

# MATHEMATICS

The BHS Mathematics Program offers all students a preparation in the knowledge and skills necessary for competence in mathematics, as well as preparation for further training and study. All courses in mathematics aim to increase understanding of the basic concepts in mathematics. Some course will be taught using proficiency-based learning. Attention is given to providing a deeper knowledge of our number system, experience with quantitative reasoning, study of the nature of proof and of the techniques of critical thinking, and knowledge of the contributions mathematics has made and is making to the progress of civilization. An appreciation and enjoyment of mathematics as a way of thinking is sought.

## **BHS Graduation Requirement**

The Burlington High School graduate uses a variety of mathematical methods and appropriate technology to solve problems and functions confidently in a mathematically sophisticated world.

**To achieve the graduation requirement, a student must:**

- use mathematical reasoning in problem solving;
- communicate mathematics by using language, graphing symbols, concrete models, visuals, and technology to express and comprehend mathematical ideas;
- make mathematical connections;
- demonstrate a quantitative sense;
- demonstrate a spatial sense;
- demonstrate knowledge of arithmetic/algebraic properties;
- demonstrate an effective use of the basic concepts of probability and statistics.

## **GENERAL COURSE INFORMATION**

Ninth Graders have four points of entry in Mathematics: Elements/Pre-Algebra (402), Pre-algebra/Algebra I (404-9), Algebra 1 (406-9), Geometry (408-9)

- One of the three recommended credits for graduation is Algebra.
- Students who take Mathematics of Money must be Seniors who have passed Algebra II at a minimum.
- College-bound students generally should complete at least Geometry and Algebra II.
- Students wishing to transfer into Honors courses should have an A average in their previous math course and a teacher recommendation.
- Students may double up with math courses in order to progress more quickly through the sequence of classes.
- Some students may also complete math requirements through ELL, Instructional Services, and technical center classes.

## **SEQUENCE OF MATH COURSES (3.0 Credits Required)**

Elements		
Pre-Algebra		
Algebra I	9 <sup>th</sup> Grade Algebra I	
Concepts of Geometry	Geometry	9 <sup>th</sup> Grade Geometry
Trig and Discrete, Algebra II, or Applied Personal Math	Algebra II	Honors Algebra II
	Math of Money Trig and Discrete Pre-Calculus	Honors Pre-Calculus
	Calculus Statistics	AP Calculus AP Stats

## **COURSE OFFERINGS**

### **52402 Elements of Mathematics**

**1.0 Credits**

**Grades 9-10**

This is a foundations course designed to improve arithmetic skills for students who are still mastering the cornerstones of math. Students in this course meet every day for half a block and cover the Elements curriculum Semester 1 and if the pace of the course allows Pre-Algebra curriculum Semester 2. Topics include the four basic operations, factoring, fractions and percentages, working with variables, solving equations, proportion and, probability problems, and work with measurement in geometric problems. Students will be able to progress at their own pace on a computer based program, such as Khan Academy, and be given an ample amount of individual tutoring when needed. Mastery of this course will provide the student the prerequisites to go on to study Pre-Algebra or Algebra. *Prerequisite:* Middle school teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving

### **524049 Pre-Algebra/Algebra I**

**1.0 or 2.0 Credits**

**Grades 9-11**

Students in this course meet every day and cover the Pre-Algebra curriculum Semester 1 and the Algebra 1 curriculum Semester 2. This course is designed for students who have a basic understanding of arithmetic and want to enhance their mathematics skills. It is also designed to give students the foundation of understanding mathematics at a moderate pace. Semester 1 topics will include an extensive arithmetic review, working with variables, solving equations, proportions and probability problems. Semester 2 topics include simplifying algebraic expressions, properties of real numbers, solving equations, graphing linear equations and inequalities, solving system of equations, powers and exponents, quadratic equations, polynomials and factoring. Some lessons will include the use of the graphing calculator. Essential material will be covered to

prepare the students for Geometry. *Prerequisite:* Middle school teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving

**52406 Concepts of Algebra I 1.0 Credit Grades 10-12**

This proficiency-based course is designed to give students the foundations of secondary mathematics at a moderate pace. Essential material will be covered to prepare students for Geometry. Topics covered will include creating and simplifying algebraic expressions, solving and graphing linear equations and inequalities, solving systems of linear equations, working with exponential functions and an introduction to probability. Students will be exposed to the online graphing tool Desmos and should have access to their own scientific calculator outside of class. *Prerequisite:* Proficiency in Pre-Algebra or teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving.

**524069 Algebra I 1.0 Credit Grade 9**

This course is designed to give students a firm foundation in secondary mathematics. The concepts and topics that are covered include: evaluating and simplifying algebraic expressions, properties of real numbers, solving and graphing linear equations and inequalities, solving systems of equations, powers and exponents, solving quadratic equations, operations on polynomials, factoring polynomials and simplifying radical expressions. Technology will include the use of Khan Academy and student tablets. Additionally, graphing calculators will be incorporated into this course to help students effectively work with data. *Prerequisite:* Middle school teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving.

**52403 Concepts of Geometry 1.0 Credit Grades 10-12**

This course is designed for students who have taken Pre-Algebra/Algebra I the previous year. Basic terms and essential topics and skills of geometry will be explored and expanded upon at a moderate pace. Topics include congruence and transformations, different polygons (triangles, quadrilaterals, and circles), area and volume, and similarity. Students' proficiency will be assessed through homework and in-class assignments, quizzes, tests, and projects throughout the year. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Effective Communication.

**52407 Applied Personal Mathematics 1.0 Credit Grades 11-12**

This course integrates the review of basic math skills with practical knowledge students need to become informed financial decision-makers. Areas covered will include calculating wages, taxes, banking services, credit card buying, housing and automobile purchases. *Prerequisite:* The student must have two math credits and Junior or Senior standing. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Personal Development.

**524082 Geometry 1.0 Credit Grades 10-12**

Geometry is the study of the properties and relationships of angles, triangles, polygons, and circles. The course begins with common terminology to gradually build a solid body of mathematical reasoning. Work in the course involves intuitive discovery, constructions, simple proofs, and spatial reasoning through applications of area and volume. Students will be required to use their 1-1 device to develop proofs and examples with Geogebra web based calculator. Proficiency is assessed throughout the year with projects, quizzes, tests and homework. *Prerequisite:* Proficiency in Concepts of Algebra I or Algebra I and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Effective Communication.

**524081 Freshmen Geometry 1.0 Credit Grade 9**

This course is designed for the motivated math student with an above average interest in mathematics. Geometry is the study of the properties and relationships of angles, triangles, polygons, and circles. This course focuses on intuitive discovery, constructions, simple proofs, and spatial reasoning through applications of area and volume. Areas of emphasis include logical deductive reasoning, solid and coordinate geometry, transformations, 2-column proofs, and trigonometry. **Students have the option to earn Honors status** in this class by demonstrating learning of core concepts, skills, and knowledge on identified assignments and assessments during the school year at an honors level. The earned Honors designation will be awarded at the end of year. *Prerequisite:* Middle school teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Effective Communication.

**524101 Concepts of Algebra II .0 Credit Grades 11-12**

This course is designed to give students the foundations of secondary mathematics at a moderate pace. Algebra II adds to the previous knowledge of graphing and solving linear functions gained in Algebra by graphing and solving quadratic and cubic functions. Other topics include learning about systems of non-linear equations, exponential and logarithmic functions, and probability. A graphing calculator will be used in class and at home using the online resource Desmos by students throughout the year. *Prerequisite:* Proficiency in both Algebra I and Geometry and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving.

**52410 Algebra II 1.0 Credit Grades 10-12**

Algebra II is one of the most useful and necessary courses for future work in math, science, and other applied fields of study. It is full of direct real world applications that students can relate to and be inspired by. Students will become proficient in linear and quadratic functions and inequalities, systems of non-linear equations, factoring and graphing higher degree polynomials, and exponential and logarithmic functions. A graphing calculator will be used proficiently by students throughout the year. *Prerequisite:* Proficiency in Algebra I and Geometry and teacher recommendation; 9<sup>th</sup> graders by permission of instructor. *Primary Graduate Expectations:* Critical Thinking & Problem Solving.

- 52411 Honors Algebra II** **1.0 Credit** **Grades 10-11**  
 This course is for students prepared to work at an accelerated pace. Students will study polynomial and rational functions, polynomial and rational inequalities, the real and complex number systems, systems of equations, matrices, exponential and logarithmic functions, sequences and series, and applications of right-triangle trigonometry (if time). The graphing calculator (TI-84) will be used to supplement instruction throughout the year, as well as, other web based calculators such as Desmos. It is expected that each student will have a graphing calculator (TI-84) and iPad/Chromebook to use. Proficiency is based on daily homework, daily quizzes, daily questions and daily attitude. *Prerequisite:* Proficiency in 9<sup>th</sup> Grade Geometry or A in Geometry and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving.
- 52421 Mathematics of Money** **1.0 Credit** **Grade 12**  
 This course will cover mathematics material with an emphasis on money and finances. This is an applications-based learning approach that will include the stock market, modeling a business, banking services, credit cards, mortgages and loans. We will also explore automobile and home ownership, while including household budgeting. Also included will be a look at employment basics, commissions, benefits, Social Security, looking into retirement planning. The course includes a strong review of basic algebra formulas with variables, equations, functions, systems of equations, graphs and statistics. Selected advanced mathematics topics such as, piecewise functions, regression limits, exponential functions, and linear/quadratic systems are also addressed. Much of the daily computations will be spreadsheet and/or Desmos based. Students will learn how to program complex financial formulas and results. Proficiency is based on daily attitude, participation, quizzes, questions, tests and projects. *Prerequisite:* Completion of Algebra II and 12th grade standing. *Primary Graduate Expectations:* Critical thinking and problem solving; Effective Communication; Personal Development.
- 52412 Pre-Calculus** **1.0 Credit** **Grades 11 or 12**  
 This course is designed for students who plan to study calculus. Students will begin with an in-depth review of polynomial, rational, exponential, and logarithmic functions. Students will also study right triangle trigonometry, analytic trigonometry, oblique triangles, sequences and series, and polar coordinates. Each student will be required to have a graphing calculator (TI 83 Plus or TI-84) to use for the year. *Prerequisite:* B in Algebra II or C in Honors Algebra II and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Effective Communication
- 52413 Honors Pre-Calculus** **1.0 Credit** **Grades 11 or 12**  
 This is an accelerated course designed for motivated math students with an above average interest in mathematics. The course will cover all topics presented in Pre-Calculus plus students will study conic sections, parametric equations, and be introduced to limits (time permitting). All students will be required to have a graphing calculator (TI 83 Plus or TI 84). *Prerequisite:* B+ in Honors Algebra II or A- in Algebra II and a teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Curiosity & Creativity.
- 52416 Trigonometry and Statistics** **1.0 Credit** **Grade 12**  
 This course is designed for seniors who wish to continue their studies in mathematics after Algebra II. The first semester of the course will focus on trigonometric functions and their applications while the second semester will focus on statistics concepts such as displaying data, basic probability, confidence intervals and hypothesis testing. Credit will not be given for both Pre-Calculus and Trigonometry and Statistics. *Prerequisite:* Completion of Algebra II, 12<sup>th</sup> grade standing. *Primary Graduate Expectations:* Critical Thinking and Problem Solving; Effective Communication
- 52414 Calculus** **1.0 Credit** **Grade 12**  
 This is an advanced (but non-AP) course for mostly seniors who plan to study mathematics or a social sciences related field in college. This course offers much of the topics covered in college introductory calculus, with less focus on proofs and theorems. Thus, most of our attention will be devoted to authentic application of concepts. The first part of the course covers the concepts of limits, continuity, differentiability and derivatives of a variety of functions as well as application of derivatives to optimization problems and related rates. During the second part of the course, students learn various techniques of integration and their applications. Each student will be required to have a graphing calculator (TI-84) to use. Students who are in this class do not prepare for the Advanced Placement Exam. *Prerequisite:* C in Honors Pre-Calculus or B in Pre-Calculus. *Primary Graduate Expectations:* Critical Thinking & Problem Solving; Curiosity & Creativity.
- 52415 AP Calculus** **1.0 Credit** **Grade 12**  
 Calculus is a valuable course for students who eventually want to major in mathematics, science, engineering, or computer science. During the first part of the course, students will study limits, continuity, and derivatives and differentials of algebraic and transcendental functions. Then students apply the derivative to sketching and to problems in related rates, maxima and minima, and curvature. During the second part of the course, students learn various techniques and applications of integration. Students are required to take the Advanced Placement Examination in Calculus (Calculus AB) which is given in May of each year. Each student will be required to have a graphing calculator (TI 83 Plus or TI 84) to use. Students are required to take the Advanced Placement Examination in May. *Prerequisite:* Proficiency in Honors Pre-Calculus or A in Pre-calculus and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving, Curiosity & Creativity.
- 52420 AP Statistics** **1.0 Credit** **Grade 11 or 12**  
 This is an elective class for those juniors or seniors who may be concurrently taking an advanced science class or planning to pursue a college degree in a research field. Topics include constructing and summarizing single and multiple variable data, creating and conducting surveys and experiments, understanding randomness and probability principles, types of distributions

(normal, binomial, geometric, student's t, chi-square), and inference (confidence intervals and hypothesis testing). Multiple software packages and presentation tools will be used and each student will be required to have a TI-84 graphing calculator. Students are required to take the Advanced Placement Examination in May. *Prerequisite:* A-in Algebra II or B in Pre-Calculus or higher and teacher recommendation. *Primary Graduate Expectations:* Critical Thinking & Problem Solving, Effective Communication.