

College of San Mateo
Official Course Outline

1. **COURSE ID:** MATH 268 **TITLE:** Discrete Mathematics **C-ID:** MATH 160
Units: 4.0 units **Hours/Semester:** 64.0-72.0 Lecture hours; and 128.0-144.0 Homework hours
Method of Grading: Letter Grade Only
Prerequisite: MATH 251

2. **COURSE DESIGNATION:**
Degree Credit
Transfer credit: CSU; UC
AA/AS Degree Requirements:
 CSM - COMPETENCY REQUIREMENTS: C1 Math/Quantitative Reasoning Basic Competency
CSU GE:
 CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 -
 Mathematics/Quantitative Reasoning
IGETC:
 IGETC Area 2: MATHEMATICAL CONCEPTS AND QUANTITATIVE REASONING: A: Math

3. **COURSE DESCRIPTIONS:**
Catalog Description:
 Covers topics in discrete mathematics with particular emphasis on applications to computer science. Includes logic, sets, functions and relations, mathematical induction, recursion, Boolean algebra, elementary number theory, and probability. Extra supplies may be required.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
 Upon successful completion of this course, a student will meet the following outcomes:
 1. Use recursion to analyze algorithms and programs;
 2. Write proofs using symbolic logic and Boolean Algebra;
 3. Use sets to solve problems in combinatorics and probability theory;
 4. Apply matrices to analyze graphs and trees; and
 5. Use finite state machines to model computer operations.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
 Upon successful completion of this course, a student will be able to:
 1. Use recursion to analyze algorithms and programs;
 2. Write proofs using symbolic logic and Boolean Algebra;
 3. Use sets to solve problems in combinatorics and probability theory;
 4. Apply matrices to analyze graphs and trees; and
 5. Use finite state machines to model computer operations.

6. **COURSE CONTENT:**
Lecture Content:
 1. Formal logic including statements, symbolic representation, tautologies, propositional logic, quantifiers, predicates, and validity, predicate logic, and logic programming;
 2. Proofs, recursion, and analysis of algorithms including proof techniques, proof by induction, proof of correctness programming, recursive definitions, recurrence relations, and analysis of algorithms;
 3. Sets, combinatorics, probability, and number theory including counting, principle of inclusion and exclusion; Pigeonhole Principle, permutations and combinations, and Binomial Theorem;
 4. Relations, functions, and matrices including relations and databases, modular arithmetic;
 5. Graphs and trees including graphs and their representations, trees and their representations, decision trees, and Huffman Codes;
 6. Graph algorithms including directed graphs and binary relations; Warshall's algorithm, Euler Path and Hamiltonian Circuit, shortest path and minimal spanning tree, traversal algorithms, and articulation points and computer networks;
 7. Boolean Algebra and computer logic including Boolean algebra structure, logic networks, and minimization; and
 8. Modeling arithmetic, computation, and languages including algebraic structures, finite-state machines, and formal languages.

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Discussion

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students will be required to explain concepts and compose logical arguments in writing assignments.

Example: Prove or disprove: If an integer is a perfect square then its cube root is irrational.

Reading Assignments:

Assignments requiring the student to read sections of the (discrete mathematics) textbook and/or selected materials supplied by the teacher. Example: Read the section in the textbook on Division into Cases and the Quotient-Remainder Theorem. Example: Read the instructor's handout on RSA Cryptography.

Other Outside Assignments:

Students will be assigned problem sets requiring students to compute, solve, construct, prove, and assess.

Example: A group of 8 people are attending the movies together. Two of them insist on sitting together. In how many ways may the 8 be seated in a row? Example: Prove: The product of any four consecutive integers is divisible by 8.

Also students will be encouraged to discuss and debate conceptual questions in classroom discussion and in study groups and students are encouraged to question whatever the teacher or other students do. Example: $f(n) = 2n$ is a mapping from the integers into the integers. Is f one to one? Prove or give a counter-example. Is f onto? Prove or give a counter-example Example: Do the set of real numbers more than 0 and less than one and the set of real numbers more than 0 and less than 2 have the same cardinality? Why or why not?

Collaborative work in or out of class may be assigned.

Work using computer software may be assigned.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Class Work
- C. Exams/Tests
- D. Group Projects
- E. Homework
- F. Oral Presentation
- G. Papers
- H. Projects
- I. Quizzes
- J. Written examination

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Rosen, Kenneth. *Discrete Mathematics and Its Applications*, ed. McGraw-Hill, 2018
- B. Epp, Susanna S.. *Discrete Mathematics with Applications*, ed. Cengage, 2019

Origination Date: November 2021

Curriculum Committee Approval Date: February 2022

Effective Term: Fall 2022

Course Originator: Christopher Walker