

**RARITAN VALLEY COMMUNITY COLLEGE  
ACADEMIC COURSE OUTLINE**

**MATH 114H PRECALCULUS HONORS**

**I. Basic Course Information**

- A. Course Number and Title: MATH 114H Precalculus Honors
- B. New or Modified Course: Modified Course
- C. Date of Proposal: Spring 2020
- D. Effective Term: Fall 2020
- E. Sponsoring Department: Mathematics and Computer Science
- F. Semester Credit Hours: 4
- G. Weekly Contact Hours: 5           Lecture: 3  
  Laboratory: 2  
  Out of class student work per week: 7
- H. Prerequisites:  
    GPA of 3.5 or permission of instructor; and  
    MATH 030 Intermediate Algebra or  
    Math 030R Intermediate Algebra w/Review or  
    appropriate score on math placement test
- I. Laboratory Fees: No
- 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](mailto:Lori.Austin@raritanval.edu), x8576  
    Divisional Dean: Dr. Sarah A. Imbriglio, [Sarah.Imbriglio@raritanval.edu](mailto:Sarah.Imbriglio@raritanval.edu),  
    x8241

**II. Catalog Description**

Prerequisite: GPA of 3.5 or permission of instructor; and MATH 030 Intermediate Algebra or Math 030R Intermediate Algebra w/Review or appropriate score on Placement Test. This is an honors course designed for students preparing to study calculus. The material covered in this course combines the material in BOTH MATH 112 Precalculus I and MATH 113 Precalculus II. As an honors course, it addresses the standard material in greater depth, and includes additional materials. Topics include the study of polynomial,

rational, logarithmic, exponential, and trigonometric functions and other topics from algebra, trigonometry and analytic geometry. The additional materials include sequences and series of arithmetic and geometric progressions, and the binomial theorem. Students who successfully complete Precalculus Honors can proceed directly into the study of calculus.

### **III. Statement of Course Need**

A. This course is a general education mathematics course and serves as a math requirement for various A.S. and A.A. programs. This course is a prerequisite to the study of calculus.

B. Honors courses in mathematics have been developed to provide mathematically talented students the opportunity to obtain a level of rigor not currently available in existing courses.

C. This course will generally transfer as a mathematics general education course.

D. The lab hour would allow spiraling the content to be implemented as well as time to apply the content for solving real life problems. An extra hour lab component would benefit Precalculus Honors because four hours a week is tight for course content that is more than double that of Precalculus I or II alone.

### **IV. Place of Course in College Curriculum**

A. This course is a free Elective for all programs.

B. This course serves as a General Education course in Mathematics.

C. This course meets a program requirement for various A.S. and A.A. degrees. To see course transferability: for New Jersey schools, go to the NJ Transfer website, [www.njtransfer.org](http://www.njtransfer.org); for all other colleges and universities, go to the individual websites.

D. This course generally transfers as a mathematics course in most liberal arts programs.

E. This course is an honors course.

### **V. Outline of Course Content**

A. Functions and Their Graphs

1. Function definition
2. Graphs: shifts, translations, reflections, stretches
3. Combinations of functions
4. Inverse functions

B. Polynomial and Rational Functions

1. Quadratic functions

2. Higher degree polynomials
  3. Complex numbers
  4. Fundamental Theorem of Algebra
  5. Rational functions and asymptotes
  6. Graphs of rational functions
- C. Exponential and Logarithmic Functions
1. Exponential characteristics, properties, graphs
  2. Logarithmic characteristics, properties, graphs
  3. Solving equations involving exponents and logs
  4. Non-linear models
- D. Trigonometric Functions
1. Radian and degree measure
  2. Circular and right triangle trigonometry
  3. Trigonometric graphs
  4. Inverse trigonometric functions
  5. Trigonometric models
- E. Analytic Trigonometry
1. Trigonometric identities
  2. Trigonometric equations
  3. Trigonometric formulas
  4. Law of Sines, Law of Cosines
  5. Vectors
- F. Systems of Equations and Inequalities
1. Linear systems of two and three variables
  2. Systems of non-linear equations in two variables
  3. Systems of inequalities
  4. Partial Fractions (optional)
- G. Topics in Analytic Geometry
1. Parabolas
  2. Hyperbolas
  3. Ellipses
  4. Polar coordinates and polar graphs (optional)
- H. Sequences and Series
1. Sequences and Summation Notation
  2. Arithmetic Sequences
  3. Geometric Sequences
- I. The Binomial Theorem
1. Evaluating a binomial coefficient
  2. Expanding a binomial raised to a power

3. Finding a particular term in a binomial expansion

## **VI. Educational Goals and Learning Outcomes**

### **A. General Education Learning Outcomes:**

Upon completion of this course, students will be able to:

1. Identify functional relationships between two variables, both graphically and algebraically. (GE-NJ2)
2. Identify the characteristics of the conic sections, both graphically and algebraically. (GE-NJ2)
3. Specify the graphical and algebraic characteristics of trigonometric functions and polynomial, rational, radical, exponential, or logarithmic functions. (GE-NJ2)
4. Employ mathematical modeling techniques to solve problems using polynomial, rational, radical, exponential, or logarithmic functions. (GE-NJ2)
5. Solve application problems using the Law of Cosines, the Law of Sines, vectors, and Right Triangle Trigonometry. (GE-NJ2)
6. Verify identities and solve equations by using fundamental trigonometric identities, double angle, product-to-sum, sum-to-product, sum, difference, and half-angle. (GE-NJ2)
7. Define the Binomial Theorem and use it to expand a binomial expression and find its  $n^{\text{th}}$  term. (GE-NJ2)
8. Solve systems of equations and inequalities. (GE-NJ2)
9. Find the explicit and recursive definition of an arithmetic and geometric sequence and calculate the sum. (GE-NJ2)
10. Identify the terms in a binary expansion of a binomial raised to a power. (GE-NJ2)

### **B. Course Learning Outcomes**

See above

## **VII. Modes of Teaching and Learning**

Instructors can use a variety of modes including, but not limited to the following:

- A. lecture/discussion
- B. small-group work
- C. computer-assisted instruction
- D. student oral presentations
- E. student collaboration
- F. independent study

## **VIII. Papers, Examinations, and other Assessment Instruments**

Student learning outcomes are assessed using a combination of the following:

- A. tests
- B. final examination
- C. projects
- D. quizzes

## **IX. Grade Determinants**

Final grades are determined by a combination of the following:

- A. cumulative final examination
- B. tests
- C. projects
- D. individual teacher determinants

## **X. Texts and Materials**

The following text and materials are required for the course:

- A. Suggested Textbook: *Precalculus* by Blitzer, published by Pearson Prentice Hall
- B. Graphing calculator is required. TI-82, TI-83, or TI-84 is recommended.

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.

## **XI. Resources**

No unusual resources are needed.