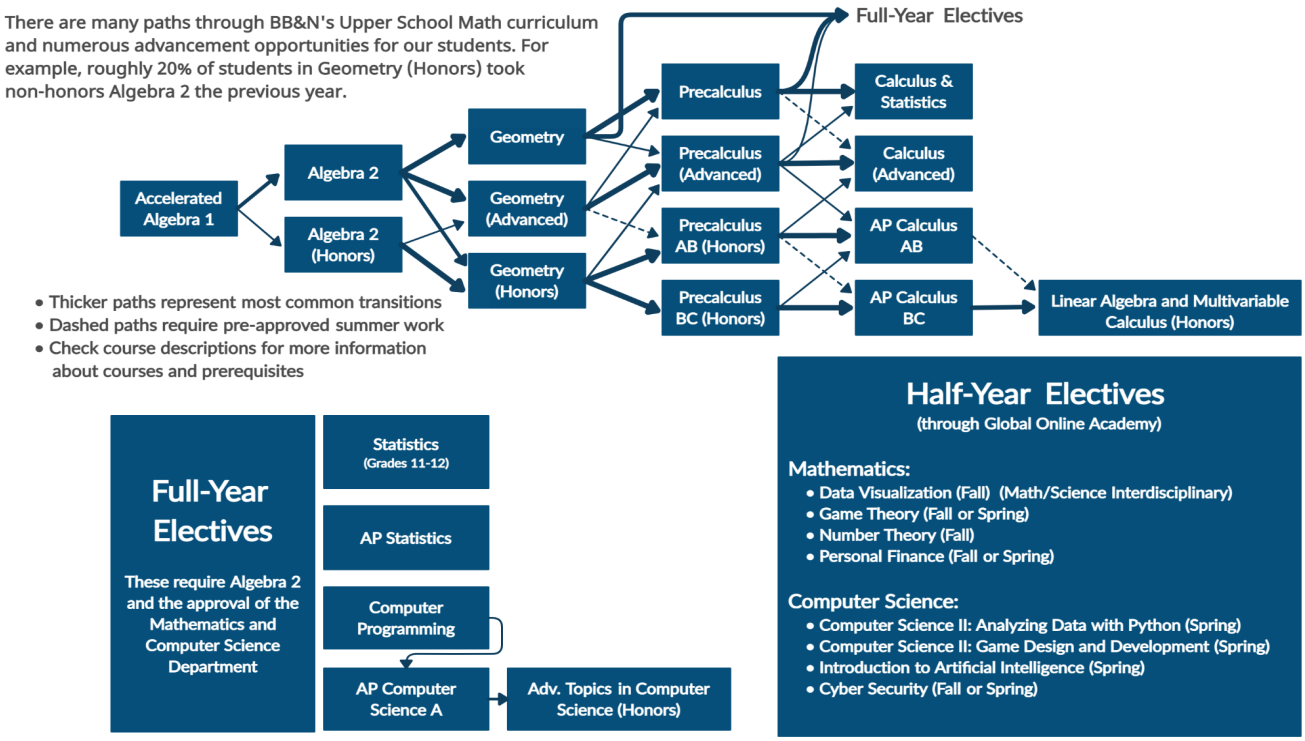
Mathematics and Computer Science Department



Accelerated Algebra 1
Topics in this algebra course include equations, systems of equations, graphing, polynomials, rational expressions, radicals, quadratics, problem solving, and an introduction to the graphing calculator. Throughout the course, emphasis is placed on skill development and conceptual understanding.
Prerequisite: Algebra 1 or Pre-Algebra with approved summer preparation

Algebra 2 and Algebra 2 (Honors)
The topics studied in this course include linear equations, quadratic functions, transformations, polynomial functions, exponential and logarithmic functions, inequalities, and statistics. Additional topics in the honors course may include symmetry, linear programming, rational functions, and triangle trigonometry. In some cases, technology (including graphing calculators and online graphing apps) is used as an efficient approach to a solution, while at other times it is used to explore and enhance the students' understanding of algebraic concepts and relationships.
Prerequisite: Algebra 1

Geometry
This course approaches Euclidean Geometry with an in-depth analysis of plane, solid, and coordinate geometry as they relate to both abstract and concrete mathematical concepts as well as to real-world problem situations. To develop critical thinking and logic skills, students are exposed to informal proof and different technological tools and manipulatives as they discover geometric relationships. In place of more formal proof taught in other geometry courses, there is a greater emphasis on applying algebra skills to geometry topics. Topics include parallel lines and polygons, perimeter and area analysis, volume and surface area analysis, similarity and congruence, right-triangle trigonometry, and analytic geometry. Additional topics may include statistics and computer programming.
Prerequisite: Algebra 2

Geometry (Advanced)
Like Geometry, this course approaches Euclidean Geometry with an in-depth analysis of plane, solid, and coordinate geometry as they relate to both abstract and concrete mathematical concepts as well as to real-world problem situations, yet at a faster pace. To develop critical thinking and reasoning skills, students are exposed to different technological tools and manipulatives as they discover geometric relationships. Topics include more formal deductive and inductive proof, parallel lines and polygons, perimeter and area analysis, volume and surface area analysis, similarity and congruence, right-triangle trigonometry, analytic geometry, and computer programming. Additional topics may include statistics and circular trigonometry.
Prerequisite: Algebra 2 (generally with a grade of B or higher) and approval of the Mathematics and Computer Science Department

Geometry (Honors)
This fast-paced course encourages students to think in new ways. Students learn to build on what they know to be true and to avoid making false assumptions. Deductive reasoning and discovery are the common threads that run through each unit in this course. Students make frequent use of technology and participate in frequent group assessments that allow students to complete more challenging material. In addition to exploring the topics taught in Geometry, the Geometry (Honors) course also studies circular trigonometry, trigonometric identities/equations, the Laws of Sines and Cosines, probability, and combinatorics. Students code in Java during the unit on computer programming.
Prerequisite: Algebra 2 (Honors) (generally with a grade of B or higher) or Algebra 2 (generally with a grade of A- or higher), and approval of the Mathematics and Computer Science Department

Precalculus
Students in this course study polynomial functions, sequences and series, trigonometric functions, exponential, and logarithmic functions. Other topics studied include transformations and rational functions. This course is generally designed for students who are ready for a precalculus course but not yet ready for the increased rigor of Precalculus (Advanced). Successful completion of this course could prepare Grade 12 students for an advanced college precalculus course or a humanities-level college calculus course, and Grade 11 students for Calculus & Statistics or the yearlong Statistics course.
Prerequisites: Algebra 2, Geometry (generally with grades of C+ or higher), and approval of the Mathematics and Computer Science Department

Precalculus (Advanced)
Students in this course study transformations and modeling, polynomial and rational functions, real and complex roots of polynomials, sequences and series, exponential and logarithmic functions, and circular trigonometry. The study of trigonometry includes the six trigonometric functions (their definitions, graphs, applications, and inverses), a variety of trigonometric identities, the polar form of complex numbers, and the Laws of Sines and Cosines. Other topics may include statistics, combinatorics and probability, and vectors.
Prerequisites: Algebra 2, Geometry (Advanced) (generally with grades of B+ or higher), and approval of the Mathematics and Computer Science Department

Precalculus AB (Honors) and Precalculus BC (Honors)
The honors courses take a toolkit approach to a large variety of functions that can be transformed to model phenomena. Precalculus AB (Honors) studies precalculus topics for the entire year, while Precalculus BC (Honors) accelerates to include an introduction to limits and differential calculus. Since Precalculus BC (Honors) begins the AP Calculus syllabus after Spring Break, students in Precalculus BC (Honors) who move on to Calculus the following year are expected to take the Advanced Placement Calculus BC course. A

deviation from this sequence is rare and requires approval of the Mathematics and Computer Science Department.
Prerequisites: Algebra 2, Geometry, and approval of the Mathematics and Computer Science Department

Calculus & Statistics
This course provides an introduction to both calculus and statistics topics. The first trimester focuses on calculus concepts, including limits, derivatives, and integrals. The second trimester focuses on statistics and introduces students to the fundamental concepts and techniques employed when working with data. Additional topics in calculus and statistics are studied during the third trimester.
Prerequisites: Precalculus and approval of the Mathematics and Computer Science Department

Calculus (Advanced)
Major topics of this calculus course are limits, differential calculus and integral calculus, and their many applications. In addition, some sections may do non-calculus enrichment topics or projects.
Prerequisite: Precalculus (Advanced) (generally with a grade of B or higher) and approval of the Mathematics and Computer Science Department

Advanced Placement Calculus AB
Major topics of this course are limits, differential calculus and integral calculus, and their many applications. The course includes, as a minimum, all topics stated in The College Board Advanced Placement (AP) Calculus AB syllabus (generally equivalent to one semester of college calculus), but usually includes numerous topics beyond the AP curriculum. Seniors who do not continue with this course during Senior Spring Project are required to complete the AP curriculum, which may require additional assignments or class meetings before or during the third trimester.
Prerequisite: Precalculus AB (Honors) or Precalculus (Advanced) (generally with a grade of A or higher), and approval of the Mathematics and Computer Science Department

Advanced Placement Calculus BC
Major topics of this course are limits, differential calculus and integral calculus, and their many applications. Infinite series, advanced techniques of integration, vectors, parametric, and polar equations are also covered. The course includes, as a minimum, all topics stated in The College Board Advanced Placement (AP) Calculus BC syllabus (generally equivalent to two semesters of college calculus), but usually includes numerous topics beyond the AP curriculum. Seniors who do not continue with this course during Senior Spring Project are required to complete the AP curriculum, which may require additional assignments or class meetings before or during the third trimester.
Prerequisite: Precalculus BC (Honors) or approval of the Mathematics and Computer Science Department

Linear Algebra and Multivariable Calculus (Honors)
Students in this yearlong course study two semesters of college mathematics beyond the Advanced Placement Calculus BC curriculum. A half-year of multivariable calculus includes the generalization of calculus concepts to two and three dimensions; they include partial derivatives, multiple integrals, optimization problems (using Lagrage multipliers), other coordinate systems (cylindrical, spherical), and vector calculus (Green's Theorem, Stokes' Theorem, etc.) A half-year of linear algebra includes basic concepts involving vectors and matrices, including solving systems of linear equations by Gaussian elimination, Cramer's Rule, and inverse matrices; the concepts of linear independence, spanning vectors, and basis vectors; the dot (inner) product and the cross product; eigenvalues, eigenvectors, and the diagonalization of matrices; abstract linear transformations and change of basis. This course may also include some discussion of differential equations and Fourier series.
Prerequisite: AP Calculus BC (AP Calculus AB only allowed with the approval of the Mathematics and Computer Science Department)

Statistics* (Grades 11 – 12)
Students in this course are acquainted with the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students frequently work on projects involving the hands-on gathering and analysis of real world data. Ideas and computations presented in this course have immediate connections with actual events and future applications for study in the social sciences, natural sciences, or business. Computers and calculators allow students to focus deeply on the concepts involved in statistics. Juniors enrolled in this course spend the third trimester preparing for Precalculus.
Prerequisite: Algebra 2 and Geometry

Advanced Placement Statistics* (Grades 10 – 12)
Students in the Advanced Placement (AP) Statistics course are acquainted with the major concepts and tools for collecting, analyzing, and drawing conclusions from authentic data. Students frequently work on projects and projects involving the hands-on gathering and analysis of real-world data. Ideas and computations presented in this course have immediate connections with world events. The use of technology allows students to focus deeply on the concepts involved in statistics. This course prepares students for the AP Statistics exam. For students in Grades 10 and 11, this course is generally taken in addition to a math course in the normal sequence. For students in Grade 12, this course can be an appropriate college-preparatory alternative to Calculus. Seniors who do not continue with this course during Senior Spring Project are required to complete the AP curriculum, which may require additional assignments or class meetings before or during the third trimester.
Prerequisite: Algebra 2 and approval of the Mathematics and Computer Science Department

Computer Programming* (Grade 12; Grades 10 – 11 with approval from the Mathematics and Computer Science Department)
This introductory computer science course provides students with a comfortable and engaging first programming experience. Topics include programming methodology, conditionals, loops, methods, arrays, strings, and the use and creation of objects. This course is designed to prepare students for a college-level programming course, including BB&N's AP Computer Science A course. The primary language is Java.
Prerequisite: Generally a grade of B or higher in the current math course and approval of the Mathematics and Computer Science Department

Advanced Placement Computer Science A (Plus Data Structures)* (Grades 10 – 12)
This is an introductory college-level computer science course with an emphasis on programming methodology, algorithms, and data structures. Major topics include arrays, methods, classes, objects, linked lists, trees, recursion, and searching and sorting algorithms. Participating students are prepared to take the AP Computer Science A exam. This course goes beyond the AP syllabus, including the set of topics typically composing a full year of college level computer science. The primary programming language is Java. Previous programming experience is not necessary.
Prerequisite: Generally a grade of B or higher in an honors math course, a B+ or higher in Computer Programming or comparable programming experience, and approval of the Mathematics and Computer Science Department

Advanced Topics in Computer Science* (Honors) (Grade 12)
This course offers students the opportunity to learn about topics that go beyond the Advanced Placement Computer Science A curriculum. In recent years, students in this course constructed a simulated computer system as they learned about the interactions of hardware, software, compilers, and operating systems. Other topics studied in this course could include advanced data structures and algorithms, parallel computing, machine learning, iOS app development, and computer graphics. This is a hands-on course and students learn through a series of individual and small-group projects. Students interested in this course are encouraged to contact the teacher or Department Head for more information about what topics will be taught in the upcoming year.

Prerequisite: Prior programming experience (at the level of AP Computer Science or beyond) and approval of the Mathematics and Computer Science Department

*Enrollment in Statistics, AP Statistics, Computer Programming, AP Computer Science A, and Advanced Topics in Computer Science (Honors) is limited. A lottery may be used if a course is over-enrolled.

Global Online Academy Courses: The following mathematics and computer science courses are offered to students in Grades 11 and 12 through Global Online Academy:

Mathematics

- **Data Visualization** (Fall, Math/Science Interdisciplinary Course)
- **Game Theory** (Fall and Spring)
- **Number Theory** (Fall)
- **Personal Finance** (Fall and Spring)

Computer Science

- **Computer Science II: Analyzing Data with Python** (Spring)
- **Computer Science II: Game Design and Development** (Spring)
- **Cyber Security** (Fall and Spring)
- **Introduction to Artificial Intelligence** (Spring)

For more information on these courses, please refer to the Global Online Academy section of this Program Planning Guide.