Linear algebra A*

Course Title: Linear algebra A*
Course prerequisites: Calculus
Class hour: 48
Department: Department of Mathematics
Students: 工商(全英文) 国贸(全英文)

Course description

Linear algebra is more exciting now than at almost any time in the past. Its applications continue to spread to more and more fields. Largely due to the computer revolution of the last half century, linear algebra has risen to a role of prominence in the mathematical curriculum rivaling that of calculus. Modern software has also made it possible to dramatically improve the way the course is taught. This course is an introduction to Linear Algebra. It also introduces the basics of abstract mathematics as well as a software package that is valuable both for learning and using linear algebra. The main development of the course will follow the text

Course goals.

- To provide students with a good understanding of the concepts and methods of linear algebra, described in detail in the syllabus.
- To help the students develop the ability to solve problems using linear algebra.
- To connect linear algebra to other fields both within and without mathematics.
- To develop abstract and critical reasoning by studying logical proofs and the axiomatic method as applied to linear algebra.

Textbook

Linear Algebra with Applications, Eighth Edition, Steven J. Leon, University of Massachusetts, Dartmouth.

Grades

Your course grade will be determined using the following formula:

15% Warm-up problems
25% Homework
60% Final exam

Topics

This is a 1-semester course in linear algebra for students who have completed two semesters of calculus. It covers Systems of Linear Equations and Matrices, Determinants, Vectors in 2-space

and 3-space, Abstract Vector Spaces, Linear Transformations, Eigenvalues and Eigenvectors, and Inner Product Spaces. We will follow the textbook and aim to cover in full or in part the following chapters:

1. Matrices and Systems of Equations (10)
1.1 Systems of Linear Equations
1.2 Row Echelon Form
1.3 Matrix Arithmetic
1.4 Matrix Algebra
1.5 Elementary Matrices
1.6 Partitioned Matrices

2. Determinants (6)
2.1 The Determinant of a Matrix
2.2 Properties of Determinants

3 Vector Spaces (10)
3.1 Definition and Examples
3.2 Subspaces
3.3 Linear Independence
3.4 Basis and Dimension
3.5 Change of Basis
3.6 Row Space and Column Space

4 Linear Transformations (4)
4.1 Definition and Examples
4.2 Matrix Representations of Linear Transformations
4.3 Similarity

5 Orthogonality (8)
5.1 The Scalar Product in Rn
5.2 Orthogonal Subspaces
5.3 Least Squares Problems
5.4 Inner Product Spaces
5.5 Orthonormal Sets
5.6 The Gram-Schmidt Orthogonalization Process

6. Eigenvalues (10)
6.1 Eigenvalues and Eigenvectors
6.2 Systems of Linear Differential Equations
6.3 Diagonalization
6.4 Hermitian Matrices
6.5 The Singular Value Decomposition

6.6 Quadratic Forms
6.7 Positive Definite Matrices