



El Camino College  
COURSE OUTLINE OF RECORD – Approved

**I. GENERAL COURSE INFORMATION**

**Subject and Number:** Mathematics 140  
**Descriptive Title:** Finite Mathematics for Business and Social Sciences  
**Course Disciplines:** Mathematics  
**Division:** Mathematical Sciences

**Catalog Description:**

This course consists of a study of functions, matrices, linear programming, sets, combinatorics, probability, statistics, mathematics of finance, and Markov chains.

**Conditions of Enrollment:**

**Prerequisite:** Mathematics 73 or Mathematics 80 or Mathematics 67 with a minimum grade of C in prerequisite or qualification by appropriate assessment

<b>Course Length:</b>	<b>X Full Term</b>	<b>Other (Specify number of weeks):</b>
<b>Hours Lecture:</b>	<b>4.00 hours per week</b>	<b>TBA</b>
<b>Hours Laboratory:</b>	<b>0 hours per week</b>	<b>TBA</b>
<b>Course Units:</b>	<b>4.00</b>	

**Grading Method:** Letter  
**Credit Status:** Associate Degree Credit

**Transfer CSU:** X Effective Date: Prior to July 1992  
**Transfer UC:** X Effective Date: Prior to July 1992

**General Education:**

**El Camino College:**

**4B – Language and Rationality – Communication and Analytical Thinking**

Term: Other:

**6 – Mathematics Competency**

Term: Other:

**CSU GE:**

**B4 - Mathematics/Quantitative Thinking**

Term: Fall 2000 Other:

**IGETC:**

**2A - Mathematical Concepts and Quantitative Reasoning**

Term: Fall 2000 Other:

## II. OUTCOMES AND OBJECTIVES

### A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. Students will set up and solve linear programming problems.
2. Students will use the Gauss Jordan technique to solve a system of linear equations.
3. Students will utilize problem solving skills to determine the solution for an application involving sets, counting, probability, statistics, or Markov chains.
4. Students will be able to apply techniques of simple and compound interest to solve amortization and annuity problems.

### B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Use linear, exponential, and logarithmic functions to model problems from business and the social sciences.  
Written homework
1. Write and solve systems of linear equations for applied problems by the Gauss-Jordan method.  
Objective Exams
2. Perform matrix operations, find the inverse of a square matrix, and using the inverse to solve a system of linear equations.  
Other exams
3. Use graphical linear programming methods to optimize linear functions subject to a set of constraints.  
Written homework
4. List the elements in the intersection, union, difference and complements of sets.  
Objective Exams
5. Determine the number of elements in a finite set using the inclusion-exclusion principle, the complement principle, Venn diagrams, the multiplication principle, permutations, and combinations, as needed.  
Other exams
6. Find the probability and the conditional probability of a given event.  
Objective Exams
7. Find the expected value of a random variable.  
Written homework
8. Compute the mean, the variance, and the standard deviation for a given set of data.  
Other exams
9. Write a transition matrix for a Markov chain, compute the state vector after k transitions, and compute the stable state vector.  
Objective Exams
10. Solve applied problems in finance including simple and compound interest, future and present value, annuities, sinking funds, and amortization.  
Objective Exams

**III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)**

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	8	I	<p>APPLICATIONS OF LINEAR FUNCTIONS</p> <p>A. Review the Cartesian plane and graphing equations of lines</p> <p>B. Applications of linear functions to economics such as cost, revenue, and profit functions, supply and demand equations, break-even point, and free market equilibrium</p> <p>C. Relating geometric and algebraic solutions to systems of two linear equations</p>
Lecture	14	II	<p>MATRICES</p> <p>A. Systems of linear equations and augmented matrices</p> <p>B. Gauss-Jordan elimination</p> <p>C. Matrix algebra</p> <p>D. Inverse of a square matrix</p> <p>E. Solving matrix equations and their applications</p>
Lecture	8	III	<p>LINEAR PROGRAMMING</p> <p>A. Solve linear programming problems as mathematical models</p> <p>B. Solve linear inequalities in two or three variables</p> <p>C. Graphical solutions of linear programming problems</p>
Lecture	6	IV	<p>SETS AND COUNTING TECHNIQUES</p> <p>A. Use DeMorgan's laws to negate a compound statement.</p> <p>B. List the elements in the intersection, union, difference, and complements of sets.</p> <p>C. Use Venn diagrams to compute the cardinality of compound sets.</p> <p>D. The multiplication principle for counting</p> <p>E. Permutations and combinations</p>
Lecture	10	V	<p>PROBABILITY</p> <p>A. Equally likely outcomes</p> <p>B. Outcomes with unequal probability</p> <p>C. Odds</p> <p>D. Conditional probability</p> <p>E. Addition rule for probability and mutually exclusive events</p> <p>F. Multiplication rule for probability and independent events</p> <p>G. Bayes' Theorem</p> <p>H. Random variables, probability distributions, and expected value</p>
Lecture	8	VI	<p>STATISTICS</p> <p>A. Organizing and displaying data</p> <p>B. Measures of central tendency</p> <p>C. Measures of dispersion</p> <p>D. Bernoulli Trials and binomial experiments</p> <p>E. Normal distributions</p>
Lecture	6	VII	<p>MARKOV CHAINS</p> <p>A. The transition matrix and its properties</p> <p>B. Regular Markov chains</p>

Lecture	12	VIII	MATHEMATICS OF FINANCE A. Exponential and logarithmic functions B. Simple interest C. Compound interest D. Future and present value D. Annuities and sinking funds F. Amortization
<b>Total Lecture Hours</b>		72	
<b>Total Laboratory Hours</b>		0	
<b>Total Hours</b>		72	

#### IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

##### A. PRIMARY METHOD OF EVALUATION:

Problem solving demonstrations (computational or non-computational)

##### B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

1. At the Boy Scout camp council, there are two boys from each of the states Iowa, New Mexico, Florida, and Maine. In how many ways can a committee of four be formed from among these boys, in which there is at least one boy from Maine?

##### C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. A dietitian is to prepare two foods in order to meet certain requirements. Each pound of Food A contains 100 units of vitamin C, 40 units of vitamin D, 10 units of vitamin E, and costs \$0.20. Each pound of Food B contains 10 units of vitamin C, 80 units of vitamin D, 5 units of vitamin E, and costs \$0.15. Any mixture of Food A and Food B is delicious! The dietitian must produce a mixture that contains at least 260 units of vitamin C, at least 320 units of vitamin D, and at least 50 units of vitamin E. How many pounds of each type of food should be used in order to minimize the cost?
2. The voting population in Mt Vernon remains rather constant at 12,000. From election to election, the changes among Democrats, Republicans, and Independents are as shown in the transition matrix below (the rows represent this election, the columns represent next election):
 

..... Dem Rep Ind  
 Dem 0.80 0.15 0.05  
 Rep 0.08 0.90 0.02  
 Ind 0.20 0.15 0.65

In the long run, how many voters will each party have?

##### D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Other exams  
Quizzes  
Homework Problems

#### V. INSTRUCTIONAL METHODS

Lecture

**Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.**

## VI. WORK OUTSIDE OF CLASS

Study  
Required reading  
Problem solving activities

**Estimated Independent Study Hours per Week: 8**

## VII. TEXTS AND MATERIALS

### A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

Barnett, Ziegler and Byleen. FINITE MATHEMATICS FOR BUSINESS, ECONOMICS, LIFE SCIENCES AND SOCIAL SCIENCES, 13<sup>th</sup> ed., Pearson 2015, Discipline Standard

### B. ALTERNATIVE TEXTBOOKS

### C. REQUIRED SUPPLEMENTARY READINGS

### D. OTHER REQUIRED MATERIALS

## VIII. CONDITIONS OF ENROLLMENT

### A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
Course Prerequisite Mathematics-73 or	Sequential
Course Prerequisite Mathematics-80 or	Sequential
Course Prerequisite Mathematics-67 or	Sequential
Non-Course Prerequisite	Placement assessment is an officially recognized mechanism for controlling enrollment in mathematics courses. Placement cut scores are periodically reviewed by faculty and adjusted to match success rates in the target courses. Students who do not meet the placement cut score for this class are statistically highly unlikely to succeed.

### B. Requisite Skills

Requisite Skills
1. Basic skills related to linear functions, including graphing linear functions, evaluating linear functions, solving linear equations, finding and interpreting the slope and equation of a line. MATH 80 - Solve problems involving a variety of function types, including linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions. MATH 73 - Solve problems involving a variety of function types, including linear, quadratic, polynomial, rational and radical functions, as well as the absolute value function. MATH 67 - Describe the effect that a change in the value of one variable has on the values of other variables that share an algebraic relationship. MATH 67 - Describe the behavior of linear and exponential functions using symbolic expressions, verbal descriptions, tables and graphs.

<p>2. Solve systems of linear equations using graphical and algebraic methods.  MATH 73 - Solve a variety of equations and inequalities, as well as systems of equations and inequalities, using algebraic and graphical methods. Types of equations include linear, quadratic, polynomial, rational and radical equations, as well as absolute value equations.  MATH 80 - Solve a variety of equations and inequalities, as well as systems of equations and inequalities, using algebraic and graphical methods. Types of equations include linear, quadratic, polynomial, rational, radical, exponential and logarithmic equations.  MATH 67 - Construct and use equations and inequalities to represent relationships involving one or more unknown or variable quantities to solve problems.</p>
<p>3. Solve and graph linear inequalities and systems of linear inequalities.  MATH 80 - Solve a variety of equations and inequalities, as well as systems of equations and inequalities, using algebraic and graphical methods. Types of equations include linear, quadratic, polynomial, rational, radical, exponential and logarithmic equations.  MATH 73 - Solve a variety of equations and inequalities, as well as systems of equations and inequalities, using algebraic and graphical methods. Types of equations include linear, quadratic, polynomial, rational and radical equations, as well as absolute value equations.  MATH 67 - Construct and use equations and inequalities to represent relationships involving one or more unknown or variable quantities to solve problems.</p>

**C. Recommended Preparations (Course and Non-Course)**

Recommended Preparation	Category and Justification
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**D. Recommended Skills**

Recommended Skills
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**E. Enrollment Limitations**

Enrollment Limitations and Category	Enrollment Limitations Impact
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**Course created by A. Filman on 05/01/1975.**

**BOARD APPROVAL DATE:**

**LAST BOARD APPROVAL DATE: 04/20/2020**

**Last Reviewed and/or Revised by: Linda Ho on 11/10/2019.**