



## MATHEMATICAL ANALYSIS

*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**

This rigorous course extends concepts of intermediate algebra while introducing various topics of college algebra. Topics include functions, theory of equations, matrices, sequences and series, polar coordinates, exponential and logarithmic functions, and limits. Topics of trigonometry are extended.

### **PREREQUISITE**

Algebra II/Trigonometry or Algebra II and Trigonometry

### **OPTIONS FOR NEXT COURSE**

Advanced Placement Calculus AB or Advanced Placement Calculus BC  
Advanced Placement Computer Science A or Advanced Placement Statistics

### **REQUIRED STUDENT TEXTBOOK**

*Precalculus, Third Edition, Blitzer, Pearson/Prentice Hall (2007)*

### **RECOMMENDED CALCULATOR**

TI-83 Plus or TI-84 Plus

**Virginia Beach Instructional Objectives**  
**Mathematical Analysis – MA3162**

School Net Objective	Objective
	<b>Functions</b>
<b>MA.MA.1.1</b>	The student will be able to identify the characteristics of functions including: intercepts, domain, range, and increasing, decreasing, or constant intervals, including absolute value functions of the form $f(x) =  g(x)  + h(x)$ where both functional parts are linear functions. <b>(SOL MA.1)</b>
<b>MA.MA.1.2</b>	The student will be able to determine if symmetry exists and whether a function is odd, even, or neither both algebraically and graphically. <b>(SOL MA.1)</b>
<b>MA.MA.1.3</b>	The student will be able to thoroughly analyze and solve polynomial functions and apply the maximum or minimum values to solve problems. <b>(SOL MA.1)</b>
<b>MA.MA.1.4</b>	The student will be able to use transformations to sketch a graph of a polynomial function with or without graphing utilities. <b>(SOL MA.2)</b>
<b>MA.MA.1.5</b>	The student will be able to thoroughly analyze and identify major characteristics of rational functions including: domain, range, zeros, intercepts, and vertical or horizontal asymptotes. <b>(SOL MA.2)</b>
<b>MA.MA.1.6</b>	The student will be able to find inverse functions algebraically and graphically. <b>(SOL MA.2)</b>
<b>MA.MA.1.7</b>	The student will be able to determine $\lim_{x \rightarrow \pm\infty} f(x)$ and $\lim_{x \rightarrow c} f(x)$ if they exist using intuitive reasoning, algebraic method, numerical substitution, and a graphing calculator. <b>(SOL MA.7)</b>
<b>MA.MA.1.8</b>	The student will be able to identify and use transformations to graph exponential functions. The student should be able to define $e$ and to sketch $y = e^x$ . <b>(SOL MA.9)</b>
<b>MA.MA.1.9</b>	The student will be able to identify and use transformations to graph logarithmic functions, including the natural logarithmic function. <b>(SOL MA.9)</b>
<b>MA.MA.1.10</b>	The student will be able to solve exponential and logarithmic equations and apply both appropriate to problem solving. <b>(SOL MA.9)</b>
<b>MA.MA.1.11</b>	The student will be able to determine the continuity or discontinuity and classify discontinuity as point, jump, or infinite, and use these concepts to sketch a function graph. <b>(SOL MA.2, MA.3)</b>
<b>MA.MA.1.12</b>	The student will be able to apply the definition of derivative of a function. <b>(SOL MA.2, MA.3)</b>
	<b>Discrete Mathematics</b>
<b>MA.MA.2.1</b>	The student will be able to use the binomial theorem. Students will be able to use sigma notation, binomial expansion, and determine a $k$ th term. <b>(SOL MA.4)</b>
<b>MA.MA.2.2</b>	The student will be able to solve problems using finite and infinite sequences and series. <b>(SOL MA.5)</b>
<b>MA.MA.2.3</b>	The student will be able to determine if an infinite sequence or series is convergent or divergent and find the limit if it exists. <b>(SOL MA.5)</b>
<b>MA.MA.2.4</b>	The student will be able to apply the principle of mathematical induction. <b>(SOL MA.6)</b>

<b>Polar and Parametric Equations</b>	
<b>MA.MA.3.1</b>	The student will be able to use a graphing calculator to investigate and identify characteristics of polar and parametric equations. This includes identification of classical polar curves, their intercepts, extremities, symmetries, and intersections of multiple polar curves. <b>(SOL MA.10, MA.12)</b>
<b>Analytical Analysis</b>	
<b>MA.MA.4.1</b>	The student will be able to determine the value of the trigonometric ratios of the special angles and their related angles without a calculator, or given the ratio, find the angle measure. <b>(SOL MA.13)</b>
<b>MA.MA.4.2</b>	The student will be able to use transformations to sketch functions of the form $y = A \sin B(x + C) + D$ for each of the six trigonometric functions and given a graph, write an equation. <b>(SOL MA.13)</b>
<b>MA.MA.4.3</b>	The student will be able to thoroughly analyze and identify major characteristics of inverse trigonometric functions. <b>(SOL MA.13)</b>
<b>MA.MA.4.4</b>	The student will be able to perform operations with vectors in the coordinate plane and apply vectors to practical problems. <b>(SOL MA.11)</b>
<b>MA.MA.4.5</b>	The student will be able to perform matrix operations using a graphing calculator and apply matrices to problem solving. <b>(SOL MA.14)</b>
<b>MA.MA.4.6</b>	The student will be able to apply techniques of translation and rotations of axes in the coordinate plane to graphing functions and conic sections.



**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.**

**DEPARTMENT OF CURRICULUM AND INSTRUCTION**

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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.