

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Mathematics 120 – Quantitative Reasoning

3 hours lecture, 3 units

Catalog Description

The students will survey the historical development of mathematics and apply topics such as logic, geometry, probability, statistics, problem solving, sequences and patterns, numeration systems, and personal finance to develop quantitative reasoning skills. Designed for students who do not intend to prepare for a career in science or business.

Prerequisite

Appropriate placement beyond intermediate algebra or equivalent

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Understand basic mathematics vocabulary and terminology.
- 2) Computing and simplifying using the basic operations on real numbers and algebraic expressions.
- 3) Solve linear equations.
- 4) Geometry: understand definitions of the basic shapes; familiarity with perimeter, area and volume.
- 5) Graph linear equations.

Course Content

- 1) Logic (inductive vs. deductive reasoning)
- 2) Patterns and predictions from pattern recognition or formulas
- 3) Personal finance (may include budgeting, installment buying, investments, or student loans)
- 4) Spatial Analysis (may include congruence and similarity, polygons, area and perimeter, or use of shapes)
- 5) Diagrams, Figures, and Charts (may include truth tables, histograms, mapping, or Euler diagrams)
- 6) Relevance of topics to mathematical applications and to current social issues
- 7) General problem-solving techniques as well as those specific to current events
- 8) Historical context for survey topics

Course Objectives

Students will be able to:

- 1) Utilize the concept of logic (inductive vs. deductive reasoning), set theory, and various problem-solving strategies to analyze problems and to formulate and carry out appropriate solution strategies.
- 2) Identify and practice problem solving skills related to survey and historical topics.
- 3) Apply logic and reasoning to problems based on life experiences or current events.
- 4) Solve problems using diagrams, maps, graphs, and other geometric figures.
- 5) Calculate and interpret quantities important for understanding probability, statistics, personal finance, or other survey topics.
- 6) Analyze patterns in order to develop solutions, formulas, or predictions about survey concepts.
- 7) Communicate reasons why solutions are correct or applicable, and the value of understanding a given survey topic.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Homework assignments that measure students' ability to solve varieties of problems using concepts of logic as well as linear system theory.
- 2) Quizzes that measure students' ability to work with linear and quadratic functions and inequalities, as well as work with different systems of numeration, sequences and series.
- 3) Projects that measure students' ability to compare and contrast mathematical concepts throughout history as well as the application of mathematical concepts in other fields.
- 4) Exams which measure students' ability to apply and use appropriate concepts and terms from the fields of geometry and finite math.

Special Materials Required of Student

None

Minimum Instructional Facilities

Standard classroom with at least two walls of writing boards

Method of Instruction

- 1) Lecture and discussion
- 2) Group work
- 3) Teacher-guided discovery which leads students to generalizing and deriving their own formulas

Out of Class Assignments

- 1) **Reading:** Lecture notes; assigned textbook sections explaining mathematical concepts and procedures; instructional materials provided by the instructor; worked example sets; reference materials for mathematical symbols and notation; supplemental explanations from approved online resources; and documentation for graphing calculators or mathematical software.
- 2) **Writing / Problem Solving:** Problem sets requiring clear, step-by-step demonstration of reasoning using correct mathematical notation; written explanations supporting solutions and justifying methods; error analysis and revision of incorrect or incomplete work; solution summaries explaining conceptual understanding; problem-based learning tasks requiring application of multiple skills; written responses to mathematical prompts or inquiry problems; and organized documentation of problem-solving strategies used in individual or group assignments.
- 3) **Other:** Online homework assignments or quizzes using learning platforms; collaborative problem solving using shared documents or discussion boards; graph construction by hand and with technology; review and annotation of instructor feedback to revise and resubmit work; preparation for exams through practice tests and concept reviews; mathematical modeling activities using real-world data; use of graphing calculators or math software to explore and verify solutions; and completion of study logs, learning reflections, or structured practice plans to build mastery.

Texts and References

- 1) Required (representative example): Sobecki & Mercer. *Math in our World: A Quantitative Literacy Approach*. Fifth Edition. McGraw-Hill, 2025.
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Developing curiosity and confidence in solving problems using an individualized thinking process
- 2) Testing and evaluating the reasonableness of information presented
- 3) Identifying and applying the appropriate mathematics to the problem

- 4) Communicating methods of problem solving orally and in writing
- 5) Understanding and applying problem solving strategies using Polya's four steps
- 6) Using guess, revise, and test strategies
- 7) Using a variable to represent unknown quantities
- 8) Drawing diagrams to support problem solving
- 9) Looking for patterns to analyze and solve problems
- 10) Making lists to organize problem information
- 11) Solving simpler related problems to build toward a solution

Student Learning Outcomes

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

- 1) Use reasoning techniques and problem-solving strategies to categorize and solve a wide range of problems covered in a survey of mathematical topics.
- 2) Analyze patterns and apply visualization and organizational techniques to a range of topics that can be applied to liberal arts courses and life experiences.