

## MATHEMATICS

Most students want to study mathematics as a tool for effective citizenship, as a tool for functioning in a technological world, as a system in its own right, or as a fulfillment of requirements – high school graduation or college entrance.

Newton North High School supports students in these endeavors through courses that cater to a variety of interests and learning styles. All courses support students' advancement in their knowledge of mathematical content and equally as important, their development and mastery of the Standards of Mathematical Practice. Based on the Common Core State Standards, our courses prepare students for state assessments and expose students to the content assessed on college entrance and Advanced Placement exams (when applicable). While progression through the content is an important part of the experience, our courses emphasize the importance of deepening students' knowledge and understanding as well as their ability to thoughtfully communicate what they have learned.

Throughout their experience at Newton North High School, students will have opportunities to interact with various technological tools to support their learning of mathematics. One way is through instruction that integrates technology as a way to emphasize the visual aspects of mathematics. Another is through lessons that may include student engagement with web-based applications like Desmos, Geogebra and Google Sheets. Throughout their 4 years, students will be taught how to use a graphing calculator to support their exploration and understanding of mathematical concepts. In line with Common Core Mathematical Practice 5, we desire for students to use appropriate tools strategically in a variety of problem solving situations.

Different courses are offered to address different learning styles, skill levels and interests. New registrants take a placement test upon registration to designate appropriate placement in courses. Students in Newton Public Schools go through a placement process at their respective Middle Schools. It is expected that students in Grade 9 take a Math 1 course and progress through Math 2-4. Deviations from this sequence are not permitted. There are opportunities to access courses at different curriculum levels (CP, ACP, Accelerated, and Honors) depending on student skill development and mastery. Descriptions of all course offerings, including electives, are listed on the next few pages.

*Scope, Sequence, and Course Placement Philosophy:*

Newton North has a commitment to opportunity, access, and excellence for all students. The scope and sequence of courses in each department has been designed to support these overarching goals. Courses include an articulation of content and skills that can be developed and learned within a developmentally appropriate community of learners at each grade level. The curriculum is designed to support the continuous academic, social, and skill development growth for all students. A core value at North is that all students are appropriately challenged and supported both in terms of the work in individual classes and more broadly across a student's schedule. As students consider their course load, we support them in finding an appropriate level of stretch and balance within their classes. Teachers consider this placement philosophy when making course level recommendations.

Placement in leveled courses requires teacher recommendation.

MATHEMATICS COURSES LEVELS				
GRADE	CP	ACP	ACP ACC	H
9	541	516	511	501
10	542	517	512	502
11	543	518	513	503
12	544, 858	519	514, 508*	508, 504

\*508 Earns Honors Credits

OTHER OFFERINGS	
505	AP Statistics
858	Business Math
532	Math Concepts & Skills
580	Classroom Aide in Mathematics

COMPUTER SCIENCE	
549	Introduction to Computer Science
551, 552	Computer Programming
553	Computer Science Principles

## MATH 1 OFFERINGS

- 541 Math 1** CP 9 FY 5 credits  
 ★ Math 1 CP provides an integrated study of mathematics including topics traditionally covered in algebra 1, geometry, an introduction to sequences and basic statistics. Students will be supported in developing their ability to handle abstraction during problem solving. Students will make connections in their learning with structures designed to build their independence.
- 516 Math 1** ACP 9 FY 5 credits  
 ★ Math 1 ACP provides an integrated study of mathematics including topics traditionally covered in algebra 1, geometry, an introduction to sequences and basic statistics. Students will be supported in handling abstractions and problem solving with structures designed to build their independence. Students in this course respond when given a challenge, can articulate their struggles, and can realistically apply feedback.
- 511 Math 1 Accelerated** ACP 9 FY 5 credits  
 ★ Math 1 ACP Accelerated provides an integrated study of mathematics including topics traditionally covered in algebra 1, geometry, and an introduction to sequences and basic statistics. This course is designed for students who enjoy the challenge of figuring out problems, who respond positively when given a challenge, who ask questions to clarify understanding, can handle abstractions and are supported in making connections with previous content knowledge and experience. Students will engage in problem solving with independence and increasing efficiency.
- 501 Math 1** H 9 FY 5 credits  
 ★ Math 1 Honors provides an integrated study of mathematics traditionally covered in algebra, geometry, and probability/statistics through problem solving. The course is designed for students who seek out and enjoy the challenge of figuring out problems, who ask questions that deepen/extend their learning and who make connections with previous content knowledge and experience. Students will regularly seek the most efficient methods in problem-solving practices, and synthesize the big picture in concepts they are learning.

## MATH 2 OFFERINGS

- 542 Math 2** CP 10 FY 5 credits  
 Math 2 CP provides an integrated study of mathematics including an introduction to topics traditionally covered in algebra 2, geometry, right triangle trigonometry, and probability. Students will be supported in developing their ability to handle abstraction during problem solving. Students will make connections in their learning with structures designed to build their independence. Students enrolled in this course may benefit from also enrolling in Math Concepts and Skills (532).
- 517 Math 2** ACP 10 FY 5 credits  
 Math 2 ACP provides an integrated study of mathematics including an introduction to topics traditionally covered in algebra 2, geometry, right triangle trigonometry, and probability. Students will be supported in handling abstractions and problem solving with structures designed to build their independence. Students in this course respond when given a challenge, can articulate their struggles, and can realistically apply feedback.

- 512 Math 2 Accelerated** ACP 10 FY 5 credits  
 Math 2 ACP Accelerated provides an integrated study of mathematics including topics traditionally covered in algebra 2, geometry, right triangle trigonometry, and probability at an accelerated pace. This course is designed for students who enjoy the challenge of figuring out problems, who respond positively when given a challenge, who ask questions to clarify understanding, can handle abstractions and are supported in making connections with previous content knowledge and experience. Students will engage in problem solving with independence and increasing efficiency.
- 502 Math 2** H 10 FY 5 credits  
 Math 2 Honors completes the integrated study of topics traditionally covered in algebra 2 and geometry with an introduction to trigonometry, logarithms and additional concepts in probability. The course is designed for students who seek out and enjoy the challenge of figuring out problems, who ask questions that deepen/extend their learning and who make connections with previous content knowledge and experience. Students will regularly seek the most efficient methods in problem-solving practices, and synthesize the big picture in concepts they are learning.

## MATH 3 OFFERINGS

- 543 Math 3** CP 11 FY 5 credits  
 Math 3 CP provides an integrated study of mathematics completing topics traditionally covered in algebra 2, sequences and series, and additional introductory trigonometry topics. Students will be supported in developing their ability to handle abstraction during problem solving. Students will make connections in their learning with structures designed to build their independence.
- 518 Math 3** ACP 11 FY 5 credits  
 Math 3 ACP provides an integrated study of mathematics completing topics traditionally covered in algebra 2, sequences and series, and additional introductory trigonometry topics. Students will be supported in handling abstractions and problem solving with structures designed to build their independence. Students in this course respond when given a challenge, can articulate their struggles, and can realistically apply feedback.
- 513 Math 3 Accelerated (Precalculus)** ACP 11 FY 5 credits  
 Math 3 ACP Accelerated provides a study of precalculus in preparation for student success in an introductory calculus course. This course is designed for students who enjoy the challenge of figuring out problems, who respond positively when given a challenge, who ask questions to clarify understanding, can handle abstractions and are supported in making connections with previous content knowledge and experience. Students will engage in problem solving with independence and increasing efficiency.
- 503 Math 3 (Precalculus)** H 11 FY 5 credits  
 Math 3 Honors offers a comprehensive study of trigonometry and precalculus including the precalculus of parametric and vector equations as well as limits. The course is designed for students who seek out and enjoy the challenge of figuring out problems, who ask questions that deepen/extend their learning and who make connections with previous content knowledge and experience. Students will regularly seek the most efficient methods in problem-solving practices, and synthesize the big picture in concepts they are learning.

## MATH 4 OFFERINGS

- 544 Math 4** CP 12 FY 5 credits  
 Math 4 CP continues an integrated study of mathematics with a particular focus on modeling with linear, quadratic and exponential functions. Students will be supported in developing their ability to handle abstraction during problem solving. Students will make connections in their learning with structures designed to build their independence. By successful completion of this course, students will be prepared to pursue college level mathematics.
- 519 Math 4 (Trigonometry and Statistics)** ACP 12 FY 5 credits  
 Math 4 ACP begins the study of precalculus, continues the study of trigonometry and includes additional units of study in statistics and personal finance. Students will be supported in handling abstractions and problem solving with structures designed to build their independence. Students in this course respond when given a challenge, can articulate their struggles, and can realistically apply feedback. By successful completion of this course, students will be fully prepared to pursue college level mathematics.
- 514 Math 4 Accelerated (Introduction to Calculus)** ACP 12 FY 5 credits  
 Introduction to Calculus continues the study of precalculus and introduces foundational topics in differential and integral calculus. This course is designed for students who enjoy the challenge of figuring out problems, who respond positively when given a challenge, who ask questions to clarify understanding, can handle abstractions and are supported in making connections with previous content knowledge and experience. Students will engage in problem solving with independence and increasing efficiency. By successful completion of this course, students will be prepared to pursue rigorous college level mathematics.
- 508 Math 4 (Advanced Placement Calculus AB)** H 12 FY 5 credits  
 Advanced Placement Calculus AB begins the study of calculus and follows the Advanced Placement Calculus AB syllabus. Students are offered a college-level calculus course that includes topics of derivatives and integrals and their applications. Topics in this course are typically the equivalent of a College Calculus 1 course. The structure of this course provides time and support for students to connect their prior knowledge of pre-calculus to the learning of new calculus concepts. By successful completion of AP Calculus (508/504), students will be prepared to pursue advanced college level mathematics.

<b>504</b>	<b>Math 4 (Advanced Placement Calculus BC)</b>	<b>H</b>	<b>12</b>	<b>FY</b>	<b>5 credits</b>
<p>Advanced Placement Calculus BC begins the study of calculus and follows the Advanced Placement Calculus BC syllabus. Students are offered a college-level calculus course which includes all topics of Calculus AB in derivatives and integrals, as well as additional techniques and applications. Further, the Calculus BC course offers the study of infinite series, including Taylor Series and Taylor Polynomials. Topics in this course are typically the equivalent of College Calculus 1 and Calculus 2 courses. By successful completion of this course, students will be prepared to pursue advanced college level mathematics.</p>					

## COMPUTER SCIENCE OFFERINGS

For students planning to take all of our Computer Science courses, the most logical sequence would be Introduction to Computer Science, followed by Computer Programming, and then Computer Science Principles. However, students can take any combination of the courses, in any order, provided they meet the prerequisites.

<b>549</b>	<b>Introduction to Computer Science</b>	<b>ACP</b>	<b>9, 10, 11, 12</b>	<b>SM</b>	<b>2.5 credits</b>
<b>★</b>	<p>In this 2x/week course, students will be introduced to such topics as data analysis, graphic design, robotics, computer programming, and HTML. Intro to Computer Science enables students to dip their toes into principles of computer science and prepares them to take more advanced courses in the future. No previous programming experience is needed.</p>				
<b>552</b>	<b>Computer Programming</b>	<b>ACP</b>	<b>10, 11, 12</b>	<b>SM</b>	<b>2.5 credits</b>
<b>551</b>	<b>Computer Programming</b>	<b>H</b>	<b>10, 11, 12</b>	<b>SM</b>	<b>2.5 credits</b>
<p>The Computer Programming elective offers students at all levels an introduction to coding. The course begins with Python, a high-level but accessible language. The course then moves to HTML, CSS, and the languages that drive today's Internet. At the ACP level, students will work at the pace appropriate for their level of experience, whether they are new to coding or have been writing computer programs for years. At the Honors level, students will tackle more challenging problems requiring a stronger mathematics background. Priority will be given to juniors and seniors</p>					
<b>553</b>	<b>Computer Science Principles</b>	<b>H</b>	<b>11, 12</b>	<b>FY</b>	<b>5 credits</b>
<p><b>Prerequisite:</b> <i>Math 3 ACP or H and recommendation from math or computer science teacher.</i></p> <p>The newest Computer Science offering is a project-based course that provides students with a comprehensive overview of contemporary computing topics, ranging from the basic functioning and parts of a computer to concepts in cybersecurity to the fundamentals of programming. Students will utilize the C programming language, Python, and some HTML/CSS to create applications and websites. The course is adapted from the Computer Science Principles curricula of Harvard's CS50 course.</p>					

## OTHER OFFERINGS

<b>505</b>	<b>Advanced Placement Statistics</b>	<b>H</b>	<b>11, 12</b>	<b>FY</b>	<b>5 credits</b>
<p><b>Prerequisite:</b> <i>Successful completion of 502, 512, 518, and recommendation from math teacher, priority will be given to seniors</i></p> <p>This course will introduce you to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. The four major themes are: exploratory analysis using graphical and analytical techniques to study patterns and departures from patterns; data collection according to a well-developed plan; use of probability to anticipate data distribution; use of statistical inferences to select reasonable models. Advanced Placement Statistics is not a traditional math course. It is very language based and requires a lot of reading, interpretation, and writing. Students who find success in History and English and who have outstanding work habits are good candidates for this course.</p> <p>Advanced Placement Statistics is an elective course and should be taken in addition to the student's traditional math course.</p>					
<b>858</b>	<b>Business Mathematics*</b>	<b>CP</b>	<b>11, 12</b>	<b>FY</b>	<b>5 credits</b>
<p>This one-year course is divided into two major units: Personal Business Mathematics and Operational Business Mathematics. Students will review fundamental math skills before learning about financial literacy through instruction about savings and checking accounts, investment opportunities, credit cards, bank loans, etc. They will also learn math related to business operations including costs, sales, purchasing, and production. Students will make connections in their learning with structures designed to build their independence.</p> <p>*Students with strong fundamental math skills are encouraged to explore Business Technology courses offered through the CTE Department.</p>					
<b>532</b>	<b>Mathematics Concepts &amp; Skills</b>	<b>no level</b>	<b>10</b>	<b>SM</b>	<b>2.5 credits</b>
<p>Students receive targeted support to reinforce mathematical learning of concepts, skills and practices.</p>					
<b>580</b>	<b>Classroom Aide in Mathematics</b>	<b>no level</b>	<b>11, 12</b>	<b>SM1, SM2</b>	<b>varies</b>
<p>Students must complete the application/registration process through the department head to be considered as a candidate for the position of mathematics classroom aide. Selected students will be paired with a supervising math teacher. The math classroom aide and the supervising teacher will work together closely on tasks that are helpful to the teacher (and/or her students) and that are educational for the student. The program is open to responsible upperclassmen that have taken math classes at all curriculum levels. For many students the experience is similar to a job shadow or internship.</p>					