Chesapeake Bay Governor's School
For Marine and Environmental Science
Warsaw Campus

Advanced Algebra II (MTH 115/116) 2013-2014

Mark D. King

Course Description:
This two-semester course will focus on algebraic concepts that are foundational for more advanced mathematics. After reviewing and expanding upon basic skills from Algebra I, we will focus on a variety of functions both familiar and unfamiliar, including linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions. We will then move on to systems of equations, sequences and series, probability, statistics, and other selected topics as time permits. Students who successfully complete this course should be prepared for Pre-Calculus I (MTH 163) and should be able to succeed on the Virginia Standards of Learning End of Course Algebra II Exam.

Text:
Blitzer, Robert. *Precalculus*. 4th ed**.** Upper Saddle River, NJ: Pearson, 2010.
*Your textbook is the property of CBGS. Please **cover** your textbook and keep it covered all year!*

Course Credit: 6 credits (3 per semester)

Contact Information:
Office: (804) 333–1306 E-mail: mking@cbgs.k12.va.us
Cell: (804) 313–1920

Required Materials:
Students will need a notebook (or 3-ring binder), pencils, erasers, graph paper, a ruler or straight-edge, a scientific calculator, and a graphing calculator. A limited number of graphing calculators can be checked out from the Governor's School. You may also want colored pencils for graphing, but they are optional.

Schedule of Topics Covered:

Chapter P: Prerequisites: Fundamental Concepts of Algebra I
- Radicals, operations and simplifying with radicals
- Rational exponents, simplifying with rational exponents

- Polynomials (Identifying polynomials, identifying degree of polynomials, special types of polynomials, adding/subtracting, multiplying/dividing, special products)
- Factoring polynomials (GCF, by grouping, trinomials, special cases)
- Rational expressions (simplifying, multiplying/dividing, adding/subtracting, difference quotient, rationalizing)
- Solving rational equations
- Solving absolute value equations
- Solving quadratic equations (all methods), finding the discriminant
- Solving radical equations
- Solving linear inequalities and absolute value inequalities, using interval notation

Chapter 1: Functions and Graphs

- Relations, domain and range, functions, functions as equations, function notation, graphs of functions, domain and range of a function from a graph
- Increasing/decreasing functions, relative extrema, even/odd functions, symmetry, evaluating and graphing a piecewise function, functions and difference quotients
- Slope, linear equations, graphing linear equations
- Finding equations of parallel and perpendicular lines
- Graphs of common functions, vertical and horizontal translations, reflections of graphs, vertical stretching and shrinking, sequencing transformations
- Domain of a function, operations with functions, composition of functions, decomposing functions
- Definition of function inverses, finding the inverse of a function, horizontal line test and one-to-one functions, graphs of inverse functions

Chapter 2: Polynomials and Rational Functions

- Complex numbers, operations with complex numbers, quadratic equations with imaginary solutions
- Graphs of quadratic functions, graphs of quadratic functions from vertex form and standard form, applications of quadratic equations, solving quadratics to maximize and minimize
- Polynomial functions, end behavior, zeros of polynomial functions, intermediate value theorem, graphing polynomial functions
- Long division of polynomials, synthetic division, remainder theorem and factor theorem
- Zeros of polynomial functions, rational zero theorem, finding roots of polynomial equations, fundamental theorem of algebra, Descartes' rule of signs
- Rational functions, domain of rational functions, graphs of rational functions and vertical asymptotes, horizontal asymptotes, graphs of rational functions
- Polynomial inequalities
- Using direct and inverse variation to model real world applications

Chapter 3: Exponential and Logarithmic Functions

- Evaluating and graphing exponential functions, characteristics and transformations of exponential functions, natural base, and applications of

exponential functions
- Defining and evaluating logarithmic functions; graphs, characteristics, and transformations of logarithmic functions; common logarithms; and natural logarithms

Chapter 7: Systems of Equations and Inequalities
- Solving systems of linear equations in two variables—substitution method and addition method; systems with no solutions and infinite solutions; applications of systems of equations to include profit functions and break-even points.
- Solving systems of linear equations in three variables with the addition method; applications of such systems.
- Solving systems of non-linear equations in two variables—substitution method and addition method. Applications of systems of non-linear equations.

Chapter 10: Sequences, Induction, and Probability
- Sequences, recursive formulas, factorial notation, summation notation
- Arithmetic sequences
- Geometric sequences and series
- The Fundamental Counting Principle, permutations, combinations

Statistics
- Distributions, mean, standard deviation, empirical rule
- Standard normal distribution, z-scores

Additional topics may be covered if time permits.

Course Information and Policies:

Assignments: Students should expect short **weekly quizzes** covering material learned during the previous week. There will be a **test** at the end of each chapter and at the midpoint of longer chapters. These tests will be announced in class at least one week prior to the test to ensure that you have time to prepare. Students may also be assigned worksheets and projects periodically.

Grading: Quizzes, tests, and projects constitute the majority of graded assignments. Homework will **not** be graded unless I indicate otherwise. Assignments will be graded on a point system. Each assignment has a specific number of points available. Your grade for that assignment can be found by dividing the points received by the total points available. I will regularly post grades online.

Letter Grade:
90 – 100%: A 80 – 89%: B 70 – 79%: C 60 – 69%: D 0 – 59%: F

Make-up work policy: If you miss a class, you are responsible for discovering what work you missed. If you are absent on the day of a test or quiz you will be required to

make it up on the day that you return to class as they are scheduled well in advance. You will not be allowed to make up tests or quizzes missed due to an unexcused absence.

Attendance: Class attendance is required. The course attendance policy can be found in the Student Handbook. I will record absences and tardiness each class.

Academic Dishonesty: As set forth in the student handbook, students are required to abide by the CBGS Student Honor Code. If academic dishonesty is discovered, the honor code mandates severe and specific penalties that *will* be enforced.

Cell Phones: Students are required to **turn off** and **put away** their cell phones before class starts. Students may not use their phones as calculators. The cell phone policy can be found in the Student Handbook.

Emergency Evacuation Plan:
In each classroom, laboratory or other places where students are assembled for the purpose of instruction, a fire evacuation plan will be posted indicating the direction of travel from the room in the event it becomes necessary to evacuate the building as a result of fire or other emergency. This plan will be posted in a conspicuous place near the exit from the room. Whenever the fire alarm sounds, the building will be evacuated. The instructor will ensure the fire door is closed upon leaving the area (doors with automatic closures on them). Instructors are also responsible for assisting disabled students. If a classroom does not have an evacuation plan posted, the student or instructor should notify the academic dean.

CBGS Statement on Safety:

What to know and do to be prepared for emergencies at CBGS/RCC:
- Sign up to receive RCC text messaging alerts and keep your information up-to-date <https://alert.rappahannock.edu/index.php?CCheck=1>
- Know the safe evacuation route from each of your classrooms. Emergency evacuation routes are posted in campus classrooms.
- Listen for and follow instructions from CBGS/RCC or other designated authorities.
- Know where to go for additional emergency information.
- Report suspicious activities and object

Statement on Americans with Disabilities Act

Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 require Schools to provide an 'academic adjustment' and/or a 'reasonable accommodation' to any qualified individual with a physical or mental disability who self-identifies as having such. Students should contact/ inform CBGS faculty for appropriate academic adjustments or accommodations.