

MATHEMATICS DEPARTMENT

Four credits are required for graduation – 1 algebra credit and 1 geometry credit must be included in the 4 credits.

MATHEMATICAL APPROACH TO PROBLEM SOLVING A/B (Grade 9)

3014/3015

.5 credit/.5 credit

This is a general mathematics course designed for students needing additional help with pre-algebra skills and the Maryland Functional Mathematics Test domains. Calculators and computers are used in problem-solving situations and in the development of concepts and skills from arithmetic, algebra, geometry, and probability and statistics.

RELATED MATHEMATICS A/B (Grades 9-12)

3231/3232

.5 credit/.5 credit

This course reinforces the essential pre-algebra and algebra concepts and skills necessary to function in authentic problem-solving situations. Emphasis is on skills and applications related to success in Algebra. Essential skills and concept development of algebraic formulas, percent and ratio, and proportion in algebraic problem-solving situations are emphasized. Support of the attainment of algebraic objectives is provided. Use of technology in the problem-solving process is an integral component of the course. **This course is taken in conjunction with Algebra 1.**

ALGEBRA 1A/B (Grade 9)

3111/3112

ALGEBRA 1 +10 (Grade 10-12)

311110/311210

.5 credit/.5 credit

This course studies the basic structure of real numbers, algebraic expressions, and functions. The topics studied are linear equations, inequalities, functions and systems, quadratic equations and functions, polynomial and radical expressions, data analysis, probability, and the elementary properties of functions. Mathematical modeling of real-life problems, problem solving, constructing appropriate linear models to fit data sets and uses of technology are major themes of the course.

PRINCIPLES OF GEOMETRY AND ALGEBRA A/B (Grades 10-12)

3205/3206

.5 credit/.5 credit

This course integrates the basic concepts of algebra and geometry in the solution of real life problems using technology. Topics of study include perimeter, first-degree equations and inequalities, angle relationships, linear functions, construction and triangles, area and polynomials, quadratics and special quadrilaterals, radicals and right triangles, data analysis and probability, volume and number concepts, and right triangle applications. The Core Learning Goals for Algebra and Data Analysis are embedded in outcomes for this course. This course is not open to students who have successfully completed Geometry. **This course is taken in conjunction with Geometry.**

GEOMETRY A/B (Grades 9-12)

3201/3202

3203/3204 – HONORS LEVEL (Grades 9-11)

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Algebra 1

Geometry is studied through the deductive development of relationships in the plane and space developed intuitively in previous years. Indicators include the geometry of art and nature, geometry as a mathematical system, congruent segments and angles, circle chords, secants and tangent segments, parallel and perpendicular lines, angle measure in triangles, direct and indirect triangle congruence proofs, solids of revolution, logic, similar triangles, the Pythagorean Theorem, geometric constructions, and surface area and volume of solids.

ALGEBRA 2A/B (Grades 10-12)

3301/3302

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Algebra 1 and Geometry

Algebra 2 is the study of the complex number system, symbolic manipulation, and functions. Advanced algebraic and data analysis techniques incorporating technology enable students to discuss, represent, and solve increasingly sophisticated real-world problems. Topics studied include the properties of functions, the algebra of functions, matrices, and systems of equations. Linear, quadratic, exponential, logarithmic, polynomial and rational functions are studied with an emphasis on making connections to other disciplines and as preparation for a multitude of careers. A principal goal is to apply advanced data analysis techniques to find the best fit

model from all the important function models, justify the model, and use it to make predictions. Communication of the problem-solving skills used and the conclusions reached is another major emphasis. A graphing calculator is used throughout the course.

ALGEBRA 2 WITH ANALYSIS A/B (Grades 9-12)

3310/3311

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Algebra 1 and Geometry

Algebra 2 with Analysis is an intensive, accelerated course intended for the student with the motivation to prepare for advanced mathematics courses. Algebra 2 with Analysis focuses on the use of technology and data analysis to develop students' thinking, problem-solving and communication skills. Topics studied include the properties, applications, algebra, and parametric representation of functions; matrix algorithms; and linear, quadratic, radical, exponential, logarithmic, polynomial, and rational functions. Data analysis techniques include the use of re-expression and residuals to find and verify best-fit rules. The final unit continues the study of conics begun with radical functions, and includes applications as well as the properties relevant to advanced mathematics. A graphing calculator is used throughout this course.

CONSUMER MATHEMATICS A/B (Grades 11-12)

3241/3242

.5 credit/.5 credit

This course is not open to students who have completed Precalculus.

Consumer education is combined with the mathematics necessary for making wise consumer decisions. Topics include income, budgeting, purchasing, banking, credit, and investments. Spreadsheets are studied and used in consumer and business applications. The mathematical aspects of taxation, transportation and travel, housing, insurance, and the operation of a small business are investigated in this course. Probability and statistics are studied to illustrate business applications. Materials from daily newspapers, consumer magazines, web sites, and federal publications supplement standard text material and keep the content relevant and current.

PRECALCULUS A/B (Grades 11-12)

3489/3490

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Algebra 2

Precalculus completes the formal study of the elementary functions begun in Algebra 1 and continued in Algebra 2. Students use the mathematical and modeling skills previously developed to study and apply the trigonometric functions. The use of technology and problem solving are emphasized in units covering data analysis, circular functions, and trigonometric inverses and identities. Students conduct research and write extensively as they prepare for higher levels of mathematics. The concepts of trigonometry are extended to the study of polar coordinates and complex numbers. Conics and quadratic relations are introduced through a locus definition using polar representations. Discrete topics include the Principles of Mathematical Induction, the Binomial Theorem, and sequences and series, where sequences are represented both explicitly and recursively. Students complete an oral and written modeling presentation. A graphing calculator is used throughout this course.

PRECALCULUS WITH ANALYSIS A/B (Grades 10-12)

3350/3351

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Algebra 2 with Analysis

The formal study of elementary functions is extended with the introduction of the trigonometric functions. Students apply technology, modeling, and problem solving skills to the study of these functions in units on circular functions, trigonometric identities and inverses, and applications of trigonometric functions. Vectors in two and three dimensions are studied and applied. Problem simulations are explored in multiple representations: algebraic, graphical, and numeric. The trigonometric functions are applied to the study of polar coordinates and complex numbers. Conic sections and quadratic relations are introduced in polar representation and studied in rectangular and parametric representations. The concept of limit is applied to rational functions and to discrete functions such as infinite sequences and series. The formal definition of limit is applied to proofs of the continuity of functions and provides a bridge to calculus. A culminating project provides synthesis of the concepts studied. A graphing calculator is used throughout this course.

AP STATISTICS (Grades 11-12)

3320/3321

.5 credit/.5 credit

Prerequisite: Attainment of outcomes of Precalculus w/ Analysis or IB Precalculus

This course is the equivalent of a non-calculus-based introductory college statistics course and concentrates on four conceptual themes: exploring data, planning a study anticipating patterns, and statistical inference. Students are engaged in the exploratory analysis of data and make use of graphical and numerical techniques to study patterns and departures from patterns. Data sets are collected according to well-developed plans: e.g.,

census, sample surveys, experiments, and/or observed studies from which inferences will be made. Association is distinguished from causation. Students are expected to produce models using probability and simulation. The techniques of statistical inference, confidence intervals and hypothesis testing are studied in detail. A graphing calculator is used throughout the course and is required for the advanced placement examination.

STATISTICS AND MATHEMATICAL MODELING (Grades 11-12)

3322/3323

.5 credit/.5 credit

Prerequisite: A Grade of A or B in Algebra 2 or attainment of outcomes of Precalculus

Topics of this course include data analysis, probability, simulations, inferential statistics, normal and binomial distributions, techniques of sampling, confidence intervals and hypotheses testing. Students use exploratory methods to identify patterns and make decisions. By using a hands-on approach and simulations, students gain a strong understanding of statistical concepts. Emphasis is placed on applications and the use of statistics to solve real life problems. Modules presented in this course are chosen from a selection of discrete mathematics topics including Cryptography and Coding, Game Theory, Graph Theory, Mathematics and Architecture, Applications of Trigonometry, Fairness and Apportionment, Mathematics and Careers, Investment and Finance, and College Placement Test Review. The course provides an application-based approach to the study of mathematical modeling and provides a bridge from high school mathematics to the mathematical applications commonly encountered in a variety of college disciplines. A graphing calculator is used throughout this course.

CALCULUS WITH APPLICATIONS A/B (Grades 11-12)

3356/3357

.5 credit/.5 credit

Prerequisite: Attainment of outcomes of Precalculus

The introductory topics of this course include limits and continuity of functions, derivatives of functions, and their applications to problems. Students find derivatives numerically, represent derivatives graphically, and interpret the meaning of a derivative in real-world applications. Models of previously studied functions will be analyzed using calculus concepts. The topics developed include the relationship between the derivative and the definite integral. The understanding, properties, and applications of the definite integral are included as students learn to explain solutions to problems. Students will model real-world situations involving rates of change using difference or differential equations. A graphing calculator is used throughout this course.

AP CALCULUS AB, A/B (Grades 11-12)

3452/3453

AP CALCULUS BC, A/B (Grades 11-12)

3491/3492

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of Precalculus with Analysis

The topics studied in AP Calculus are those traditionally offered in the first year of calculus in college, and designed specifically for students who wish to obtain advanced placement in mathematics in college. Concepts are communicated graphically, numerically, analytically and verbally. The basic topics studied include limits and continuity of functions, derivatives and integrals of algebraic and transcendental functions and their applications in problems. The advanced topics covered in the BC course also include convergence tests for series, Taylor or Maclaurin series, elementary differential equations, and calculus of polar and parametric functions. A graphing calculator is required for the AP examination.

MULTIVARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS A/B (Grades 11-12)

3048/3049

.5 credit/.5 credit

Prerequisite: Attainment of the outcomes of AP Calculus BC

The first semester covers three-dimensional analytic geometry and vectors, the calculus of functions of more than one variable including partial derivatives, vector-valued functions, multiple integrals, volumes, surface area, and the classical theorems of Green, Stokes, and Gauss. The second semester is an introduction to the basic concepts, theory, methods, and applications of ordinary differential equations. The specific topics covered are first-order equations, higher order linear differential equations, solutions by power series, and the Laplace transform.