RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

MATH 255: DISCRETE MATHEMATICS

I. Basic Course Information

A. Course Number and Title: MATH 255 Discrete Mathematics

B. New or Modified Course: Modified Course

C. Date of Proposal: Fall 2024

D. **Effective Term: Fall 2025**

E. Sponsoring Department: Math and Computer Science

F. Semester Credit Hours: 4

G. Weekly Contact Hours: 4 Lecture: 4
Laboratory: 0
Out of class student work per week: 8

H. ☐ Prerequisite (s): MATH 152 Calculus II with a grade of C or higher or MATH 152H Calculus II Honors with a grade of C or higher or an AP score of 3 or higher on the Calculus BC exam.
☐ Corequisite (s) :

I. Laboratory Fees: None

II. Catalog Description

Prerequisite: MATH 152 Calculus II with a grade of C or higher or MATH 152H with a grade of C or higher or an AP score of 3 or higher on the Calculus BC exam. This course introduces the fundamental concepts of algebra and logic that are needed for computer science. It includes sets, relations, functions and proofs by induction along with their applications to problems in computer science.

III. Statement of Course Need

A. This course serves as an elective in the Mathematics AS Degree.
B. This course does not have a lab component.
C. This course generally transfers as a Mathematics program requirement or program elective or as a mathematics general elective dependent on the transfer institution.

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. A. Course Learning Outcomes

At the completion of the course, students will be able to:

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

B. 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. Check One: ☐Honors Course ☐Honors Options ☒ N/A