
Engineering Linear Algebra

IE-15570, SPRING 2020

Engineering Building TBA, Mon/Wed 15:00–16:15

Instructor	Chanseok Park (e-mail: CP<AT>PUSAN<DOT>AC<DOT>KR) OFFICE: Engineering Building 207–10527 OFFICE HOURS: 10:30–11:30am (M/W); 16:30–17:30pm (M/W); or by appointment. (No afternoon office hours on the first Monday of each month).
Textbook	공학 선형대수학 (저자: 김상일, 김준교, 김현민, 윤지훈, 이동희, 이창익, 정일효, 천정수, 허찬, 히라사카). (주)교문사(청문각). 제1판 1쇄 (2019). ISBN 978-89-363-1832-1
Web Page	https://AppliedStat.GitHub.io/teaching
Software	<i>R Language</i> (http://www.r-project.org).
Prerequisite	The expectation is that you have already been exposed to the basic high-school-level algebra.
Policy	<ul style="list-style-type: none">• Attendance Policy: Class attendance is mandatory. If you miss a class for some reason, it is your responsibility to get notes, <u>etc.</u> from someone in class. I will not repeat lectures during my office hours.• Tardy Professor Policy: If the instructor has not arrived within 15 minutes of the scheduled class time, you may assume that class has been canceled.• All drop/add procedures are your responsibility.

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

For the regular face-to-face class, the final grade will be curved and calculated as follows. For the online class, we did not decide the rule yet.

HOMEWORK:	5%
ATTENDANCE:	5% (will be checked at random and count 3 points)
MIDTERMS 1, 2:	60% (30+30)
FINAL:	30%

- The lowest one of your mid-term exam grades can be replaced by the final exam if the final grade is better. For the in-class exam, the lowest one of your mid-term exam grades can be replaced by the final exam if the final grade is better. Because of serious COVID-19 pandemic, the above policy can be changed without further notice.

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 1: T.B.A. In class
 MIDTERM 2: T.B.A. In class
 FINAL: T.B.A.

- All in-class the exams will be closed-book. (Other instructions will be provided for the online exam.)
- For the final exam, you are allowed to bring in *one* A4-size formula sheet made up by yourself. But, the formula sheet should be submitted after the exam.
- 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 prohibited.
- 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 handed in 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.