

MATH 550 Linear Algebra (Instructor: S. Kabbaj)

Description

Basic properties of vector spaces and linear transformations, algebra of polynomials, characteristic values and diagonalizable operators, invariant subspaces and triangulable operators. The primary decomposition theorem, cyclic decompositions and the generalized Cayley-Hamilton theorem. Rational and Jordan forms, inner product spaces. The spectral theorem, bilinear forms, symmetric and skew symmetric bilinear forms.

Textbooks

[HK] Linear Algebra, by K. Hoffman – R. Kunze, Second Edition.

[A] Linear Algebra Done Right, by S. Axler, Third Edition.

National Day : Wed. – Thu., September 23 – 24

Midterm Break : Tue. – Thu., October 20 – 22

Autumn Break : Sun. – Mon., November 22 – 23

Sections	Topics
1.1-2.1-2.2 2.3	Fields, Vector Spaces, Subspaces (Review) Bases and Dimension
2.4 3.1	Coordinates Linear Transformations.
3.2-3.3 3.4	The Algebra of Linear Transformations, Isomorphisms Representation of Transformations by Matrices
3.5 3.6-3.7	Linear Functionals The Double Dual, The Transpose of a Linear Transformation
6.1-6.2 6.3	Elementary Canonical Forms. Characteristic Values Annihilating Polynomials
6.4 6.5-6.6	Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum Decomposition
6.7-6.8	Invariant Direct Sums, The Primary Decomposition Theorem
7.1-7.2	The Rational and Jordan Forms. Cyclic Subspaces and Annihilators, Cyclic Decompositions and the Rational Form
7.3 7.4	The Jordan Form Computation of Invariant Factors
7.5	Summary, Semi-simple Operators
8.1-8.2	Inner Product Spaces. Inner Products, Inner Product Spaces
8.3 8.4	Linear Functionals and Adjoint Unitary Operators
8.5 9.5	Normal Operators Spectral Theory
10.1 10.2	Bilinear Forms Symmetric Bilinear Forms
10.3	Skew-Symmetric Bilinear Forms