GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

# Course Outline

**COURSE:** MATH 14 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2021 CURRICULUM APPROVAL DATE: 12/8/2020

SHORT TITLE: MATH/LIBERAL ARTS

LONG TITLE: Math for the Liberal Arts

| Units | Number of Weeks | Type | Contact Hours/Week | Total Contact Hours |
|---|---|---|---|---|
| 3 | 18 | Lecture: | 3 | 54 |
| | | Lab: | 0 | 0 |
| | | Other: | 0 | 0 |
| | | Total: | 3 | 54 |
| | | Total Learning Hrs: | 162 | |

**COURSE DESCRIPTION:**

Survey of selected topics from contemporary mathematics to introduce the liberal arts student to a variety of mathematical ideas, methods and historical trends. Topics include systems of numeration, logic, set theory, mathematical modeling, geometry, trigonometry, mathematics of finance, probability and statistics. PREREQUISITE: Math 240 or Math 242 with a grade of 'C' or better.

PREREQUISITES:

Completion of MATH 233, as UG, with a grade of C or better.
OR
(Completion of MATH 233A, as UG, with a grade of C or better.
AND Completion of MATH 233B, as UG, with a grade of C or better.)
OR
Completion of MATH 240, as UG, with a grade of C or better.
OR
Completion of MATH 242, as UG, with a grade of C or better.
OR
Completion of MATH 235, as UG, with a grade of C or better.
OR
Completion of MATH 3, as UG, with a grade of C or better.
OR
Completion of MATH 6, as UG, with a grade of C or better.
OR
Completion of MATH 7, as UG, with a grade of C or better.
OR
Completion of MATH 5, as , with a grade of  or better.
OR
Completion of MATH 8A, as UG, with a grade of C or better.
OR
Completion of MATH 8B, as UG, with a grade of C or better.
OR
Completion of MATH 1A, as UG, with a grade of C or better.
OR
Completion of MATH 1B, as UG, with a grade of C or better.
OR
Completion of MATH 1C, as UG, with a grade of C or better.
OR
Score of 33 on Intermediate Algebra
OR
Score of 13 on Pre-Calculus
OR
Score of 2600 on Accuplacer Math
OR
Score of 2600 on MM CCCApply Math
OR
Score of 2600 on MM Placement Tool Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed

**STUDENT LEARNING OUTCOMES:**

1. Demonstrate literacy in a variety of mathematical topics including set theory, logic, mathematical modeling, geometry, trigonometry, systems of numeration, probability and statistics.

Measure of assessment: Homework, quiz, exam, project.

Year assessed, or planned year of assessment: 2019

Semester: Spring

**CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS**

Curriculum Approval Date: 12/8/2020

**DE MODIFICATION ONLY**

1. Hours: 6

Review of Operations on Real Numbers

Student Performance Objectives: Students will review exponents and order of operations, evaluate and manipulate algebraic

expressions. Review operations on fractions, decimals, integers, and percents.

Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.

2. Hours: 8

Set Theory and Logic

Set Theory:

Well-defined sets, the empty set, set notation, subsets, set operations, Cartesian products, cardinality and one-to-one correspondence. Subsets versus proper subsets, equivalent versus equal sets.

Venn diagrams: representations of sets, verification of set relationships, applications.

Real numbers and their subsets, rational and irrational numbers, properties of the real numbers.

Infinite sets, transfinite numbers, and Cantor's influence on these ideas.

Logic:

Translation of compound statements into symbolic statements.

Creation of truth tables for compound statements using logical connectives.

Tautologies and logically equivalent statements including the use of DeMorgan's laws.

Converse, contrapositive, and inverse of a given conditional statement, equivalence of these forms.

Determination of the validity of an argument using truth tables, Venn diagrams, or by recognizing valid forms.

Performance Objectives: Students will demonstrate knowledge of set properties and operations. Students will use sets and Venn diagrams to analyze a situation, distinguish between inductive and deductive reasoning, and make deductive arguments. They will create symbolic statements and truth tables to represent arguments and determine valid conclusions based on given assumptions.

Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will successfully complete a project dealing Zeno's paradoxes or the use of Logic by Lewis Carroll.
3. Hours: 6
Systems of Numeration
Types of numeration systems such as Egyptian, Greek, Chinese, Roman numerals, Babylonian, Mayan, etc., including different base systems.
Arithmetic operations in other bases as well as clock and modular arithmetic.
Properties of finite and infinite axiomatic systems such as commutative, associative, inverse, and identity.
Groups, including modular systems and systems defined by tables and symmetries.
Number Theory.
Performance Objectives: Students will compare and contrast different numeration systems, base systems, and axiomatic systems.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
4. Hours: 6
Geometry and Trigonometry
Fractals and fractal dimension.
Tessellations (regular, semi-regular, non-periodic tilings).
Proofs of the Pythagorean Theorem.
Axiomatic systems, Euclidean geometry, and non-Euclidean geometries.
Basic concepts of right triangle trigonometry.
Applications of right triangle trigonometry to problem solving.
Performance Objectives: Students will create and analyze fractals and tessellations. They will differentiate between Euclidean and non-Euclidean geometries. Students will use sine, cosine, and tangent to solve right triangles. They will
use trigonometric functions to solve various application problems involving right triangles.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will complete a project exploring fractal dimensions, area, and volume.
5. Hours: 6
Mathematical Modeling
Review the concept of a function and graphing.
Modeling of various real-world situations with an emphasis on linear, quadratic, exponential, and logarithmic functions.
Use of models to analyze and make predictions about real-world situations.
Determination of reasonable domains in specific applications and of the validity of quantitative results.
Characteristics and trends of various mathematical models, identification of appropriate models to fit various real-life situations.
Performance Objectives: Students will identify and graph linear models, quadratic models, exponential models, and logarithmic models. Students will construct and solve equations to represent real-life applications.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will complete an out of class group project which requires them to explore the concept of mathematical models in everyday life.

6. Hours: 6
Math of Finance
Simple and compound interest formulas, annuities, and amortized loans.
Performance Objectives: Students will apply the appropriate formulae to calculate interest, interest rates, annuities, and amortized loans to consumer applications. They will write an amortization schedule.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will complete a project which addresses mortgage rates and annuities.
7. Hours: 6
Probability
Randomness, populations, samples, sample spaces, and events.
Probability calculation using counting methods including the basic counting law, tree diagrams, Venn diagrams, combinations, and permutations.
Mutually exclusive and independent events.
Compound and conditional probabilities.
Performance Objectives: Students will calculate probabilities using various methods. They will be able to explain the difference between permutations and combinations. Students will determine the probability and odds of single events using experimental and theoretical methods. They will be able to explain the difference between independent and dependent events and apply the Counting Principle. Students will apply the concepts of probability, odds, and expected value.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will spend one session in a computer lab using statistical software to explore the Law of Large Numbers.
8. Hours: 8
Statistics
Data collection and organization.
Measures of central tendency (mean, median, and mode) and dispersion (variance and standard deviation).
Frequency distributions, histograms, and pie charts.
Probability calculation using the normal distribution, z-scores, and probability tables.
Construction of confidence intervals.
Performance Objectives: Students will analyze a data set using measures of central tendency, measures of dispersion, tables, and graphs. Students will interpret the meaning of the margin of error and confidence interval of an estimate.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply,
and explore concepts taught in class.
Project: Students will work in small groups to perform a simple survey and use statistical methods learned in this section to analyze
the results.
OPTIONAL
Introduction to Calculus
Rate of change and the slope of a line.
Explore the derivative as a slope of the tangent line to the curve.
Apply the derivative formula and simple power rule for differentiation.
Applications of the derivative.

Approximation of the area under a curve.
Performance Objectives: The students will use the derivative formula and differentiation rules to find the derivative of a function. The students will explain the concepts of tangent lines, slopes of tangent lines to curves, relative maxima and minima and areas bounded by curves. The students will perform the necessary calculations to find the slopes of the tangent lines of curves, relative maxima and minima, and areas bounded by curves. Students will estimate instantaneous rates of change and area under a curve using tables and graphs.
Out-of-Class Assignments: Students will complete homework assignments which require them to explain, apply, and explore concepts taught in class.
Project: Students will complete a project in which they investigate the relationship between the derivative and velocity.
Hours: 2
Final Exam

**METHODS OF INSTRUCTION:**
Instruction will follow a standard lecture/discussion format. Extensive homework will be assigned in order to assure mastery of the concepts covered in class. Students will be given opportunities to work together on problems given in class and group projects.

**OUT OF CLASS ASSIGNMENTS:**
Required Outside Hours: 108
Assignment Description:
1. Regularly assigned homework that requires students to analyze and study pertinent text material, solved examples and lecture notes.
2. Regularly assigned homework that requires students to apply the principles and skills covered in class by solving related problems.

**METHODS OF EVALUATION:**
Writing assignments
Percent of total grade: 10.00 %

Out-of-class projects
Problem-solving assignments
Percent of total grade: 10.00 %
Homework, quizzes

Objective examinations
Percent of total grade: 80.00 %
In-class written exams

**REPRESENTATIVE TEXTBOOKS:**
Required Representative Textbooks
Angel, Abbott, Runde. A Survey of Mathematics with Applications. Pearson,2017.
ISBN: 9780134112107
Reading Level of Text, Grade: 12 Verified by: Jennifer Nari

**ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

GAV B4, effective 200170

CSU GE:

CSU B4, effective 200170

IGETC:

IGETC 2A, effective 200170

CSU TRANSFER:

Transferable CSU, effective 200170

UC TRANSFER:

Transferable UC, effective 200170

**SUPPLEMENTAL DATA:**

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN:
CAN Sequence:
CSU Crosswalk Course Department: MATH
CSU Crosswalk Course Number: 14
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000038393
Sports/Physical Education Course: N
Taxonomy of Program: 170100