



**DUAL ENROLLMENT CALCULUS WITH  
ANALYTIC GEOMETRY II  
TIDEWATER COMMUNITY COLLEGE MATH 174  
(FIRST COLONIAL AND SALEM HIGH SCHOOLS ONLY)**

*Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.*

**COURSE DESCRIPTION**

*Calculus with Analytic Geometry II* is a dual-enrollment, one-semester course providing the successful student with four college semester credits and one-half Virginia Beach City Public Schools (VBCPS) elective credit. This course continues the study of analytic geometry and the calculus of algebraic and transcendental functions including rectangular, polar and parametric graphing, indefinite and definite integrals, methods of integration, and power series along with their applications. It is designed for mathematical, physical, and engineering science programs.

\*Tuition, fees, and textbook fees are the responsibility of the student in accordance with the dual enrollment regulation (5-30.2).

**PREREQUISITE**

Students who have successfully completed Advanced Placement (AP) Calculus AB with a minimum score of four on the corresponding AP exam.

## Objectives for Math 174: Calculus with Analytic Geometry II

### **Unit 1: Integration Techniques, L'Hôpital's Rule, and Improper Integrals**

- a. The student will be able to construct antiderivatives using the Fundamental Theorem of Calculus.
- b. The student will be able to find antiderivatives using u substitution.
- c. The student will be able to find antiderivatives using integration by parts.
- d. The student will be able to find antiderivatives of trigonometric integrals.
- e. The student will be able to find antiderivatives using trigonometric substitution.
- f. The student will be able to find antiderivatives using partial fractions.
- g. The student will be able to use Integration tables to find antiderivatives when appropriate.
- h. The student will be able to evaluate indeterminate forms using L'Hôpital's Rule.
- i. The student will determine when improper integrals converge and compute values where possible.

### **Unit 2: Infinite Series**

- a. The student will determine when a sequence converges.
- b. The student will review basic geometric series and sequences.
- c. The student will study the following tests for series convergence (divergence):
  1. The Integral and p-Series Tests
  2. The Series Comparison Test
  3. The Alternating Series Test
  4. The Ratio Test
  5. The nth Root Test
  6. The Limit Comparison Test
- d. The student will be able to construct Power Series.
- e. The student will be able to represent functions with series.
- f. The student will be able to construct Taylor Polynomials.
- g. The student will be able to construct Taylor (MacClaurin) Series.
- h. The student will be able to find both the interval and radius of convergence for Taylor and MacClaurin Series.

### **Unit 3: Conics, Parametric Equations, Polar Coordinates**

- a. The student will review conic sections.
- b. The student will be able to represent plane curves with parametric equations.
- c. The students will be able to apply Calculus to parametric equations and compute the following:
  1. Derivatives
  2. Antiderivatives
  3. Arc Length
  4. Surface Area
- d. The student will review polar coordinates and polar graphs.
- e. The student will be able to apply Calculus to polar equations and compute the following:
  1. Derivatives
  2. Antiderivatives
  3. Arc Length
  4. Surface Area

### **Unit 4: Vectors and the Geometry of Space**

- a. The student will review representation of vectors in a plane.
- b. The student will be able to compute coordinates and manipulate vectors in space.
- c. The student will be able to compute the dot product of two vectors.
- d. The student will be able to compute the cross product of two vectors in space.



**VIRGINIA BEACH CITY PUBLIC SCHOOLS**  
A H E A D O F T H E C U R V E

**MISSION STATEMENT**

**The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.**

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**DEPARTMENT OF CURRICULUM AND INSTRUCTION**  
**2512 George Mason Drive P.O. Box 6038**  
**Virginia Beach, VA 23456-0038**

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Alternative formats of this publication which may include taped, Braille, or large print materials are available upon request for individuals with disabilities. Call or write The Department of Curriculum and Instruction, Director of Secondary Instructional Services, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038, Telephone (757) 263-1070 or (757) 263-1429, fax (757) 263-1412.