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Mathematics (MATH) 1520 Finite Mathematics (3 Units) CSU:UC
[formerly Mathematics 11]

Prerequisite: Successful completion in Mathematics 1060 or the equivalent

Prerequisite knowledge/skills: Before entering the course a student should be able to:

1. identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2. perform the basic arithmetic operations with positive and negative real numbers, plus raising to powers,
3. know and apply the rules of exponents and the order of operations in algebraic calculations,
4. know and apply the properties of addition and multiplication for real numbers and identify their use in practice,
5. solve linear equations and inequalities in one variable, and analyze and solve applications leading to such equations or inequalities,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable,
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on trinomials quadratic in form, and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and reduce to lowest terms,
10. solve equations involving rational algebraic expressions, and analyze and solve word problems leading to such equations,
11. simplify radical expressions involving numbers and/or variables,
12. use fractional exponents,
13. perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results, including rationalization of denominators,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable, and equations quadratic in form, by factoring, completing the square, and the quadratic formula,
16. analyze and solve application problems requiring the use of quadratic equations,
17. solve and graph quadratic inequalities in one variable,
18. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from its equation,
19. determine the slope of the line between any specified pair of points,
20. know the slope forms of the equation of a straight line, and be able to determine the

- equation of a particular straight line from specified input information,
21. solve and graph linear inequalities in two variables,
 22. solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
 23. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
 24. evaluate determinants and use them to solve linear systems of equations,
 25. determine whether or not a specified relation is a function,
 26. for a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions in numeric or algebraic terms,
 27. identify the quadratic equation representing a specific conic section, and be able to draw the graph of a conic section by analyzing its equation, or to write the equation of a specified conic section,
 28. solve nonlinear systems of equation involving the intersection of two conic sections or a conic section and a straight line,
 29. compute and graph specified exponential and logarithmic functions,
 30. know the properties of logarithms (product, quotient, power and change of base rules) and be able to use them in practical numerical computations using a table of common logarithms or a calculator, and
 31. solve simple exponential and logarithmic equations.

Advisory: Eligibility for English 1000 and Reading 1005 strongly recommended

Total Hours: 48 hours lecture

Catalog Description: Linear functions, systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, sets and Venn diagrams, combinatorial techniques and an introduction to probability. This course has applications in business, economics and social sciences.

Type of Class/Course: Degree Credit

Text: Lial, Margaret, et al. *Finite Mathematics with Applications in the Management, Natural, and Social Sciences*. 11th ed. Boston, Pearson, 2014. Print.

Course Objectives:

By the end of the course, a successful student will be able to:

1. Apply linear and exponential graphs and functions;
2. Write a system of linear equations to solve applied problems;
3. Solve a system of linear equations using Gauss-Jordan elimination and interpret the result;
4. Find the inverse of a square matrix and use the inverse to solve a system of linear equations;
5. Solve linear programming problems in at least three variables;
6. Find unions, intersections and complements of sets and use Venn diagrams to solve

- problems;
7. Apply basic combinatorial principles to enumeration problems;
 8. Determine the probability of a specified event;
 9. Find the conditional probability of an event; and
 10. Solve applied problems in finance including simple and compound interest, future and present value, annuities, sinking funds, and amortization.

Course Scope and Content:

Unit I Functions and the Mathematics of Finance

- A. Real Numbers
- B. Functions
- C. Exponential Functions
- D. Logarithmic Functions
- E. Simple and Compound Interest
- F. Future and Present Value
- G. Annuities, Sinking Funds
- H. Amortization

Unit II Linear Models

- A. Produce graphs of linear functions.
- B. Calculate and interpret the meaning of the slope of a line.
- C. Determine linear demand and supply functions.
- D. Calculate distance between two or more points.
- E. Calculate and utilize the least squares regression line for a given set of data.

Unit III Matrix Theory

- A. Solve systems of equations.
- B. Solve underdetermined and over determined systems of equations.
- C. Use matrices to solve systems of equations.
- D. Solve systems of equations using inverse matrices.
- E. Apply matrix operations to solve business related problems.

Unit IV Linear Programming-The Graphical Method

- A. Graph systems of linear inequalities in two variables.
- B. Understand the construct of a linear programming problem.
- C. Solve linear programming problems graphically.

Unit V Linear Programming-The Simplex Method

- A. Solve linear programming problems based on the simplex method.

Unit VI Sets and Counting

- A. Identify finite sets.
- B. Perform operations based on sets.
- C. Appropriately apply permutations and combinations.
- D. Venn Diagrams and DeMorgan's Laws

Unit VII **Probability**

- A. Identify the appropriate sample space for simple experiments.
- B. Calculate probabilities based on experiments, empirical data and theoretical values.
- C. Identify independent versus dependent events based on probabilities.
- D. Calculate and interpret conditional probabilities.

Unit VIII **Decision Theory**

- A. Identify a stochastic matrix.
- B. Make decisions based on Markov Chains and Steady-State vectors.
- C. Use game theory to model and solve games.

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside of the regular class time doing the following:

1. Studying,
2. Completing required reading, and
3. Problem solving activity or exercise.

Methods of Instruction:

1. Lecture-demonstrations,
2. student participation, and
3. sample problems.

Methods of Evaluation:

1. Computational or non-computational problem-solving demonstrations, including:
 - a. Exams,
 - b. homework problems, and
 - c. quizzes.