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 (2022)	Sections	Topics
1	Aug. 28-Sep.1	1.1, 2.1, 2.2 2.3	Fields, VECTOR SPACES. Subspaces (Review) Bases and Dimension
2	Sep. 04 - 08	2.4 3.1	Coordinates LINEAR TRANSFORMATIONS.
3	Sep. 11 - 15	3.2-3.3 3.4	The Algebra of Linear Transformations, Isomorphisms Representation of Transformations by Matrices
4	Sep. 18 - 21	3.5 3.6-3.7	Linear Functionals The Double Dual, The Transpose of a Linear Transformation
5	Sep. 25 - 29	6.1-6.2 6.3	ELEMENTARY CANONICAL FORMS. Characteristic Values Annihilating Polynomials
6	Oct. 02 - **06**	6.4 6.5-6.6	Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum Decomposition
7	Oct. 09 - 13	6.7-6.8	Invariant Direct Sums, The Primary Decomposition Theorem
Major Exam 1			
8	Oct. 16 - 20	7.1-7.2	THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces and Annihilators, Cyclic Decompositions and the Rational Form
9	Oct. 23 - 27	7.3 7.4	The Jordan Form Computation of Invariant Factors
10	Oct.30 - Nov.03	7.5	Summary, Semi-simple Operators
11	Nov. 06 - 10	8.1-8.2	INNER PRODUCT SPACES. Inner Products, Inner Product Spaces
12	Nov. 13 - **17**	8.3 8.4	Linear Functionals and Adjoints Unitary Operators
Major Exam 2			
13	Nov. 20 - 24	8.5 9.5	Normal Operators Spectral Theory
14	Dec. 04 - 08	10.1 10.2	BILINEAR FORMS Symmetric Bilinear Forms
15	Dec. 11-15	10.3	Skew-Symmetric Bilinear Forms
16	Dec. 18		Review
Final Exam			