II. Catalog Description

The second semester of a three-semester sequence of introductory calculus with a technology-based computer laboratory component. Topics include integration techniques, integration applications in various coordinate systems, indeterminate forms, improper integrals, and infinite series. Proofs, and calculus application problems from business, the natural sciences, and mathematics.
III. Statement of Course Need

A. This course also serves as a prerequisite for MATH 251 Calculus III. This course also serves as a math requirement for programs in Chemistry, Computer Science, Engineering Science, General Science, and Mathematics.

Enrollment History:
In the fall 2014 semester we have approximately 80 students who registered for Calculus II. Students from such a cohort can opt to take Calculus II Honors instead of the regular calculus section. (Note that a Calculus I Honors course ran last fall and is again running this fall.)

Additional Value for Students;
Honors courses in mathematics have been developed to provide mathematically talented students the opportunity to obtain a level of rigor above the level currently available in existing courses.

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 generally transfers as a mathematics course in the mathematics program and as a program elective in technical (physical science, computer science) fields.

IV. Place of Course in College Curriculum

A. This course is a free elective and a Mathematics elective for all programs.
B. This course serves as a General Education requirement in Mathematics.
C. This course meets a program requirement in Chemistry, Computer Science, Engineering Science, General Science, and Mathematics.
D. This course transfers as a second 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. Applications of Integration
   1. Area of a region between two curves
   2. Volume, disk method and shell method

B. Integration Techniques, L'Hôpital's Rule, and Improper Integrals
   1. Basic integration rules, integration by parts, trigonometric substitution
   2. Partial fractions; tables
   3. Indeterminate forms and L'Hôpital's Rule
4. Improper integrals

C. Infinite Series
1. Sequences, series, and convergence
2. Integral test, p-series, comparison test
3. Alternating series, ratio test, root test
4. Taylor polynomials and approximations; power series
5. Representation of functions by power series; Taylor and Maclaurin series

D. Conics, Parametric Equations, and Polar Coordinates
1. Conics and calculus
2. Plane curves and parametric equations; parametric equations and calculus
3. Polar coordinates and polar graphs
4. Area and arc length in polar coordinates
5. Polar equations of conics and Kepler's Laws

E. Enrichment and proofs
1. Selected Proofs appropriate to the level of the course

F. Application Problems
1. Applied Math applications
2. Engineering/Physics applications
3. Natural science applications
4. Business applications

VI. Educational Goals and Learning Outcomes

A. General Education Learning Outcomes

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

1. Use algebraic techniques such as trigonometric substitutions, partial fractions, and by parts, to evaluate integrals (GE – NJ 2)
2. Utilize integration techniques to solve problems involving volumes and surface areas of solids of revolution, centroids, and arclength (GE – NJ 2)
3. Use the concept of limit to evaluate improper integrals and indeterminate forms (GE – NJ 2)
4. Test infinite series for convergence and or divergence (GE – NJ 2)
5. Use Taylor polynomials to estimate function values (GE – NJ 2)
6. Operate in alternate reference frames including polar and parametric coordinates (GE – NJ 2)
7. Prove selected theorems appropriate to the level of the course. (GE – NJ 2)
8. Demonstrate proficiency in the computer algebra software designated for calculus labs (GE – NJ 4)
B. **Course Learning Outcomes**

See above.

C. **Assessment Instruments:**

A. homework  
B. weekly problems  
C. quizzes  
D. laboratory products  
E. projects  
F. tests  
G. cumulative final examination, or designated portions thereof

**VII. Grade Determinants**

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

A. homework  
B. weekly problems  
C. quizzes  
D. laboratory products  
E. projects  
F. tests  
G. cumulative final examination  
H. individual teacher determinant

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. weekly problems  
F. quizzes  
G. projects  
H. tests  
I. cumulative Final Examination

**VIII. Texts and Materials**

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 math software currently licensed to the math department. Contact the math department
to