

MATH 312 FALL, 2015 SYLLABUS
Prof. Murray Gerstenhaber

August 20, 2015

The numbering of sections follows that of the text, *Linear Algebra, 2nd edition* by Kenneth A. Hoffman and Ray Kunze.

The heart of the course is Chapter 8 on inner product spaces, which we will cover thoroughly. While the syllabus below leaves time for Chapters 9 and 10, if we don't get to them those who wish may read and do exercises on the material for extra credit. We will skip from Chapter 3 to Chapter 5 and then take up Chapter 4 after the midterm, which is scheduled for October 20.

Our treatment of determinants will be advanced but there will be notes. You will need understand dual bases, currently scheduled for Lecture 9. The syllabus is not filled in after Thanksgiving; details will be added. To the extent that time permits, we will end with some important applications.

TUESDAYS	THURSDAYS
AUG 25 VACATION	AUG 27 LECTURE 1 1.1. Fields 1.2. Systems of Linear Equations 1.3. Matrices and Elementary Row Operations
SEPT 1 LECTURE 2 1.4. Row-Reduced Echelon Matrices 1.5. Matrix Multiplication 1.6. Invertible Matrices <i>The determinant of a 2×2 matrix. (General determinants will be covered later.)</i>	SEPT 3 LECTURE 3 1.6 Invertible Matrices (cont'd) 2.1 Vector Spaces 2.2 Subspaces <i>quotient spaces Rings and modules; Rings of matrices We will introduce here some topics covered more fully in Chapter 8, in particular inner product spaces (Euclidean spaces).</i>
SEPT 8 LECTURE 4 2.3 Bases and Dimension	SEPTEMBER 10 LECTURE 5 2.4 Coordinates 2.5 Summary of Row Equivalence
SEPT 15 NO CLASS (ROSH HASHANAH 2ND DAY)	SEPTEMBER 17 LECTURE 6 2.6 Computations Concerning Subspaces <i>Review</i>

TUESDAYS	THURSDAYS
SEPT 22 LECTURE 7 3.1 Linear Transformations 3.2 The Algebra of Linear Transformations <i>Linear operators on a vector space; The concept of a group</i>	SEPT 24 LECTURE 8 3.3 Isomorphism 3.4 Representation of Transformations by Matrices
SEPT 29 NO CLASS (SUKKOT 2ND DAY)	OCT 1 LECTURE 9 3.5 Linear Functionals <i>Dual bases; Dual transformations</i>
OCT 6 LECTURE 10 Chapter 5. Determinants <i>Some basic concepts will simplify the treatment in the text.</i> 5.x1 Tensor and exterior products of vector spaces	OCT 8 NO CLASS – FALL BREAK
OCT 13 LECTURE 11 Determinants (cont'd)	OCT 15 LECTURE 12 Chapter 6. Review
OCT 20 MIDTERM	OCT 22 LECTURE 13 Chapter 4. Polynomials 4.1 Algebras 4.2 The algebra of Polynomials 4.3 Lagrange Interpolation
OCT 27 LECTURE 14 4.4 Polynomial Ideals 4.5 The Prime Factorization of a Polynomial <i>Factorization over the real and over the complex numbers</i>	OCT 29 LECTURE 14 Chapter 6. Elementary Canonical Forms

TUESDAYS	THURSDAYS
NOV 3 (ELECTION DAY) LECTURE 15 Chapter 6. Elementary Canonical Forms 6.1 6.2 6.3 6.4	NOV 5 LECTURE 16 6.5 6.6 6.7 6.8
NOV 10 LECTURE 17 Chapter 7. The Rational and Jordan Forms	NOV 12 LECTURE 18 Chapter 7. The rational and Jordan Forms
NOV 17 LECTURE 19 Chapter 8. Inner Product Spaces	NOV 19 LECTURE 20 Chapter 8. Inner Product Spaces
NOV 24 LECTURE 21 Chapter 8. Inner Product Spaces	NOV 26 THANKSGIVING DAY
DEC 1 LECTURE 22	DEC 3 LECTURE 23
DEC 8 LECTURE 24 LAST CLASS	DEC 10 READING DAY Review

MONDAY, DEC 14 FINAL EXAM