Math Course Descriptions

Course Title: **Algebra: Concepts and Connections**	Course Description and Prerequisite(s)
Course Number (s): 27.0811001 (fall) 27.0811002 (spring)	This course is designed as the first course in a three-course series. Students will apply their algebraic and geometric reasoning skills to make sense of problems involving algebra, geometry, bivariate data, and statistics. This course focuses on algebraic, quantitative, geometric, graphical, and statistical reasoning. In this course, students will continue to enhance their algebraic reasoning skills when analyzing and applying a deep understanding of linear functions, sums and products of rational and irrational numbers, systems of linear inequalities, distance, midpoint, slope, area, perimeter, nonlinear equations and functions, quadratic expressions, equations and functions, exponential expressions, equations, and functions, and statistical reasoning. Prerequisite: Math 8
Term: Year-Long	
Eligible Grade(s): 9	

Course Title: **Geometry: Concepts and Connections Honors**	Course Description and Prerequisite(s)
Course Number (s): 27.0821041 (fall) 27.0821042 (spring)	This course is designed as the second course in a three-course honors series. This course enhances students' geometric, algebraic, graphical, and probabilistic reasoning skills. Students will apply their algebraic and geometric reasoning skills to make sense of problems involving geometry, trigonometry, algebra, probability, and statistics. Students will continue to enhance their analytical geometry and reasoning skills when analyzing and applying a deep understanding of polynomial expressions, proofs, constructions, rigid motions and transformations, similarity, congruence, circles, right triangle trigonometry, geometric measurement, and conditional probability. Prerequisite: Algebra: Concepts and Connections Honors
Term: Year-Long	
Eligible Grade(s): 9	

Course Title: **Geometry: Concepts and Connections**	Course Description and Prerequisite(s)
Course Number (s): 27.0821001 (fall) 27.0821002 (spring)	This course is designed as the second course in a three-course series. This course enhances students' geometric, algebraic, graphical, and probabilistic reasoning skills. Students will apply their algebraic and geometric reasoning skills to make sense of problems involving geometry, trigonometry, algebra, probability, and statistics. Students will continue to enhance their analytical geometry and reasoning skills when analyzing and applying a deep understanding of polynomial expressions, proofs, constructions, rigid motions and transformations, similarity, congruence, circles, right triangle trigonometry, geometric measurement, and conditional probability. Prerequisite: Algebra: Concepts and Connections
Term: Year-Long	
Eligible Grade(s): 10	

	Course Description and Prerequisite(s)
Course Title: **Advanced Algebra: Concepts and Connections Honors**	This course is designed as the third course in a three-course honors series. This course will continue to enhance data and statistical reasoning skills as students learn specific ways to collect, critique, analyze, and interpret data. Students will learn how to use matrices and linear programming to represent data and to solve contextually relevant problems. Students will strengthen their geometric and spatial reasoning skills as they learn how to solve trigonometric equations using the unit circle. Students will further develop their functional and graphical reasoning as they explore and analyze structures and patterns for exponential, logarithmic, radical, polynomial, and rational expressions, equations and functions to further understand the world. Prerequisite: Geometry: Concepts and Connections Honors
Course Number (s): 27.0831041 (fall) 27.0831042 (spring)	
Term: Year-Long	
Eligible Grade(s): 9 or 10	
Course Title: **Enhanced Advanced Algebra and AP Precalculus: Concepts and Connections Honors**	This single-credit course is a thoughtful blend of Advanced Algebra: Concepts & Connections and AP Precalculus. Students will be provided the opportunity to develop a deep understanding of concepts in Algebra that are critical to the study of Calculus as well as an understanding of trigonometry and its applications. Students will continue to enhance their understanding of data and statistical reasoning, functional and graphical reasoning, patterning and algebraic reasoning, and geometric and spatial reasoning. There will be an emphasis on notational fluency and the use of multiple representations. Additional topics include sequences and series with the incorporation of convergence and divergence; conic sections as implicitly defined curves; the six trigonometric functions and their inverses; applications of trigonometry such as modeling periodic phenomena, modeling with vectors and parametric equations, solving oblique triangles in contextual situations, graphing in the Polar Plane; solutions of trigonometric equations in a variety of contexts; and the manipulation and application of trigonometric identities. Students will further develop their algebraic, functional, and graphical reasoning as they explore and analyze structures and patterns for exponential, logarithmic, radical, polynomial, piecewise and rational expressions, equations, and functions to further understand the world. Prerequisite: Geometry: Concepts and Connections Honors
Course Number (s): 27.0931041 (fall) 27.0931042 (spring)	
Term: Year-Long	
Eligible Grade(s): 10 or 11 ***Since this course consists of two complete mathematics courses (four semesters) taught during one academic year (two semesters), approval of the Mathematics Department Chair is required.**	

Course Title: **Advanced Algebra: Concepts and Connections**	Course Description and Prerequisite(s) This course is designed as the third course in a three-course series. This course will continue to enhance data and statistical reasoning skills as students learn specific ways to collect, critique, analyze, and interpret data. Students will learn how to use matrices and linear programming to represent data and to solve contextually relevant problems. Students will strengthen their geometric and spatial reasoning skills as they learn how to solve trigonometric equations using the unit circle. Students will further develop their functional and graphical reasoning as they explore and analyze structures and patterns for exponential, logarithmic, radical, polynomial, and rational expressions, equations and functions to further understand the world. Prerequisite: Geometry: Concepts and Connections
Course Number (s): 27.0831001 (fall) 27.0831002 (spring)	
Term: Year-Long	
Eligible Grade(s): 11	
Course Title: **AP Precalculus**	Course Description and Prerequisite(s) The course centers on functions modeling dynamic phenomena. Students also learn that functions and their compositions, inverses, and transformations are understood through graphical, numerical, analytical, and verbal representations, which reveal different attributes of the functions and are useful for solving problems in mathematical and applied contexts. In turn, the skills learned in this course are widely applicable to situations that involve quantitative reasoning. Students learn that a function is a mathematical relation that maps a set of input values— the domain—to a set of output values—the range—such that each input value is uniquely mapped to an output value. Students understand functions and their graphs as embodying dynamic covariation of quantities, a key idea in preparing for calculus. With each function type, students develop and validate function models based on the characteristics of a bivariate data set, characteristics of covarying quantities and their relative rates of change, or a set of characteristics such as zeros, asymptotes, and extrema. This type of understanding helps students to engage with both familiar and novel contexts. See Precalculus course description below for additional topics. Prerequisite: Advanced Algebra: Concepts and Connections Honors
Course Number (s): 27.0741001 (fall) 27.0741002 (spring)	
Term: Year-Long	
Eligible Grade(s): 10 or 11 or 12	

Course Title: **Precalculus** Course Number (s): 27.0841001 (fall) 27.0841002 (spring) Term: Year-Long Eligible Grade(s): 11 or 12	Course Description and Prerequisite(s) The course provides students with the opportunity to develop a deeper understanding of concepts in Algebra that are critical to the study of Calculus as well as an understanding of trigonometry and its applications. Throughout the course there will be a focus on notational fluency and the use of multiple representations. The course includes the study and analysis of piecewise and rational functions; limits and continuity as related to piecewise and rational functions; sequences and series with the incorporation of convergence and divergence; conic sections as implicitly defined curves; the six trigonometric functions and their inverses; applications of trigonometry such as modeling periodic phenomena, modeling with vectors and parametric equations, solving oblique triangles in contextual situations, graphing in the Polar Plane; solutions of trigonometric equations in a variety of contexts; and the manipulation and application of trigonometric identities. Prerequisite: Advanced Algebra: Concepts and Connections or Advanced Algebra: Concepts and Connections Honors
Course Title: **Advanced Mathematical Decision Making** Course Number (s): 27.0850001 (fall) 27.0850002 (spring) Term: Year-Long Eligible Grade(s): 12	Course Description and Prerequisite(s) This course is designed to give students further experiences with statistical information and summaries, methods of designing and conducting statistical studies, an opportunity to analyze various voting processes, modeling of data, basic financial decisions, and use network models for making informed decisions. Prerequisite: Advanced Algebra: Concepts and Connections
Course Title: **Statistical Reasoning** Course Number (s): 27.0880001 (fall) 27.0880002 (spring) Term: Year-Long Eligible Grade(s): 12	Course Description and Prerequisite(s) Statistical Reasoning offers students opportunities to strengthen their understanding of the statistical method of inquiry and statistical simulations. Students will formulate statistical investigative questions to be answered using data, will design and implement a plan to collect the appropriate data, will select appropriate graphical and numerical methods for data analysis, and will interpret their results to make connections with the initial question. Prerequisite: Advanced Algebra: Concepts and Connections

Course Title: **Calculus** Course Number (s): 27.0780001 (fall) 27.0780002 (spring) Term: Year-Long Eligible Grade(s): 12	Course Description and Prerequisite(s) The course provides students with the opportunity to develop an understanding of the derivative and its applications as well as the integral and its applications. Throughout the course there will be a focus on notational fluency and the use of multiple representations. The course includes the study and analysis of limits and continuity as applied to a variety of functions; the derivative as related to limits and continuity; various derivative rules such as product, quotient, and chain; applications of the derivative including curve analysis, applied max/min situations, related rate problems, and use of Mean Value Theorem; the definite integral as a limit of Riemann sums; properties of definite integrals; the Fundamental Theorem of Calculus as it relates derivatives and integrals; techniques of integration including u-substitution; and applications of the integral including solving separable differential equations, finding a particular solution curve given an initial condition, area between curves on a coordinate plane, and average value situations. Prerequisite: Precalculus or AP Precalculus
Course Title: **AP Calculus AB** Course Number (s): 27.0720011 (fall) 27.0720012 (spring) Term: Year-Long Eligible Grade(s): 11 or 12	Course Description and Prerequisite(s) Topics in AP Calculus AB include limits and their properties; derivatives and differentiation applications; anti-derivatives and indefinite integration; area and definite integrals; integration by substitution; the trapezoidal rule; logarithmic, exponential, and other transcendental functions; applications and methods of integration; miscellaneous topics in Calculus AB. This course is equivalent to a college-level Calculus I course. Prerequisite: AP Precalculus
Course Title: **AP Calculus BC** Course Number (s): 27.0730011 (fall) 27.0730012 (spring) Term: Year-Long Eligible Grade(s): 11 or 12	Course Description and Prerequisite(s) Topics in AP Calculus BC include all topics from AP Calculus AB as well as applications of integration involving work and arc length; parametric equations; analysis of acceleration and velocity vectors; applications of slope fields to differential equations; analysis of geometric, harmonic, *p*-, and alternating series; and approximations of polynomials with Taylor and Maclaurin series. This course is equivalent to college-level Calculus I and Calculus II courses. Prerequisite: AP Precalculus
Course Title: **AP Statistics**	Course Description and Prerequisite(s)

Course Number (s): 27.0740011 (fall) 27.0740012 (spring) Term: Year-Long Eligible Grade(s): 11 or 12	Topics in AP Statistics include introduction to statistics; descriptive statistics; probability; probability distributions; normal probability distributions; estimates and sample size; hypotheses testing; inferences from two samples; correlation and regression; multinomial experiments; analysis of variance; statistical process control; nonparametric statistics; design and sampling. Students are required to do a fair amount of reading and are expected to use the textbook as a primary source of information. Likewise, there is a major emphasis on writing rather than algebraic manipulation. This course is equivalent to introductory college-level Statistics. Prerequisite: Advanced Algebra: Concepts and Connections
Course Title: **AP Computer Science A** Course Number (s): 11.0160001 (fall) 11.0160002 (spring) Term: Year-Long Eligible Grade(s): 11 or 12	Course Description and Prerequisite(s) Major themes include critical thinking and problem solving in computer programming. Students design, implement, and analyze solutions as well as write, run, test, and debug solutions in the Java programming language. Prerequisite: Advanced Algebra: Concepts and Connections