

Math 192 – Finite Mathematics

Course Description from Bulletin: This course introduces fundamental concepts of finite mathematics with an emphasis on real-world applications in business, economics, and the social sciences. Topics include linear equations and inequalities, matrix operations and systems of linear equations, linear programming using geometric methods, linear transformations, the Leontief Input-Output Model, and Markov processes. Students will develop quantitative reasoning skills and learn to model and solve problems using algebraic, graphical, and matrix-based techniques.

Enrollment: Counted as one of the mathematics requirements for the Bachelor of Information Technology and Management. This course does not count toward any mathematics requirements in computer science, engineering, mathematics, or natural science degree programs.

Textbook(s): Goldstein, S. M., Schneider, C. P., Siegel, S. L., & Hair, J. F. (2018). *Finite mathematics and its applications* (12th ed.). Pearson.

Prerequisites: No prerequisites

Objectives:

Upon successful completion of this course, students will be able to:

1. Calculate the slope of a straight line and determine the intersection point of two lines algebraically and graphically.
2. Apply the method of least squares to fit a line to data and interpret the resulting model.
3. Solve systems of linear equations using matrix methods, including the Gauss-Jordan elimination and matrix inverses.
4. Perform arithmetic operations on matrices and compute the inverse of a square matrix when it exists.
5. Use matrices to model and analyze economic systems, such as the Leontief Input-Output Model.
6. Represent linear transformations using matrices and apply them to problems in geometry.
7. Graph and solve linear programming problems using a geometric approach.
8. Construct and analyze Markov chains using transition matrices, determine regularity and identify absorbing states.

Lecture schedule: Two 75 minutes lectures per week.

Course Outline:	Hours
1. Linear Equations and Straight Lines	3
a. The slope of a straight line	
b. The intersection point of a pair of lines	
c. The method of least squares	
2. Matrices	15
a. System of linear equations with unique solutions	
b. General systems of linear equations	
c. Arithmetic operations on matrices	
d. The inverse of a square matrix	
e. The Gauss-Jordan method for calculating inverses	
f. The Leontief Input-Output Model	
3. Linear Transformations	6.5
a. Introduction to linear transformations	
b. The matrix of linear transformations	
c. Applications to computer graphics	
4. Linear Programing, A Geometric Approach	8
a. Linear inequalities	
b. A linear programing problem	
c. Fundamental theorem of linear programing	
d. Linear programing	
5. Markov Process	5
a. The transition matrix	
b. Regular stochastics matrices	
c. Absorbing stochastic matrices	
Assessment: Homework/Quizzes	35%
Tests	30%
Final Exam	35%

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Date: Feb 1st, 2025