RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

MATH 124 MATHEMATICAL THINKING

I. Basic Course Information

A. Course Number and Title: MATH 124 Mathematical Thinking

B. New or Modified Course: Modified

C. Date of Proposal: Semester: Spring 2020

D. Effective Term: Fall 2020

E. Sponsoring Department: Mathematics and Computer Science

F. Semester Credit Hours: 1

G. Weekly Contact Hours: 1 Lecture: 1
Laboratory: 0
Out of Class Student Work Per Week: 2

H. Corequisites: MATH 151 Calculus 1 or MATH 151H Calculus 1 Honors or higher

I. Laboratory Fees: None

J. Name and Telephone Number or E-Mail Address of Department Chair and Divisional Dean at time of approval:
Department Chair: Dr. Lori Austin, Lori.Austin@raritanval.edu, x8576
Divisional Dean: Dr. Sarah A. Imbriglio, Sarah.Imbriglio@raritanval.edu, x8241

II. Catalog Description

Prerequisites: Corequisite: MATH 151 Calculus 1 or MATH 151H Calculus 1 Honors or higher. This course is designed to introduce students to the techniques of understanding and writing mathematical proof. Emphasis is on analyzing and writing proofs. Problems from a variety of mathematical areas are considered. Topics include set notation and operations, proof techniques, and mathematical logic.

III. Statement of Course Need

A.This course serves as a math requirement for math majors.

B.This course has been developed to provide students the opportunity to obtain a level of rigor not currently available in existing courses. The concept of mathematical proof is fundamental to all areas of mathematics. The ability to understand the underlying logic in proof requires effective mathematical communication. This course will introduce the student to both the language and the logic used by mathematicians to work through problems that cannot be solved by simply substituting numbers into a template.

C.Transferability.

1. This course generally transfers as a free elective.
2. This course generally transfers as a mathematics elective.

IV. Place of Course in College Curriculum

A. This course serves as a free elective.
B. This course serves as a required course for all math majors.
C. Course transferability: for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities go to their individual websites.

V. Outline of Course Content

A. Definitions and terminology

B. Mathematical Logic

1. Disjunction, conjunction, implication, biconditional
2. Tautologies, contradictions, logical equivalence
3. Quantified statements

C. Methods of Proof

1. Direct Proof
2. Proof by Contrapositive
3. Proof by Cases
4. Proof by Contradiction
5. Mathematical Induction

D. Set Theory

1. Basic concepts of Set Theory
2. Set Operations
3. Extended Set Operations and Indexed Families of Sets

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

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

1. Determine the nature and extent of the information needed. (GE-NJ IL)
2. Identify and critically evaluate information. (GE-NJ IL)
3. To produce accurate lab reports. (GE-NJ-1)

B. Course Learning Outcomes

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

1. Use the different methods of proof to prove a mathematical statement.
2. Manipulate quantified statements following the rules of mathematical logic.
3. Translate a written statement into its mathematical form using appropriate quantifiers.

C. Assessment Instruments

A. Tests
B. Online Discussion Forums
C. Quizzes
D. Homework
E. Final Examination
F. Written presentations

VII. Grade Determinants

A. homework
B. tests
C. online forum discussions
D. quizzes

Primary formats, modes, and methods for teaching and learning that may be used in the course:

A. online forum discussions
B. small-group work
C. computer-assisted instruction
D. online videos
E. independent study

VIII. Texts and Materials

A. Suggested Textbook: *Mathematical Proofs: a Transition to Advanced Mathematics*, 3rd edition, by Gary Chartrand, Albert D. Polimeni and Ping Zhang, Pearson-Addison Wesley, 2012

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.

B. video
C. web sources
D. other computer-based sources
E. student writing

IX. Resources

A. Computer access is needed.