

# Syllabus for Math 31

Text: *Linear Algebra and its Applications 5th Edition* by David C. Lay.

**Part 1** of the course will cover Chapter 1 and 2 of Lay and will cover systems of linear equations, Gaussian elimination, and matrix algebra.

Weeks 1 and 2 Systems of Linear Equations and Gaussian Elimination I [8 lectures accounting for 6 hours of Lecture and 4 hours of discussion section].

- 1.1 0.5 Systems of Linear Equations
- 1.2 1.0 Row Reduction and Echelon Forms
- 1.3 0.5 Vector Equations
- 1.4 1.0 the matrix equation  $Ax = b$
- 1.5 1.0 Solutions sets of linear systems
- 1.7 1.0 Linear independence
- 1.8 0.5 introduction to linear transformations
- 1.9 1.0 The matrix of a linear transformation

Week 3 Matrix Algebra [4 lectures accounting for 3 hours of Lecture and 2 hours of discussion section]

- 2.1 1.0 Matrix Operations
- 2.2 1.0 The inverse of a matrix
- 2.3 0.5 Characterization of Inverse matrices
- 2.5 0.5 Matrix factorization

## Week 4

Test #1

Reflection upon test 1. One discussion section is devoted to working through test exercises that students struggled with.

**Part 2** of the course covers chapters 4, 3 and 6 might be titled Vector spaces, Determinants, Eigenvalues and Eigenvectors.

## Week 4 continued

- 4.1 1.0 Vector spaces and subspaces
- 4.2 1.0 Null spaces, Column spaces and subspaces

Week 5 Vector spaces continued [4 lectures accounting for 3 hours of Lecture and 2 hours of discussion section]

- 4.3 1.0 Linearly independent sets; Bases
- 4.4 1.0 Coordinate systems
- 4.5 1.0 Dimension of a Vector space
- 4.6 1.0 Rank

Week 6 Determinants [2.5 hours of lecture = 2 hours of Lecture plus one discussion section]

- 3.1 0.5 Introduction to determinants
- 3.2 1.0 Properties of determinants
- 3.3 1.0 Cramer's rule; volume and linear transformations

Week 6 continued [1.5 hours of lecture = 1 hour of Lecture plus one discussion section]

- 5.1 1.5 Eigenvalues and eigenvectors

Week 7 Eigenvalues and Eigenvectors

- 5.2 1.0 The characteristic equation
- 5.3 1.0 Diagonalization
  - 1.0 Further discussion on Eigenvalues and eigenvectors
  - 1.0 Review for test 2.

Week 8

Test 2 in Lecture

Remainder Week 8, Week 9, and Week 10

Applications of linear algebra (at instructor's discretion)