

MISSOURI WESTERN STATE UNIVERSITY

SCHOOL OF LIBERAL ARTS AND SCIENCES

DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS

COURSE NUMBER: MAT 112

COURSE NAME: Finite Mathematics

COURSE DESCRIPTION:

Linear and quadratic equations, graphs, and functions including exponential and logarithmic functions; mathematics of finance, annuities, sinking funds, and mortgages; linear programming; counting methods, probability, expectation; descriptive statistics. (3 credit hours)

PREREQUISITE:

ACT math subscore of at least 22 or a grade of C or higher in MAT 110E or a sufficient score on the math placement exam or departmental approval.

TEXT:

Finite Mathematics, Barnett, Ziegler, and Byleen, 12th edition, Pearson Publishing

TECHNOLOGY:

Students are required to have a calculator having at least the capabilities of the TI-83.

COURSE OBJECTIVES:

This course is intended to satisfy the general studies mathematics requirement for a baccalaureate degree. It is also designed to serve as a prerequisite for future study in other disciplines that require basic algebra skills (e.g., business, elementary education, non-physical sciences). The course is designed to help students develop problem-solving skills. Successful students will be able to:

1. Read and understand an applied problem.
2. Select an appropriate problem solving strategy relevant to the problem.
3. Perform mathematical operations to solve the problem.

In order to attain these goals, the student will study basic concepts in the following:

1. Algebra: A review of linear and quadratic equations and inequalities, exponents and radicals, logarithmic and exponential functions.

2. Mathematics of Finance: Concepts of simple interest, compound interest, present and future value of ordinary annuities, amortization.
3. The solution of systems of linear equations by matrix methods.
4. The solution of systems of linear inequalities and linear programming problems.
5. Elementary counting techniques and probability.
6. Descriptive statistics and probability distributions.

STUDENT COMPETENCIES:

In order to meet the above objectives, successful students will:

1. Solve linear and quadratic equations related to applied problems and be able to graph solutions. (*Mathematical Reasoning & Modeling IA, IB, IIIA, IIIB, IIIC*)
2. Solve linear and quadratic inequalities related to applied problems and be able to graph related solution regions. (*Mathematical Reasoning & Modeling IA, IB*)
3. Be able to use appropriate formulas to calculate any of the factors related to simple and compound interest, such as principal, amount, rate of interest, number of terms, etc. (*Mathematical Reasoning & Modeling IA, IIIA, IIIB, IIIC*)
4. Be able to use appropriate formulas to determine the future or present value of an annuity, and to determine regular payments related to sinking funds or the amortization of a loan. (*Mathematical Reasoning & Modeling IA, IIIB, IIIC*)
5. Solve systems of linear equations related to applied problems using the Gauss- Jordan elimination method. (*Mathematical Reasoning & Modeling IVA*)
6. Solve systems of linear equations related to applied problems. (*Mathematical Reasoning & Modeling IB*)
7. Solve systems of linear inequalities using a geometric approach. (*Mathematical Reasoning & Modeling IVB*)
8. Solve applied linear programming problems geometrically. (*Mathematical Reasoning & Modeling IVC*)
9. Determine probability empirically using data given in tables, charts, or graphs. (*Mathematical Reasoning & Modeling IA, IIC*)
10. Apply counting methods in applied probability problems. (*Mathematical Reasoning & Modeling IA*)

11. Find and apply the expected value of a random variable.
(*Mathematical Reasoning & Modeling IIC, IID*)
12. Interpret and analyze data from various real-life scenarios represented graphically via histograms, bar graphs, pie charts, etc. (*Mathematical Reasoning & Modeling IA, IB, IIA*)
13. Compute and interpret frequency distribution, mean, median, and mode for a given set of data. (*Mathematical Reasoning & Modeling IIB*)
14. Compute and interpret range, variation, and standard deviation for a given set of data.
(*Mathematical Reasoning & Modeling IIB*)

COURSE OUTLINE:

- I. Review of basic algebra including equations and inequalities, graphing, exponential and logarithmic functions.
- II. Mathematics of finance
 - A. Simple interest
 - B. Compound interest
 - C. Future value of an annuity; Sinking funds
 - D. Present value of an annuity; Amortization
- III. Systems of linear equations; matrices
 - A. Systems of linear equations in two variables
 - B. Systems of linear equations and matrices
 - C. Gauss-Jordan elimination
- IV. Linear inequalities and linear programming
 - A. Linear inequalities in two variables
 - B. Systems of linear inequalities in two variables
 - C. Linear programming in two dimensions; a geometric approach
- V. Probability
 - A. Sample spaces, events, and probability
 - B. Union, intersection, complement of events
 - C. Conditional probability, intersection, and independence
 - D. Random variables, probability distributions, and expected value
- VI. Data description and probability distributions
 - A. Graphing data
 - B. Measures of central tendency
 - C. Measures of dispersion
 - D. Bernoulli trials and binomial distributions

GENERAL EDUCATION GOALS AND COMPETENCIES:

As noted above, this course is intended to satisfy the general studies mathematics requirement for a baccalaureate degree. Upon successful completion of this course, the following state-level goals and competencies will have been met:

I. Skills Areas

a. Communicating

Students will demonstrate the ability to...

6. Use mathematical and statistical models, standard quantitative symbols and various graphical tactics to present information with clarity, accuracy and precision.

b. Higher-Order Thinking

Students will demonstrate the ability to...

1. Recognize the problematic elements of presentations of information and argument and to formulate diagnostic questions for resolving issues and solving problems.
2. Use linguistic, mathematical or other symbolic approaches to describe problems, identify alternative solutions, and make reasoned choices among those solutions.
3. Analyze and synthesize information from a variety of sources and apply the results to resolving complex situations and problems.
4. Defend conclusions using relevant evidence and reasoned arguments.
5. Reflect on and evaluate their critical-thinking processes.

II. Knowledge Areas

c. Mathematics

Students will demonstrate the ability to...

1. Describe contributions to society from the discipline of mathematics.
2. Recognize and use connections within mathematics and between mathematics and other disciplines.
3. Read, interpret, analyze and synthesize quantitative data (e.g., graphs, tables, statistics, survey data) and make reasoned estimates.
4. Formulate and use generalizations based upon pattern recognition.
5. Apply and use mathematical models (e.g., algebraic, geometric, statistical) to solve problems.