

Math 115B: General Course Outline

Catalog Description

115B. Linear Algebra. (4) Lecture, three hours; discussion, one hour. Requisite: course 115A. Linear transformations, conjugate spaces, duality; theory of a single linear transformation, Jordan normal form; bilinear forms, quadratic forms; Euclidean and unitary spaces, symmetric skew and orthogonal linear transformations, polar decomposition. P/NP or letter grading.

Textbook

S. Friedberg, et al, *Linear Algebra*, 4th Ed., Prentice-Hall.

Schedule of Lectures

Lecture	Section	Topics
1	.	Review of Math 115A, Chapters I and II
2	2.6	Dual Spaces (This section looks short but the concepts are new and thus will take two lectures to do well)
3	2.6	Dual Spaces
4	.	Review Sections 5.1 and 5.2 from 115A
5	5.4	Invariant Subspaces and the Cayley Hamilton Theorem
6	5.4	Invariant Subspaces and the Cayley Hamilton Theorem
7	5.4	Invariant Subspaces and the Cayley Hamilton Theorem
8	.	Review Sections 6.1 - 6.4 including more detail than was done in 115A
9	.	Review Sections 6.1 - 6.4 including more detail than was done in 115A
10	6.5	Unitary and Orthogonal Operators and their matrices
11	6.5	Unitary and Orthogonal Operators and their matrices
12	6.5	Unitary and Orthogonal Operators and their matrices
13	6.6	Orthogonal Projections and the Spectral Theorem
14	6.6	Orthogonal Projections and the Spectral Theorem
15	6.6	Orthogonal Projections and the Spectral Theorem
16	.	EXAM
17	6.11	The Geometry of Orthogonal Operators
18	6.11	The Geometry of Orthogonal Operators
19	6.11	The Geometry of Orthogonal Operators
20	7.1	Jordan Canonical Form I (This is a long and intricate presentation that takes time; do examples along the way!)
21	7.1	Jordan canonical Form I
22	7.1	Jordan canonical Form I
23	7.3	The Minimal Polynomial (It might actually be better to do this section right after the Cayley Hamilton Theorem)
24	7.3	The Minimal Polynomial
25-29	.	At the discretion of the teacher.

Comments

This outline allows for only one midterm. Instructors may wish to give a second hour exam in quiz section. There may be a serious need to review Math 115A because of notational differences and time lapses. This is a leisurely outline and can be accelerated at the Professor's discretion. It is recommended that some of the more interesting problems from the sections be done as lecture material.

There are a number of interesting topics to choose from in Chapter 6, such as Bilinear Forms, Einstein's Theory of Relativity, etc. Another possibility is to have the better of the students give lectures from the material in Chapter 6. Or simply choose topics from Linear Algebra that are of interest to you).

Outline update: J. White, 6/01, 11/02

For more information, please contact Student Services, ugrad@math.ucla.edu.