

MATHEMATICS

COURSE SEQUENCES

The most common course sequences are indicated below.

If Intro to Functions was successfully mastered in grade 8:		
Grade 9	Geometry A or Geometry H or Functions	
Grade 10	Functions H or Algebra 2 A or Pre-Calculus H	
Grade 11	Pre-Calculus H, Pre-Calculus A, plus Statistics AP or Calculus AP (as an additional elective)	
Grade 12	Calculus AP or Calculus A, plus Statistics AP or Multivariable Calculus	
If Intro to Functions was not successfully completed or taken in grade 8:		
A Level/ICR	Grade 9	Enriched Algebra A ICR
	Grade 10	Geometry A ICR; may double up with Algebra 2A ICR
	Grade 11	Algebra 2A ICR; or if students double up in 10 th Grade, Pre-Calculus A
	Grade 12	Pre-Calculus A; or Calculus A if students double up in Grade 10; plus Statistics AP (as an additional elective)
R Level	Grade 9	Algebra 1 R
	Grade 10	Geometry R
	Grade 11	Algebra 2 R
	Grade 12	Trigonometry R or Introduction to College Mathematics R or Discrete Math A
R Level/ICR	Grade 9	Algebra 1R/ICR
	Grade 10	Geometry R/ICR
	Grade 11	Algebra 2 R/ICR
	Grade 12	Introduction to College Mathematics R or Discrete Math R
Other	Grade 9	Algebraic Concepts 1
	Grade 10	Algebraic Concepts 2
	Grade 11	Geometric Concepts

CORE MATH COURSES

ENRICHED ALGEBRA A: 9

5 credits

PREPARATION: Successful mastery of the pre-algebra course, 8th grade Enriched Math and less than masterful completion of EAA.

Enriched Algebra A is designed for the student who has already learned some of the major concepts and processes of algebra but seeks a deeper and broader understanding of the discipline. This course integrates the advanced elements of algebra with technology, problem solving, application and mathematical modeling. As well, Enriched Algebra A is designed to further develop the student's reasoning skills, with an emphasis on logic that is central to student achievement in upper level mathematics courses.

ENRICHED ALGEBRA A: 9/ICR

5 credits

PREPARATION: Successful mastery of the pre-algebra course, 8th grade Enriched Math and less than masterful completion of EAA.

Enriched Algebra A is designed for the student who has already learned some of the major concepts and processes of algebra but seeks a deeper and broader understanding of the discipline. This course integrates the advanced elements of algebra with technology, problem solving, application and mathematical modeling. As well, Enriched Algebra A is designed to further develop the student's reasoning skills, with an emphasis on logic that is central to student achievement in upper level mathematics courses. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRA 1 R: 9

5 credits

PREPARATION: Successful completion of 8th grade Academic Math or unsuccessful completion of 8th grade Enriched Math

A study is made of the properties of the real number system through a mathematically informal and intuitive approach. The concepts of number properties, positive and negative numbers, factoring, mathematical symbols and notation are studied. These concepts are used to perform operations with algebraic expressions. Changing words to symbols, solution of word problems, and techniques of graphing linear equations and inequalities in the Cartesian plane are included. Additional topics include the solution of systems of linear equations and simple quadratic equations with their application through math modeling and lab reports as performance assessments. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRA 1 R: 9/ICR

5 credits

PREPARATION: Successful completion of 8th grade Academic Math or unsuccessful completion of 8th grade Enriched Math

A study is made of the properties of the real number system through a mathematically informal and intuitive approach. The concepts of number properties, positive and negative numbers, factoring, mathematical symbols and notation are studied. These concepts are used to perform operations with algebraic expressions. Changing words to symbols, solution of word problems, and techniques of graphing linear equations and inequalities in the Cartesian plane are included. Additional topics include the solution of systems of linear equations and simple quadratic equations with their application through math modeling and lab reports as performance assessments.

ALGEBRA SEMINAR

5 credits

PREPARATION: Current enrollment in Algebra 1 or Enriched Algebra

This course is required for students “at promise” in Algebra 1 due to their level of math knowledge and skill as indicated on PARCC Math assessment and/or achievement in their 8th grade math course. Teachers will identify student’s areas of weakness in algebra skills and tailor a learning program that will support the common core standards for Algebra 1 to build skill, strength and self-confidence. Students will benefit from small group instruction when appropriate in this course. Students will receive a grade in this course. Additionally, students not originally identified but selected by their current math teacher may rotate into and out of this course on an as-needed basis if space is available.

ALGEBRAIC CONCEPTS 1

5 credits

PREPARATION: Completion of 8th grade Academic Math

In this course, students will solidify their understanding of real numbers at a level and in a context appropriate for high school students and will be (re)introduced to algebraic concepts in a real world context. Solving linear equations, interpreting graphs, using rules of exponents, understanding polynomials and factoring are some of the major topics they will learn. Through the use of the graphing calculator, CBLs (calculator based labs) and manipulatives, students will gain an understanding of these algebraic concepts as they develop skills that will prepare them for the PARCC End of Course Assessment. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum. This course is only available to students with IEPs.

GEOMETRY H: 9

5 credits

PREPARATION: Mastery of Intro to Functions (8th grade)

This is a rigorous and fast-paced course available to 9th grade students who have mastered Intro to Functions in the middle school and who wish to study geometry in-depth. In addition to all units studied in Geometry A, the curriculum will include such topics as: locus of points, coordinate proofs, vectors, coordinates in space, reflections, translations, rotations, and dilations. (These additional topics exceed the standards recommended by NCTM and the NJ Core Content Standards). Students who master this course are expected to enroll in Functions H in the sophomore year.

GEOMETRY A/ICR: 9, 10

5 credits

PREPARATION: Mastery of Intro to Functions (8th grade) or successful completion of Enriched Algebra A (9th grade)

A study is made of the basic structure of two and three-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and to solve problems deductively. Understanding of these fundamental concepts is achieved through a study of lines, segments, angles, polygons, and circles. The integration of algebra, methods of proof and fundamental concepts of mathematical logic are stressed. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY R: 10

5 credits

PREPARATION: Successful completion of Algebra I R (9th Grade)

A study is made of the basic structure of two-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and solve problems deductively. Understanding of these and fundamental concepts is achieved through a study of lines, segments, angles, polygons, and circles. In this course, the methods of proof are generally approached through carefully selected examples. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY R: 10/ICR

5 credits

PREPARATION: Successful completion of Algebra I R (9th Grade)

A study is made of the basic structure of two-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and solve problems deductively. Understanding of these fundamental concepts is achieved through a study of lines, segments, angles, polygons, and circles. In this course, the

methods of proof are generally approached through carefully selected examples. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY SEMINAR

5 credits

PREPARATION: Current enrollment in Geometry

This course is required for students "at-promise" in Geometry due to their level of math knowledge and skill as indicated on PARCC Math assessment and/or achievement in their Algebra 1 course. Teachers will identify student's areas of weakness in geometry skills and tailor a learning program that will support the common core standards for Geometry to build skill, strength and self-confidence. Students will benefit from small group instruction when appropriate in this course. Students will receive a grade in this course. Additionally, students not originally identified but selected by their current math teacher may rotate into and out of this course on an as-needed basis if space is available.

GEOMETRIC CONCEPTS: 11

5 credits

PREPARATION: Successful completion of Algebraic Concepts 1 & Algebra Concepts II.

This course is designed for the student who has successfully completed Algebraic Concepts 1 and Algebra Concepts II or has demonstrated knowledge of the content and skills of the course. Students will learn the language of geometry through explorations and manipulations on such technology and materials as the Geometer's Sketchpad and Geoboards. They will apply their algebra skills in the study of triangles, polygons and circles. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum. This course is only available to students with IEPs.

FUNCTIONS H: 10

5 credits

PREPARATION: Mastery of Intro to Functions (8th Grade) and successful completion of Geometry H (9th Grade)

This is a rigorous course that serves as a precursor to Pre-Calculus H and Calculus AP. During the first marking period, students use their previously mastered Enriched Algebra A skills as they learn the major concepts and skills of the second year of algebra, all of which are then applied throughout the remaining three marking periods. Operations and transformations are performed on these functions to produce other more complicated functions, which are also analyzed. Probability and statistics through the study of central tendencies, is also explored. Application of concepts is reinforced through lab experiments and math modeling. Properties of functions and relations are reviewed and the study of the circular, algebraic, exponential and logarithmic functions is extended.

ALGEBRA 2 A/ICR: 10, 11, 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A and Geometry A

This course involves a continuation of the study of the properties of the real numbers begun in Enriched Algebra A. A study of quadratic functions leads to an extension of the real number system to the complex number system. The study of quadratic functions is then generalized to the study of polynomial functions of higher degree, before an analysis of radical and rational functions is undertaken. Students will then embark upon a study of exponential and logarithmic functions before ending the year with an introduction to trigonometry. All of the above concepts are reinforced through several major themes of the course: analysis of functions presented in different forms, transformations of functions, and systems of equations.

ALGEBRA 2 R/ICR: 10, 11, 12

5 credits

PREPARATION: Successful completion of Algebra 1 R and Geometry R

This course involves a continuation of the study of the real numbers begun in Algebra 1. A study of quadratic functions leads to an extension of the real number system to the complex number system. The study of quadratic functions is then generalized to the study of polynomial functions of higher degree, before an analysis of radical and rational functions is undertaken. Students will then embark upon a study of exponential and logarithmic functions before ending the year with an introduction to trigonometry. All of the above concepts are reinforced through several major themes of the course: analysis of functions presented in different forms, transformations of functions, and systems of equations.

ALGEBRAIC CONCEPTS 2

5 credits

PREPARATION: Successful completion of Algebraic Concepts I

In this course, students will continue to develop their algebra skills begun in Algebraic Concepts 1. Through the use of graphing calculators, CBLs (calculator based labs) and manipulatives, students will deepen and expand their algebra skills as they prepare for the PARCC End of Course Assessment. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum and the New Jersey Core Content Standards. This course is only available to students with IEPs. Students who are enrolled in this course will take the PARCC Algebra 1 Assessment.

ALGEBRA 2 SEMINAR

5 credits

PREPARATION: Current Enrollment in Algebra 2

This course is required for students “at promise” in Algebra 2 due to their level of math knowledge and skill as indicated on PARCC Math assessment and/or achievement in Algebra 1 and/or Geometry course. Teachers will identify student’s areas of weakness in algebra skills and tailor a learning program that will support the common core standards for Algebra 2 to build skill, strength and self-confidence. Students will benefit from small group instruction when appropriate in this course. Additionally, students not originally identified but selected by their current math teacher may rotate into and out of this course on an as-needed basis if space is available.

PRE-CALCULUS H: 11, 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A, Geometry A or H, and Functions H.

This course continues the study of the properties of selected functions using both real and complex numbers. Limits of sequences and functions are studied in detail as a preparation for the calculus. Vectors and graphs in two and three-space are analyzed. An introduction to the derivative is made as a calculus preview incorporated through the year. Application of concepts is reinforced through math modeling and performance assessments using lab reports.

PRE-CALCULUS A: 11, 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A, Geometry A, and Algebra II A

This course involves a review of the properties of the real number system and some properties of the complex number system. Properties of functions and relations are reinforced and the study of the algebraic, exponential, logarithmic and trigonometric functions is extended. Vectors are introduced. These concepts are reinforced through math modeling of real world applications, the use of technology, lab reports and other performance assessments.

TRIGONOMETRY R: 12

5 credits

PREPARATION: Successful completion of Algebra 1 R, Geometry R, and Algebra 2 R

This course involves a review of real number systems. Properties of Functions and relations are reviewed and expanded to include circular, trigonometric, algebraic, exponential and logarithmic functions. These concepts are reinforced through math modeling of real world applications, technology and lab reports as performance assessments.

INTRODUCTION TO COLLEGE MATHEMATICS R: 12

5 credits

PREPARATION: Successful completion of Algebra 2 R or Algebra 2 R/ICS

This course involves review of algebra, geometry and extends the study of functions introduced in Algebra 1, 2, and Geometry. Other topics are sequences, series, central tendencies and probability. The use of math modeling technology and real world problems are incorporated on a regular basis.

DISCRETE MATH/PROBABILITY AND STATISTICS A: 12

5 credits

PREPARATION: Successful completion of Algebra 2

This course is designed as a full year elective for senior students desiring an additional year of mathematics outside the traditional course sequence. Topics covered will include election theory, weighted voting, fair division algorithms, graph theory, optimal scheduling, fractals, and Fibonacci growth.

Additionally, a large portion of the second semester is devoted to the study of statistics with a review of probability. The course is focused on building a direct and immediate connection between the mathematics of our world and the concrete, real-life problems in which mathematics is realized.

CALCULUS AP: 12

5 credits

PREPARATION: Successful completion of Geometry A or H, Functions H, and Pre-Calculus H

This course involves a comprehensive study of the differential and integral calculus. The concepts of limits and continuity are analyzed as the basis for the study of the calculus. A balance is maintained between theory, applications, and manipulative techniques. Included are the concepts of differentiation of elementary and transcendental functions, differentials, and the definite integral, techniques of integration, series and differential equations. The B-C syllabus of the Advanced Placement Examination is satisfied and students are expected to take the AP exam.

CALCULUS A: 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A, Geometry A, Algebra 2A, and Pre-Calculus A

A brief review of algebra is followed by an intuitive approach to the concept of a limit. Also included in the study are the concepts of continuity, differentiation of elementary and transcendental functions, differentials, definite integral, and techniques of integration. Applications of both the integral and derivative are stressed. [The A-B syllabus of the Advanced Placement Examination is satisfied.] Additionally, application of calculus concepts is applied to the real world through experiments and lab reports.

COMMON CORE ELECTIVES

STATISTICS AP: 11, 12

5 credits

PREPARATION: Successful completion of Functions H, Algebra 2A, Pre-calculus H or Pre-Calculus

This course provides a pervasive study of the major concepts and tools for collecting, analyzing, interpreting, and drawing conclusions from data. Students are exposed to four broad conceptual themes: Exploring Data, Sampling and Experimentation, Anticipating Patterns, and Statistical Inference. Students will apply knowledge of numerical and graphical summaries of data, least-squares regression and logarithms, and probability and simulation to solve problems. In addition, students will perform a variety of significant tests in order to evaluate hypotheses. These tests include sample means, sample proportions, chi-square, and inference for regression.

MULTIVARIABLE CALCULUS H: 12

5 credits

PREPARATION: Successful completion of Calculus AP (11th grade)

This course is designed to extend the fundamental concepts of calculus from the two-dimensional setting to those in three dimensions. Students begin the year with a review and extension of their knowledge of parametric and polar curves before embarking upon the calculus of vector-valued functions. The notion of a function of a single real variable is generalized to that of a function of several variables, allowing the generalization of the ideas of limits and continuity, the derivative and the integral. The limit definition of the partial derivative is introduced as a parallel to that of the ordinary derivative, and once computational fluency is achieved, applications such as optimization problems and Lagrange Multipliers are explored. The central theme of the integral is generalized to that of the multiple integral, as several coordinate systems are explored in detail, including the polar, cylindrical and spherical coordinate systems as aids to such integration.

INTRODUCTION TO COMPUTER PROGRAMMING

5 credits

PREPARATION: Successful completion of Algebra 2

This course is an introductory course designed to develop an understanding of how computers process information. Students learn organizational, analytical and problem solving skills while implementing structured programming techniques. This course introduces concepts central to computer science including data structures, object oriented programming, top down design, algorithms and event driven programming. This is accomplished by an

examination and implementation of code that forms the basis of most software applications used on the internet. A high-level drag-and-drop language will be utilized. This course will also introduce students to mobile app development