

III. Statement of Course Need

- A. This course serves as an elective in the Mathematics AS Degree.
- B. This course may serve as a math requirement for programs in Computer Science, Information Systems and Technology, and Mathematics.
- C. This course generally transfers as a general education course.
- D. This course generally transfers as a Mathematics program requirement or program elective.

IV. Place of Course in College Curriculum

- A. This course is a free elective.
- B. This course serves as a General Education course in Mathematics.
- C. This course meets a program requirement for AS degrees in Computer Science, Information Systems and Technology, and Mathematics.
- D. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

- A. Basic Structures and Foundations
 - 1. Sets
 - 2. Functions
 - 3. Sequences and Summations
 - 4. Matrices
 - 5. Relations: definitions and properties
 - 6. Representations of relations
 - 7. Equivalence relations

- B. Foundations of Logic and Proof
 - 1. Propositional Logic
 - 2. Quantifiers
 - 3. Rules of Inference
 - 4. Proof strategy
 - 5. Mathematical Induction
 - 6. Recursive definitions

- C. Foundations and Applications of Graph Theory
 - 1. Graphs: definitions and representations
 - 2. Connectivity
 - 3. Paths and circuits
 - 4. Shortest path algorithms
 - 5. Planar graphs and graph coloring
 - 6. Trees: definitions and representations
 - 7. Tree traversal
 - 8. Minimum spanning trees

- D. Other Topics
 - 1. Growth of functions; complexity
 - 2. Boolean functions and Karnaugh maps
 - 3. Languages and Grammars
 - 4. Finite State Machines

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

Students will be able to:

- 1. Apply mathematical arguments to problems (GE-NJ 2)
- 2. Solve problems quantitatively and symbolically (GE-NJ 2)

B. Course Learning Outcomes:

Students will be able to:

- 1. Apply operations or identities to sets, functions, and relations.
- 2. Apply concepts of logic and quantifiers.
- 3. Apply concepts of proof, mathematical induction, and recursion.
- 4. Utilize concepts of graph theory and trees to solve application problems.
- 5. Solve applied problems in topics such as: growth of functions; Boolean functions; Karnaugh maps; languages or grammars; finite state machines.

C. Assessment Instruments

- 1. Tests
- 2. Final examination
- 3. Projects
- 4. Quizzes

VII. Grade Determinants

- A. Cumulative final examination
- B. Tests
- C. Projects
- D. Individual teacher determinants

Modes of Teaching and Learning

- A. Tests
- B. Quizzes
- C. Cumulative final examination
- D. Projects
- E. Homework
- F. Small groups

VIII. Texts and Materials

Suggested Textbook: *Discrete Mathematics and Its Applications*, most recent edition, by Kenneth H. Rosen, McGraw Hill, Inc.

Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.

IX. Resources

No special resources are needed.

X. Honors Option:

This course does not have an honors option.