

# MATHEMATICS

Enduring Understandings:

Mathematics is a coherent, consistent system that provides for the effective communication and representation of conjectures, processes, and conclusions.

- **How do mathematical concepts relate and build upon each other?**

Mathematics is the organized study of the systems that form the structure of our universe.

- **How do we use mathematics to create a rationale based upon logical reasoning that convinces others of “the truth” of your ideas?**

Mathematics is used in all areas to quantify and to model situations in order to make predictions, inferences, and form conclusions.

- **How are appropriate mathematical strategies and representations developed, selected, and applied in order to interpret a given situation and communicate the results?**
- **How is mathematics used to quantify the components that create the form and structure of our universe?**

The mathematics curriculum at Clayton High School provides a strong four-year program for all students. The state of Missouri requires three credits in mathematics for graduation. Most students at Clayton High School take four years of mathematics. Colleges generally require at least three units in high school mathematics, and four units are required at most selective colleges. The curriculum emphasizes problem-solving with real-world applications, effective communication using the language of mathematics, reasoning skills, and making connections within mathematics and with other disciplines of study. Use of computers, calculators, and other technological tools extends the understanding of mathematical concepts and enriches problem-solving experiences.

The prerequisites required for some classes in the mathematics department cannot be satisfied by summer school courses alone. Repeating a course in summer school may satisfy the prerequisite requirement. **Students should verify the acceptance of any summer school course with the mathematics department chair BEFORE enrolling.**

## COLLEGE PREPARATORY MATHEMATICS

### COLLEGE-PREP SEQUENCE

Each year, this sequence addresses strand-specific courses typically studied in a college preparatory program: College-Prep Algebra 1; College-Prep Geometry; College-Prep Algebra 2; or College-Prep Functions Statistics and Trigonometry; College-Prep Precalculus; Honors Calculus. The TI-Nspire graphing calculator is used extensively for demonstrations, class activities, and homework. It is strongly recommended that each student purchase a TI-Nspire graphing calculator.

### COLLEGE-PREP ALGEBRA 1

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9th – 12th Grade

Credit - 1

Full Year

College-Prep Algebra 1 is intended to build a foundation for all higher math classes. This course will review algebraic expressions, integers, and mathematical properties that will lead into working with variables and linear equations. There will be an in-depth study of graphing, polynomials, quadratic equations, data analysis and systems of equations.

### COLLEGE-PREP GEOMETRY

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9th – 12th Grade

Credit - 1

Full Year

This course includes topics from Euclidean Geometry such as reasoning and proof, parallel lines, congruence and similarity, area and volume, polygons (with special emphasis on triangles and quadrilaterals), and circles. This course will further the development of critical thinking skills in mathematics. Algebraic techniques are emphasized to further the understanding of geometry.

## **COLLEGE-PREP GEOMETRY SUPPORT**

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9th - 12th Grade

Credit - 1/4

Semester 1 or 2 (A or B days)

College-Prep Geometry Support is a course designed to help students having difficulties meeting the requirements of College-Prep Geometry. The course mirrors topics being studied concurrently in College-Prep Geometry. Teachers of this course will also be teaching College-Prep Geometry, providing an ideal environment for students who wish to maintain enrollment in a college preparatory mathematics class but need additional support to be successful. College-Prep Geometry Support is for elective credit only. **(This course does not qualify for NCAA eligibility.)**

## **COLLEGE-PREP ALGEBRA 2**

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10th - 12th Grade

Credit - 1

Full Year

**Prerequisite: College-Prep Geometry**

This course will review and expand algebraic skills. College-Prep Algebra 2 topics include linear functions, transformations, systems of equations and inequalities, quadratic functions, properties of exponents, inverses, exponential functions, right triangle trigonometry, and polynomial functions.

## **COLLEGE-PREP ALGEBRA 2 SUPPORT**

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10th - 12th Grade

Credit - 1/4

Semester 1 or 2 (A or B days)

College-Prep Algebra 2 Support is a course designed to help students having difficulties meeting the requirements of the College-Prep Algebra 2 course. The course mirrors topics being studied concurrently in College-Prep Algebra 2. Teachers of this course will also be teaching College-Prep Algebra 2, providing an ideal environment for students who wish to maintain enrollment in a college preparatory mathematics class but need additional support to be successful. College-Prep Algebra 2 Support is for elective credit only. **(This course does not qualify for NCAA eligibility.)**

## **COLLEGE-PREP FUNCTIONS, STATISTICS AND TRIGONOMETRY**

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11th - 12th Grade

Credit - 1

Full Year

**Prerequisite: College Prep Algebra 2**

This course combines the ideas of functions and trigonometry with statistics and data analysis. Functions, including linear, quadratic, exponential, and polynomial will be studied. The study of probability and sequences and series are included in this course. The student will collect, analyze, process and display data. Topics of trigonometry are combined with matrix representations and exploration of real-world phenomena.

## COLLEGE-PREP PRECALCULUS

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11th – 12th Grade

Credit - 1

Full Year

**Prerequisite: College Prep Functions, Statistics and Trigonometry or teacher recommendation from College Prep Algebra 2 teacher**

This course consists of topics from precalculus and discrete mathematics. Precalculus deals mainly with infinite and continuous processes, while discrete mathematics deals with finite and iterative processes. Topics include trigonometry, analytical geometry, introductory derivatives, integrals, polynomial, rational, exponential, and logarithmic functions and their graphs. The primary goal of this course is to foster an appreciation for the axiomatic and deductive approaches used in many fields.

## HONORS CALCULUS

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12th Grade

Credit -1

Full Year

**Prerequisite: Honors Precalculus or College Prep Precalculus**

This course includes a thorough review of elementary functions. This course **is not** designed to prepare students for the AP Calculus exam. The scope of the course includes topics relating to functions and graphs, limits and continuity, differential calculus, and integral calculus. Many practical applications of calculus are studied.

## GENERAL MATHEMATICS

At CHS, students who participate in the General Mathematics sequence will receive mathematics instruction designed to meet the needs of students who need more time developing mathematical concepts. The General Mathematics sequence features hands-on study of topics such as algebra, geometry, statistics, trigonometry, discrete mathematics, and finances. Successful completion of the full course sequence prepares students for a college algebra course. The TI-Nspire graphing calculator is used extensively for demonstrations, class activities, and homework. It is strongly recommended that each student purchase a TI-Nspire graphing calculator.

## ALGEBRA 1

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9th – 12th Grade

Credit - 1

Full Year

Algebra 1 is intended to build a foundation for all higher math classes. This course will review algebraic expressions, integers, and mathematical properties that will lead into working with variables and linear equations. There will be an in-depth study of graphing, polynomials, quadratic equations, data analysis and systems of equations.

## **GEOMETRY**

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9th – 12th Grade

Credit - 1

Full Year

The course consists of topics that include two- and three-dimensional geometric figures, coordinate and transformational geometry, trigonometric relationships, and reasoning to justify conclusions. This course will further the development of critical thinking skills in mathematics. Algebraic techniques are emphasized to further the understanding of geometry.

## **ALGEBRA 2**

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10th - 12th Grade

Credit - 1

Full Year

### **Prerequisite: Geometry**

This course will review and expand algebraic skills. Algebra 2 topics include linear functions, transformations, systems of equations and inequalities, quadratic functions, properties of exponents, inverses, exponential functions, right triangle trigonometry, and polynomial functions.

## **ALGEBRA 3**

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11th - 12th Grade

Credit - 1/2

Semester - 1

### **Prerequisite: Algebra 2 or Integrated Math 2B/2C**

This course will review and expand algebraic and trigonometric skills. Algebra 3 topics include sequences and series, lines of best fit, residuals, exponential properties and functions, logarithms properties and functions, systems of linear and non-linear functions, function families which include, quadratic, square root, absolute value, and linear. Additionally, trigonometric functions and their graphical representations, right triangles, trigonometric identities, and inverse trigonometric functions will be studied. **(This course does not yet qualify for NCAA eligibility.)**

## **INTERMEDIATE COLLEGE ALGEBRA**

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12th Grade

Credit - 1

Full Year

### **Prerequisite: Integrated Math 2B/2C and Algebra 3**

Intermediate College Algebra is designed to prepare students for college-level mathematics. Emphasis will be on practicing and expanding algebraic topics to enable students to use mathematics as a modeling language for real life problems. The advanced algebraic topics include number systems, linear equations and inequalities, matrices, exponential and logarithmic functions, polynomial functions, conic sections, and rational functions. **(This course does not qualify for NCAA eligibility.)**

## **FINANCIAL ALGEBRA**

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12th Grade

Credit - 1

Full Year

**Prerequisite: Integrated Mathematics 2B/2C**

This course places emphasis on further understanding of functions, which include linear, exponential, piece-wise, quadratics, and step functions. Other topics include standard deviation, measures of center and spread, stem and leaf box plots, finance, amortization and economic principles which include supply and demand, understanding of loan and compound interest, credit card debt, car ownership, and budgets. The goal of this course is to guide students in building a strong foundation in logical thinking and problem-solving that will enable them to make good decisions concerning matters of money and finance in their daily lives. **(This course does not qualify for NCAA eligibility.)**

## **HONORS MATHEMATICS**

At CHS, students who participate in the Honors Mathematics sequence are expected to complete a fast-paced, rigorous course of study. The Honors Mathematics sequence features an in-depth study of mathematics topics such as Honors Geometry, Honors Algebra/Trigonometry, Honors Precalculus and Honors Calculus. The TI-Nspire graphing calculator is used extensively for demonstrations, class activities and homework. It is strongly recommended that each student purchase a TI-Nspire graphing calculator. Successful completion of the full course sequence prepares students for second or third semester university calculus.

## **HONORS GEOMETRY**

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9th - 12th Grade

Credit - 1

Full Year

**Prerequisite: Algebra**

This honors course consists of topics from plane Euclidean Geometry. Additional material from space, coordinate, transformation, and non-Euclidean geometries is included. A major emphasis is the development of critical thinking skills, both inductive (geometric pattern recognition) and deductive (formal proofs). Attention will be given to selected rules of inference used in the development of geometry as an axiomatic system. Some algebraic techniques are utilized to further the understanding of geometry.

## **HONORS ALGEBRA AND TRIGONOMETRY**

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10th - 12th Grade

Credit - 1

Full Year

**Prerequisite: Challenge Algebra and Honors Geometry**

Honors Algebra and Trigonometry thoroughly investigates algebraic theory as a prerequisite to real-world applications of mathematics. Algebraic and trigonometric functions and relations are defined and graphed. Properties of these functions and relations are explored in depth, and the use of these functions and relations as mathematical models is emphasized.

## **HONORS PRECALCULUS**

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11th - 12th Grade

Credit - 1

Full Year

### **Prerequisite: Honors Algebra and Trigonometry**

Honors Precalculus consists of advanced algebraic and trigonometric topics selected to augment the students' background in preparation for continuous mathematics (Calculus). Topics from Honors Algebra and Trigonometry such as polynomials, trigonometry and complex numbers are further extended; topics such as probability, statistics, vectors, and polar coordinates are developed; and derivatives and integrals are introduced.

## **AP CALCULUS AB & BC**

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12th Grade

Credit -1

Full Year

### **Prerequisite: Honors Precalculus**

AP Calculus (AB): This course includes a thorough review of elementary functions and a comprehensive presentation of limits and continuity. The differential and integral calculus are developed both intuitively and rigorously, and techniques of both are applied to a wide class of functions and problems. Many practical applications of the calculus are studied. The course covers all topics necessary for the AB level of the Advanced Placement test, which all students are encouraged to take. In order to familiarize students with specific advanced placement expectations, exams and homework problems will include selections from past AP exams. Students taking the AP test in May will also be required to take a semester exam.

AP Calculus (BC): This advanced placement course will allow for the possibility of earning two semesters of college credit. While the presentation will be faster paced than Calculus AB, considerable attention will be given to an intuitive and numerical perspective. In addition to the topics listed in the Calculus AB description, further development of integration techniques, differential equations, infinite series, and vector functions will complete the syllabus. There will be a significant emphasis on problem solving and applications of the calculus. Students taking the AP test in May will also be required to take a semester exam.

## **AP STATISTICS**

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11th - 12th Grade

Credit -1

Full Year

### **Prerequisite: Honors Algebra & Trigonometry, or College Prep Functions, Statistics & Trigonometry**

AP Statistics introduces students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. Topics include exploring data, planning a study, anticipating patterns, and making statistical inferences. Components of the course include technology, projects and laboratories, cooperative group problem-solving and writing as a part of concept-oriented instruction and assessment. This course is designed to emphasize statistical thinking and minimize computational procedures. Content is designed as effective preparation for college classes in statistics and prepares students for the Advanced Placement Statistics exam. Daily access to a graphing calculator with powerful statistical capabilities is vital to success in this course. The mathematics department strongly recommends completion or concurrent enrollment in Honors Precalculus or College Prep Precalculus.