Math 304 **Linear Algebra** **Winter 2020**

Instructor	Amites Sarkar
Text	Linear Algebra and its Applications (5^{th} ed.) Lay, Lay and McDonald
Calculator	TI-85 or higher

Course content

This course is a continuation of Elementary Linear Algebra (Math 204). We will cover Chapters 5, 6 and 7 of the book (but skip Sections 5.7 and 5.8). Some of the main themes are **diagonalization**, **orthogonality**, **quadratic forms** and **singular value decomposition**. These topics have many important applications in science and engineering, and we'll see some of these as the course progresses.

Exams

Midterm 1	Friday 31 January
Midterm 2	Friday 28 February
Final	Wednesday 18 March 8–10 am

Grading

The midterms are each worth 20%, and the final is worth 30%. In addition, there will be six 30 minute quizzes on 17 January, 24 January, 7 February, 14 February, 21 February and 6 March, which are worth 5% each. If you feel too ill to take an exam, don't take it, but bring a doctor's certificate to me when you feel better and I will make arrangements.

Office hours

My office hours are 2–2:50 on Mondays, Tuesdays, Thursdays and Fridays, in 216 Bond Hall. My phone number is 650 7569 and my e-mail is amites.sarkar@wwu.edu

Course Objectives

The successful student will demonstrate:

1. Ability to compute eigenvalues and eigenvectors of small matrices, determine whether or not a matrix is diagonalizable, and diagonalize a matrix when possible.

2. Geometric understanding of the eigenvalues and eigenvectors of a matrix, including the case of complex eigenvalues.

3. Ability to construct a matrix representation of a linear transformation, relative to given bases, and to choose a convenient basis for such a representation.

4. Ability to use eigenvalues and eigenvectors in the analysis of linear discrete dynamical systems.

5. Understanding of the role of the inner product in the geometry of vector spaces.

6. Geometric and analytic understanding of orthogonality and orthogonal projection, both in real n-dimensional space and in more abstract vector spaces, including spaces of functions.

7. Ability to construct an orthogonal basis for a subspace using the Gram-Schmidt process.

8. Understanding of least-squares problems, the ability to solve them, and knowledge of their applications to linear models and to approximation.

9. Knowledge of the properties of symmetric matrices and their associated quadratic forms.

10. Ability to compute the singular value decomposition of a matrix and the understanding of its relationship to other concepts of linear algebra.

Relation to Overall Program Goals

Among other things, this course will (i) enhance your problem-solving skills; (ii) help you recognize that a problem can have different useful representations (graphical, numerical, or symbolic); (iii) increase your appreciation of the role of mathematics in the sciences and the real world; (iv) inform you about the historical context of the area of mathematics studied.