RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

MATH 151 CALCULUS I

I. Basic Course Information

A. Course Number and Title: MATH 151 Calculus I

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: Three-and-one-half years of college preparatory mathematics including Trigonometry and a satisfactory score on a placement test or a CLEP test, or grade of C or better in MATH 113 Precalculus II, or MATH 114H Precalculus Honors

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

Prerequisite: Three-and-one-half years of college preparatory mathematics including Trigonometry and a satisfactory score on a placement test or a CLEP test, or grade of C or better in MATH 113 Precalculus II, or MATH 114H Precalculus Honors.

Introductory calculus with a technology-based computer laboratory component. Topics include limits, differentiation, applications of derivatives, integration, the Fundamental Theorem of Calculus, and logarithmic, exponential, and other transcendental functions.

III. Statement of Course Need

~~A. Enrollment History: In the spring 2015 semester we have approximately 135 students who registered for Calculus I.~~

B. The two-hour lab is standard for all of our Calculus I, II, and III sections. It enables the students to use technology to help them become proficient in the course material.

C. This course is a prerequisite for MATH 152 Calculus II. This course also serves as a math requirement for programs in Biology, Chemistry, Physics, Computer Science, Engineering Science, General Science /Pre-Health Professional and Mathematics.

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 in Biology, Chemistry, Physics, Computer Science, Mathematics, Engineering Science, General Science /Pre-Health Professional, Pre-Medicine & Pre-Pharmacy and Information Systems & Technology A.S.
D. This course transfers as a first semester calculus course. Course transferability; for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities go their individual websites.

V. Outline of Course Content

A. Limits
   1. The Idea of Limits
   2. Definitions of Limits
   3. Techniques for Computing Limits
   4. Infinite Limits
   5. Limits at Infinity
   6. Continuity
   7. Precise Definitions of Limits

B. Derivatives
   1. Introducing the Derivative
   2. The Derivative as a Function
   3. Rules of Differentiation
   4. The Product and Quotient Rules
   5. Derivatives of Trigonometric Functions
   6. Derivatives as Rates of Change
   7. The Chain Rule
   8. Implicit Differentiation
   9. Derivatives of Logarithmic and Exponential Functions

10. Derivatives of Inverse Trigonometric Functions
11. Related Rates

C. Applications of the Derivative
    1. Maxima and Minima
    2. Mean Value Theorem
    3. What Derivatives Tell Us
    4. Graphing Functions
    5. Optimization Problems
    6. Linear Approximation and Differentials
    7. L'Hôpital's Rule
    8. Newton’s Method
    9. Antiderivatives

D. Integration
    1. Approximating Areas Under Curves
    2. Definite Integrals
    3. Fundamental Theorem of Calculus
    4. Working with Integrals
    5. Substitution Rule

E. Applications of Integration
    1. Velocity and Net Change
    2. Regions Between Curves

VI. Educational Goals and Learning Outcomes

A. General Education Learning Outcomes

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

1. evaluate various limits. (GE-NJ 2)
2. utilize the concept of instantaneous rate of change to solve problems in physics, biology, economics, and other real-world phenomena. (GE-NJ 2)
3. differentiate polynomial, rational, exponential, logarithmic, and trigonometric functions algebraically. (GE-NJ 2)
4. demonstrate the relationship between the algebraic and geometric properties of the derivative. (GE-NJ 2)
5. use the Fundamental Theorem of Calculus and the concept of antiderivative to algebraically evaluate integrals. (GE-NJ 2)
6. utilize the derivative procedure to solve various application problems. (GE-NJ 2)

B. Course Learning Outcomes

See above

C. Assessment Instruments

A. tests
B. final examination
C. projects
D. laboratory products
E. quizzes

VII. Grade Determinants

Factors that may enter into the determination of the final grade:

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

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

A. lecture
B. small groups
C. labs with technology component
D. homework
E. quizzes
F. projects
G. tests
H. cumulative Final Examination

VIII. Texts and Materials

A. Suggested Textbook: *Calculus Early Transcendentals*, latest edition, by Briggs, Cochran, Gillett, and Schulz, Pearson Addison Wesley, or similar textbook.

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. A graphing calculator may be required; TI-84 is recommended

IX. Resources

This course is held in a computer lab for two hours a week. The computers need to be installed with the calculus software currently licensed to the math department. Contact the math department chair to determine which software to install.