



El Camino College
COURSE OUTLINE OF RECORD – Approved

I. GENERAL COURSE INFORMATION

Subject and Number: Mathematics 120
Descriptive Title: Liberal Arts Mathematics
Course Disciplines: Mathematics
Division: Mathematical Sciences

Catalog Description:

This course surveys general ideas and concepts of mathematics, including mathematics of finance, set theory, combinatorics, probability, statistics, voting systems, logic and applications of Euclidean geometry.

Note: This course meets the CSU general education requirement for mathematics and quantitative reasoning.

Conditions of Enrollment:

Prerequisite

Mathematics 73 or Mathematics 80 with a minimum grade of C in prerequisite or qualification by appropriate assessment.

Course Length:	X Full Term	Other (Specify number of weeks):
Hours Lecture:	3.00 hours per week	TBA
Hours Laboratory:	0 hours per week	TBA
Course Units:	3.00	

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: Fall 1999 Other:

6 – Mathematics Competency
Term: Other:

CSU GE:

B4 - Mathematics/Quantitative Thinking
Term: Fall 1999 Other:

IGETC:

2A - Mathematical Concepts and Quantitative Reasoning
Term: Fall 1999 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. **Solve Loan Problems:** Apply techniques of simple and compound interest to solve loan and annuity problems.
2. **Solve Application Problems Using Graphical Methods:** Solve application problems using graphical methods such as: 3-ring Venn diagrams, truth tables, Euclidean geometries.
3. **Analyze Voting System:** Analyze voting systems, methods of apportionment/representation to further the understanding of the political process.
4. **Solve Application Problems:** Solve application problems using basic counting principles, permutations, combinations, probability, expected value and frequency distributions.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <http://www.elcamino.edu/academics/slo/>.

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. Calculate simple and compound interest and apply these techniques to loan and annuity problems.
 - Objective Exams
2. Construct 3-ring Venn diagrams to solve application problems.
 - Homework Problems
3. Distinguish between basic counting principles, permutations and combinations.
 - Objective Exams
4. Solve practical problems using probability and expected value.
 - Objective Exams
5. Construct a frequency distribution and calculate the mean, median, mode and standard deviation of ungrouped and grouped data.
 - Homework Problems
6. Construct truth tables to determine the validity of a real life argument
 - Homework Problems
7. Examine voting systems, methods of apportionment and representation to further understanding of the political process.
 - Homework Problems
8. Understand the basics of Euclidean geometry, and apply them to regular polygon tessellations.
 - Homework Problems

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	9	I	MATHEMATICS OF FINANCE A. Consumer Mathematics B. Algebra Modeling of Percent Increase and Decrease C. Applications of Simple Interest D. Applications of Compound Interest E. Future and Present Value F. Annuities and retirement investment G. Loans, refinancing and mortgages
Lecture	6	II	SET THEORY A. Notations - Sets, Elements, Subsets, Proper Subsets B. Cardinality of Sets C. Set Equality D. Operations of Sets - Union, Intersection, Complement E. Applications using Venn Diagrams
Lecture	4	III	TOPICS IN COMBINATORICS A. Fundamental Principle of Counting B. Permutations C. Combinations
Lecture	8	IV	PROBABILITY A. History B. Basics of Probability C. Complement and Union of Events D. Probability Using Counting Techniques E. Genetics and Odds F. Expected Value
Lecture	7	V	STATISTICS A. Organizing Data and Visualizing Data B. Frequency Distributions C. Histograms and Bar Graphs D. Measures of Central Tendency - Mean, Median, Mode E. Measures of Dispersion - Range and Standard Deviation F. Normal Distributions
Lecture	8	VI	LOGIC A. Intro to Logic B. Statements and Logical Connectives C. Inductive Reasoning D. Deductive Reasoning E. Symbolic Logic - Negation, Conjunction, Disjunction, Conditional, Biconditional F. Converse, Inverse, Contrapositive G. Tautologies, Contradictions, Equivalent Statements H. Truth Tables I. Analyzing Arguments Using Truth Tables J. Euler Diagrams to Verify Syllogisms
Lecture	9	VII	VOTING SYSTEMS

			A. Types of voting systems - Plurality, Borda Count, Plurality with Elimination, Pairwise Comparison B. Flaws of Voting Methods C. Preference Tables D. Standard Quotas and Standard Divisors E. Apportionment Methods - Hamilton's, Jefferson's and Webster's Method F. Flaws of Apportionment Methods - Alabama Paradox and Population Paradox
Lecture	3	VIII	Euclidean Geometry and Its Applications A. Euclidean Geometry - Points, Lines, Planes, Angles B. Types of Polygons and Their Angles C. Regular Polygon Tessellations
Total Lecture Hours	54		
Total Laboratory Hours	0		
Total Hours	54		

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:

The Hopkins family is purchasing a yacht priced at \$75,000. If the down payment is \$15,000, find the monthly payments of their ten-year loan with an APR of 8%, compounded monthly.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. Translate the following argument into symbolic form and determine whether it is logically correct by constructing a truth table: Money causes all the world's troubles or money helps the poor. If money helps the poor, it is not the cause of all the world's troubles. Money is the cause of all the world's troubles. Therefore, money does not help the poor.
2. An insurance company has agreed to insure a customer's art collection for \$250,000 against fire loss. The company estimates that there is a 1% chance that the art will be destroyed by fire. Find the cost of the premiums to the customer if the company tries to maintain an expected value for the profit of \$2000 on each policy.

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: 6

VII. TEXTS AND MATERIALS

A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

Thomas Pirnot. Mathematics All Around. 6th ed. Pearson, 2018

B. ALTERNATIVE TEXTBOOKS

Dave Sobecki. Math in Our World. 4th ed. McGraw Hill Education, 2019.

Allen Angel. A Survey of Mathematics with Applications. 10th ed. Pearson, 2017.

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
Non-Course Prerequisite	They need prerequisites skills to do well in the course or they won't be prepared for it.

B. Requisite Skills

Requisite Skills
1. Carry out numerical operations and manipulate expressions, including expressions with rational and negative exponents. MATH 73 - Carry out numerical operations and manipulate algebraic expressions, including expressions with rational and negative exponents. MATH 80 - Carry out numerical operations and manipulate algebraic expressions, including expressions with rational and negative exponents, complex numbers, and logarithms. MATH 73 - Using numerical, symbolic and graphical methods, model application problems, solve them and interpret the results in the context of the problem. MATH 80 - Using numerical, symbolic and graphical methods, model application problems, solve them and interpret the results in the contact of the problem.

2. Solve linear and quadratic equations, including applications using linear and quadratic equations.
 MATH 73 - Recognize functional relationships in the form of graphs, data or symbolic equations.
 MATH 80 - Recognize functional relationships in the form of graphs, data or symbolic equations.
 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 80 - Solve problems involving a variety of function types, including linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions.
 MATH 80 - Graph a variety of functions and relations and draw connections between these graphs and solutions to problems.
 MATH 73 - Graph a variety of functions and relations and draw connections between these graphs and solutions to problems.
 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.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
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D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact
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Course created by Allen Bollinger on 01/15/1988.

BOARD APPROVAL DATE: 02/16/1999

LAST BOARD APPROVAL DATE: 12/16/2019

Last Reviewed and/or Revised by Megan Granich

Date: October 14, 2019

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