MATH 550 Linear Algebra

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.

SYLLABUS

Week	Dates (2021)	Sections	Topics
1	Jan 16 – 20	1.1, 2.1, 2.2 2.3	Fields, VECTOR SPACES. Subspaces (Review) Bases and Dimension
2	Jan 23 – 27	2.4 3.1	Coordinates LINEAR TRANSFORMATIONS.
3	Jan 30 – Feb 03	3.2-3.3 3.4	The Algebra of Linear Transformations, Isomorphisms Representation of Transformations by Matrices
4	Feb 06 – 10	3.5 3.6-3.7	Linear Functionals The Double Dual, The Transpose of a Linear Transformation
5	Feb 13 – 17	6.1-6.2 6.3	ELEMENTARY CANONICAL FORMS. Characteristic Values Annihilating Polynomials
6	Feb 20 – 24	6.4 6.5-6.6	Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum Decomposition
7	Feb 27 – Mar **03**	6.7-6.8	Invariant Direct Sums, The Primary Decomposition Theorem
Major Exam 1			
8	Mar 06-10	7.1-7.2	THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces and Annihilators, Cyclic Decompositions and the Rational Form
9	Mar 13 – 17	7.3 7.4	The Jordan Form Computation of Invariant Factors
10	Mar 20 – 24	7.5	Summary, Semi-simple Operators
11	Mar 27 – 31	8.1-8.2	INNER PRODUCT SPACES. Inner Products, Inner Product Spaces
12	Apr 03 – **07**	8.3 8.4	Linear Functionals and Adjoints Unitary Operators
Major Exam 2			
13	Apr 10 – 14	8.5 9.5	Normal Operators Spectral Theory
14	Apr 17 – 21	10.1 10.2	BILINEAR FORMS Symmetric Bilinear Forms
April 24-May 05 Eid Al-Fitr Holidays			
15	May 08 – 12	10.3	Skew-Symmetric Bilinear Forms
Final Exam			