

MAT 228 – LINEAR ALGEBRA

3 hrs./wk. – 3 cr.

1/2020

BEGINNING SPRING 2020

Catalog Description: Selected topics including systems of linear equations, matrices and determinants, vector and inner product spaces, linear transformations, eigenvalues and eigenvectors, with applications from a variety of disciplines.

Prerequisite: MAT 132 (grade of “C” or better).

Text: Larson, Ron, *Elementary Linear Algebra*, 8th ed. (Brooks/Cole, Cengage Learning).

Supplementary Materials: “Web Assign”

Syllabus

Period	Text Chapter	Topics
1 – 2	1.1 – 3	Introduction to systems of linear equations; Gauss and Gauss-Jordan elimination; applications
3	2.1 – 2	Operations with matrices: addition, multiplication; properties of matrix operations
4 – 5	2.3 – 5	Inverse of a matrix; elementary matrices; applications of matrix operations
6		Test no. 1
7	3.1 – 3	Determinant of a matrix; evaluation
8	3.4	Properties of determinants
9	4.1 – 2	Vectors in \mathbb{R}^n . Vector spaces
10	4.3 – 4	Subspaces of vector spaces; spanning sets, linear independence
11	4.5 – 6	Basis and dimensions; rank of a matrix, systems of linear equations
12	4.7 – 8	Coordinates and changes of basis; applications of vector spaces
13		Test no. 2
14	5.1 – 2	Length and dot product in \mathbb{R}^n , inner product spaces
15	5.3	Orthonormal bases, Gram-Schmidt Process
16 – 17	5.4	Mathematical models and least-square analysis
18 – 19	5.5	Application of inner spaces
20		Test no. 3
21 – 22	6.1 – 2	Introduction to linear transformations, kernel and range
23 – 24	6.3 – 5	Matrices, linear transformations, similar matrices, applications
25 – 26	7.1 – 2	Eigenvalues, eigenvectors, matrix diagonalization
27 – 28	7.3 – 7.4	Symmetric matrices, orthogonal diagonalization, Applications of eigenvalues and eigenvectors
29 - 30		Final Exam

Students are expected to adhere to the policies of the County College of Morris. These can be accessed at www.ccm.edu/academics/academic-policies/.

Statement of Course LEARNING OUTCOMES

- **Identify** and **solve** linear systems of equations using Gaussian elimination
- **Define** and **manipulate** matrices and **apply** factorization techniques
- **Define** and **utilize** determinants and **apply** them to solve systems of equations using Cramer's Rule
- **Explain** and **apply** the Least-Squares approximation process
- **Define**, **describe** and **interpret** vector spaces, and **define** and **apply** linear transformations between spaces
- **Define**, **interpret** and **calculate** eigenvalues and eigenvectors