

MATH 10 Course Outline as of Fall 2026**CATALOG INFORMATION**

Dept and Nbr: MATH 10 Title: NATURE OF MATH

Full Title: Nature of Mathematics

Last Reviewed: 10/20/2025

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6.5	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:

In this course, students will explore a variety of mathematical topics, develop their quantitative reasoning skills, and apply these to real-world applications. Topics include mathematical reasoning and a selection of the following: number systems, geometry, logic, sets, combinatorics, probability, statistics, graph theory, mathematical modeling, financial mathematics, matrices, and the history and culture of mathematics.

Prerequisites/Corequisites:

Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of intermediate algebra. Math Tier 1 or higher

Recommended Preparation:**Limits on Enrollment:****Schedule of Classes Information:**

Description: In this course, students will explore a variety of mathematical topics, develop their quantitative reasoning skills, and apply these to real-world applications. Topics include

mathematical reasoning and a selection of the following: number systems, geometry, logic, sets, combinatorics, probability, statistics, graph theory, mathematical modeling, financial mathematics, matrices, and the history and culture of mathematics. (Grade or P/NP)

Prerequisites/Corequisites: Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of intermediate algebra. <https://assessment.santarosa.edu/math-placement-calculations>>Math Tier 1 or higher

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area	Effective:	Inactive:
	B	Communication and Analytical Thinking	Fall 2025
	L2	Mathematical Concepts & Quantitative Reasoning	
	MC	Math Competency	
	B	Communication and Analytical Thinking	Fall 1981
	MC	Math Competency	Fall 2025
CSU GE:	Transfer Area	Effective:	Inactive:
	B4	Math/Quantitative Reasoning	Fall 1981
IGETC:	Transfer Area	Effective:	Inactive:
	2A	Mathematical Concepts & Quantitative Reasoning	Fall 1981
CSU Transfer:	Transferable	Effective: Fall 1981	Inactive:
UC Transfer:	Transferable	Effective: Fall 1981	Inactive:

CID:

Certificate/Major Applicable:

Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Apply the principles of inductive and deductive reasoning.
2. Demonstrate proficiency in mathematical skills and conceptual understanding within five of the following topics: number systems, geometry, logic, sets, combinatorics, number theory, probability, statistics, graph theory, mathematical modeling, mathematics of democracy, financial mathematics, matrices, or the history and culture of mathematics.
3. Apply mathematical concepts to a variety of real-world problems.

Objectives:

At the conclusion of this course, the student should be able to:

1. Define and apply inductive and deductive reasoning.
2. Demonstrate ability to perform five of the following objectives:
 - A. Define and use number systems of different bases.
 - B. Define and apply concepts of perimeter, areas and volumes in Euclidean geometry, and other selected topics in geometry.
 - C. Demonstrate proficiency with symbolic logic and constructing truth tables.
 - D. Perform set operations and use the rules of cardinality and Venn diagrams to solve application problems.
 - E. Apply counting techniques, permutations, and combinations.
 - F. Define and classify various sets of numbers and identify examples in art and nature.
 - G. Determine the probability of a specified event using rules of probability.
 - H. Define frequency distributions and measures of central tendency and dispersion, and create graphical displays of data.
 - I. Understand the basic terms and concepts of graph theory, utilize Euler's Theorems and apply basic graph algorithms.
 - J. Apply mathematical models such as linear, quadratic, exponential, and logarithmic, to real-world problems.
 - K. Determine results of elections or apportionments using various methods and identify problems with outcomes.
 - L. Solve applied problems in finance including simple and compound interest, annuities, sinking funds and amortization.
 - M. Perform operations with matrices and use them to solve systems of linear equations, including application problems.
 - N. Describe the historical development of mathematics, the role of theorem and proof in mathematical thought, and significant mathematical results and mathematicians.

Topics and Scope:

Topic I required. Instructor-selected topics to include five from II-XV.

- I. Mathematical Reasoning
 - A. Inductive reasoning
 - B. Deductive reasoning
- II. Number Systems
 - A. Non-place systems
 - B. Place systems
 1. Base conversion
 2. Arithmetic in different bases
 - C. Applications in cultures and civilizations
- III. Geometry
 - A. Length, area, volume
 - B. Euclidean geometry
 - C. Pythagorean theorem
 - D. One or more additional topics may include (but not limited to)
 1. Non-Euclidean geometry
 2. Conic sections
 3. Polyhedra
 4. Fractals
 5. Tessellations
- IV. Logic
 - A. Symbolic logic
 1. Negation
 2. Conjunction

- 3. Disjunction
- 4. Conditional
- B. Truth tables
 - 1. Equivalent statements
 - 2. Validity of arguments
- V. Sets
 - A. Set operations
 - B. Cardinal number of a set
 - C. Applications of Venn diagrams
- VI. Combinatorics
 - A. Fundamental counting principle
 - B. Combinations
 - C. Permutations
- VII. Number Theory
 - A. Sets of numbers such as prime, perfect, amicable
 - B. Fibonacci and Golden Ratio
 - C. One or more additional topics may include (but not limited to)
 - 1. Cardinality of infinite sets
 - 2. Modular arithmetic
 - 3. Cryptography
- VIII. Probability
 - A. Probabilities from simple events/sample spaces
 - B. Relative frequency/Law of Large Numbers
 - C. Rules of probability
 - D. Conditional probability
 - E. One or more additional topics may include (but not limited to)
 - 1. Probabilities from combinatorics
 - 2. Expected value
 - 3. Independence/dependence
- IX. Statistics
 - A. Frequency distributions
 - B. Measures of central tendency and dispersion
 - C. Data in graphs
 - D. One or more additional topics may include (but not limited to)
 - 1. Distributions
 - 2. Margin of error
- X. Graph Theory
 - A. Graphs
 - B. Euler's Theorems
 - C. Hamilton Circuit
 - D. Algorithms
 - E. One or more additional topics may include (but not limited to)
 - 1. Networks
 - 2. Scheduling
- XI. Mathematical Modeling
 - A. Linear
 - B. Quadratic
 - C. Exponential
 - D. Logarithmic
 - E. Regression
- XII. Mathematics of Democracy (two or more of the following topics)
 - A. Voting Systems

1. Methods
 2. Fairness Criteria
 3. Arrow's Impossibility Theorem
- B. Apportionment
1. Methods
 2. Quota Rule and Paradoxes
 3. Balinski-Young Impossibility Theorem
- C. Redistricting
1. Gerrymandering
 2. Measures of Compactness
- XIII. Financial Mathematics
- A. Simple and compound interest functions
 - B. Annuities
 - C. Sinking funds
 - D. Amortization
- XIV. Matrices
- A. Operations
 - B. Solving systems of equations
 - C. One or more applications may include (but not limited to)
 1. Markov chains
 2. Game theory
 3. Simplex method
- XV. History and Culture of Mathematics
- A. Overview of the historical development and cultural aspects of mathematics
 - B. Role of theorem and proof in mathematical thought
 - C. Significant mathematical results and mathematicians

Assignment:

1. Reading assignments (20-50 pages per week)
2. Problem set assignments from required text(s) or supplementary materials chosen by the instructor (1-4 per week)
3. Quizz(zes) (0-4 per week)
4. Exams (2-6)
5. Final Exam
6. Project(s) (for example, computer explorations or modeling activities) (0-10)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing
0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem sets

Problem solving
5 - 25%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations
0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Final Exam, Exams and Quiz(zes)

Exams
65 - 85%

Other: Includes any assessment tools that do not logically fit into the above categories.

Project(s)

Other Category
0 - 10%

Representative Textbooks and Materials:

Mathematics: A Practical Odyssey. 8th ed. Johnson, David and Mowry, Thomas. Cengage. 2016. (classic).

Math in Society. 2.6 Ed., Lippman, Creative Commons. 2022. (classic).

Math in Society. 2.6 Ed., Lippman, <https://www.opentextbookstore.com/mathinsociety/>, Creative Commons Attribution-ShareAlike 4.0 International License.