In addition, we will also study various applied topics such as linear transformation, eigen-value/eigen-vector, diagonalization, inner product space, Gram-Schmidt orthogonalization, least squares problems, etc.

– The popular R statistical language will be handled in this class.

Upon successful completion of this course, a student will be able to:

- Understand basic concepts on vector and matrix representation.
- Solve a system of linear equations using the linear algebra.
- Diagonalize a matrix.
- Decompose a matrix with a diagonal matrix and eigen-vectors.
- Incorporate the linear algebra technique into various engineering problems.

Grading The final grade will be curved and calculated as follows.

Homework:	5%
Attendance:	5%
Midterms:	45%
Final:	45%

Rough Grading Guide:

- A+: 95 ∼ 100 A: 90 ∼ 95-
- B+: 85 ∼ 90- B: 80 ∼ 85-
- C+: 70 ∼ 80- C: 60 ∼ 70-
- D+: 50 ∼ 60- D: 40 ∼ 50-
- F : below 40.

Exams

Midterm: T.B.A. In class
Final: T.B.A. In class

- All the exams are in-class and closed-book. (시험은 강의실에서 실시하며 시험중에 교과서는 볼 수 없습니다.)
- The final exam will be comprehensive.
- During the exams, a basic calculator will be permitted but cannot be shared with others.
- Calculators in smart phones, tablet PC and laptops are **not** allowed.
- No early or late exams will be allowed without a written and legitimate excuse.

Homework

- The students can collaborate on their homework problems, but they should submit their homeworks separately.
- Late homeworks will **not** be accepted.
- Up to 1 ∼ 3 problems, selected at random, will be graded in detail, on a scale of 0–5 each.
- To get full credit, you must show all work on the homework problems, which must be submitted in the same order as they are assigned.

Tentative Schedules

1 Matrix and a system of linear equations.
2 Gauss elimination and inverse matrix.
3 LU decomposition.
4 Basics on Determinants.
5 Applications of Determinants.
6 Basics on Vectors and vector space.
7 Subspace, basis, and dimension.
8 Row space and column space.
9 Linear transformation.
10 Matrix representation of linear transformation.
11 Eigen-value/eigen-vector, diagonalization.
12 Inner product space.
13 Normed space.
14 Orthogonal set and Gram-Schmidt orthogonalization.
15 Least squares problems, etc.
16 Final Exam.