Linear Algebra

1. Course Description

This course covers matrix theory and linear algebra, which are a branch of mathematics and are useful in natural science and engineering. The items are as follows: Matrix, linear transformation, inverse matrix, determinant, inverse matrix and simultaneous linear equations, diagonalization and Eigen values of matrix, and linear independency of vectors. The classes consist of lectures and exercises. This subject is related to the clause 1 of the diploma policy of the Department of Aerospace Engineering.

2. Course Objectives

After successfully completing the course, you will have a good understanding of the following topics and their applications:
- Matrix operations, including inverses
- Linear dependence and independence
- Determinants and their properties
- Cramer's rule, Sweep method
- Eigenvalues and eigenvectors
- Diagonalization of a matrix
- Linear transformations

3. Grading Policy

- Attendance: more than 2/3 (Requirements to take End-term exam.)
- Homework: 20%
- Mid-term exam: 40%
- End-term exam: 40%
Detail solutions of homework will be shown in LMS and be given feedback at lecture.

4. Textbook and Reference

Textbook
Lecture materials will be provided from LMS. (If needed, printed materials will be distributed at lecture).
Recommended references are the followings;
Reference
田代嘉宏　『工科の数学 線形代数』（森北出版)ISBN-13: 978-4627049222
ギルバート ストラング, 松崎 公紀他　　『世界標準MIT教科書 ストラング:線形代数イントロダクション』　（代科学社)ISBN-13: 978-4764904057
Gilbert Strang "Introduction to Linear Algebra" ISBN-13: 978-0980232776

5. Requirements(Assignments)

Preparation (1.5 hours): Students must read through the lecture materials and check in advance for any questions summarize them in a notebook.
Review (1.5 hours): Student must recheck the lecture materials, make reports or homework for better understanding.

6. Note

- Students will give presentations on homework assignments in the classes.
- Lecture contents may change depending on progress.
- Recommended items to bring to lecture: Devices to access Internet (like note PC, tablet PC, and smartphone, etc.)

7. Schedule

[1]   Introduction, What is "Linear Algebra"?
[2]   Vector, Matrix
[3]   Matrix Operations
[4]   Linear Transformations
[5]   Composition of Linear Transformations
[6]   Inverse Matrix, Linear Equations
[7]   Linear dependence and independence
[8]   Mid-Term Exam
[9]   Determinants
[10]   Cofactor Expansion, Inverse matrix of the n-dimensional square matrix
[11]   Cramer's Rule, Sweep method
[12]   Eigen value, Rank
[13]   Diagonalization of a matrix
[14]   Inner product space
[15]   Symmetric and Orthogonal matrices