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

 $\left[\textbf{HK} \right]$ Linear Algebra, by K. Hoffman – R. Kunze, Second Edition.

SYLLABUS

Sep. 08 - 12 3.4 Transformations by Matrices	SYLLABUS				
1	Week	Dates (2024)	Sections	Topics	
Sep. 01 - 05 3.1 LINEAR TRANSFORMATIONS.	1	Aug. 25-29	2.2		
Sep. 08 - 12 3.4 Transformations by Matrices	2	Sep. 01 - 05			
4 Sep. 15 - 19 3.6-3.7 The Double Dual, The Transpose of a Linear Transforman Dual, The Transpose of a Linear Transforman Sep. 29 - Oct. 26 - 26.3 6.1-6.2 ELEMENTARY CANONICAL FORMS. Characteristic Values Polynomials 6 Sep. 29-Oct. 03 - 06 6.4 6.5-6.6 Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum Triangulation/Diagonalization/Diagon	3	Sep. 08 - 12		The Algebra of Linear Transformations, Isomorphisms, Representation of Transformations by Matrices	
5 Sep. 24 - 26 6.3 Polynomials 6 Sep. 29-Oct. 03 - 06 6.4 6.5-6.6 Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum 7 Oct. 06 - 10 6.7-6.8 Invariant Direct Sums, The Primary Decomposition Theo Major Exam 1 8 Oct. 13 - 17 7.1-7.2 THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces Cyclic Decompositions and the Rational Form 9 Oct. 20 - 24 7.3 7.4 The Jordan Form Computation of Invariant Factors 10 Oct. 27 - 31 7.5 Summary, Semi-simple Operators 11 Nov. 03 - 07 8.1-8.2 Inner Product Spaces Inner Product Spaces 12 Nov. 17 - 21 8.3 8.4 Linear Functionals and Adjoints Unitary Operators Major Exam 2 13 Nov. 24 - 28 8.5 9.5 Normal Operators Spectral Theory 14 Dec. 01 - 05 10.1 10.2 BILINEAR FORMS Symmetric Bilinear Forms 15 Dec. 08-12 10.3 Skew-Symmetric Bilinear Forms 16 Dec. 15-16 Review	4	Sep. 15 - 19		Linear Functionals The Double Dual, The Transpose of a Linear Transformation	
6 Sep. 29-Oct. 03 - 06 6.5-6.6 Simultaneous Triangulation/Diagonalization, Direct-Sum 7 Oct. 06 - 10 6.7-6.8 Invariant Direct Sums, The Primary Decomposition Theo Major Exam 1 8 Oct. 13 - 17 7.1-7.2 THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces Cyclic Decompositions and the Rational Form 9 Oct. 20 - 24 7.3 The Jordan Form Computation of Invariant Factors 10 Oct. 27 - 31 7.5 Summary, Semi-simple Operators 11 Nov. 03 - 07 8.1-8.2 Inner Product Spaces. Inner Product Spaces 12 Nov. 17 - 21 8.3 Linear Functionals and Adjoints Unitary Operators Major Exam 2 13 Nov. 24 - 28 8.5 Normal Operators Spectral Theory 14 Dec. 01 - 05 10.1 BILINEAR FORMS Symmetric Bilinear Forms 15 Dec. 08-12 10.3 Skew-Symmetric Bilinear Forms 16 Review	5	Sep. 24 - 26		ELEMENTARY CANONICAL FORMS. Characteristic Values Annihilating Polynomials	
Nov. 03 -07 8.1-8.2 Inner Product Spaces	6	Sep. 29-Oct. 03 - 06		Invariant Subspaces Simultaneous Triangulation/Diagonalization, Direct-Sum Decomposition	
8 Oct. 13 - 17 7.1-7.2 THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces Cyclic Decompositions and the Rational Form 9 Oct. 20 - 24 7.3 7.4 The Jordan Form Computation of Invariant Factors 10 Oct. 27 - 31 7.5 Summary, Semi-simple Operators 11 Nov. 03 - 07 8.1-8.2 INNER PRODUCT SPACES. Inner Product Spaces 12 Nov. 17 - 21 8.3 Linear Functionals and Adjoints Unitary Operators Major Exam 2 Major Exam 2 13 Nov. 24 - 28 8.5 9.5 Theory 14 Dec. 01 - 05 10.1 BILINEAR FORMS Symmetric Bilinear Forms 15 Dec. 08-12 10.3 Skew-Symmetric Bilinear Forms 16 Review	7	Oct. 06 - 10	6.7-6.8	Invariant Direct Sums, The Primary Decomposition Theorem	
8 Oct. 13 - 17 7.1-7.2 Cyclic Decompositions and the Rational Form 9 Oct. 20 - 24 7.3 The Jordan Form Computation of Invariant Factors 10 Oct. 27 - 31 7.5 Summary, Semi-simple Operators 11 Nov. 03 - 07 8.1-8.2 Inner Product Spaces. Inner Product Spaces 12 Nov. 17 - 21 8.3 Linear Functionals and Adjoints Unitary Operators Major Exam 2 13 Nov. 24 - 28 8.5 Normal Operators Spectral Theory 14 Dec. 01 - 05 10.1 BILINEAR FORMS Symmetric Bilinear Forms 15 Dec. 08-12 10.3 Skew-Symmetric Bilinear Forms 16 Dec. 15-16 Review	Major Exam 1				
10	8	Oct. 13 - 17	7.1-7.2	THE RATIONAL AND JORDAN FORMS. Cyclic Subspaces and Annihilators Cyclic Decompositions and the Rational Form	
11	9	Oct. 20 - 24			
11	10	Oct.27 -31	7.5	Summary, Semi-simple Operators	
Nov. 17 - 21 8.4 Operators	11	Nov. 03 -07	8.1-8.2		
13 Nov. 24 - 28 8.5 yes Normal Operators Spectral Theory 14 Dec. 01 - 05 10.1 yes BILINEAR FORMS Symmetric Bilinear Forms 15 Dec. 08-12 10.3 yes Skew-Symmetric Bilinear Forms 16 Dec. 15-16 Review	12	Nov. 17 - 21		į į	
13 Nov. 24 - 28 9.5 Theory 14 Dec. 01 - 05 10.1	Major Exam 2				
14 Dec. 01 - 05 10.2 Symmetric Bilinear Forms 15 Dec. 08-12 10.3 Skew-Symmetric Bilinear Forms 16 Dec. 15-16 Review	13	Nov. 24 - 28			
15	14	Dec. 01 - 05			
16 Review	15	Dec. 08-12	10.3	Skew-Symmetric Bilinear Forms	
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Final Exam					