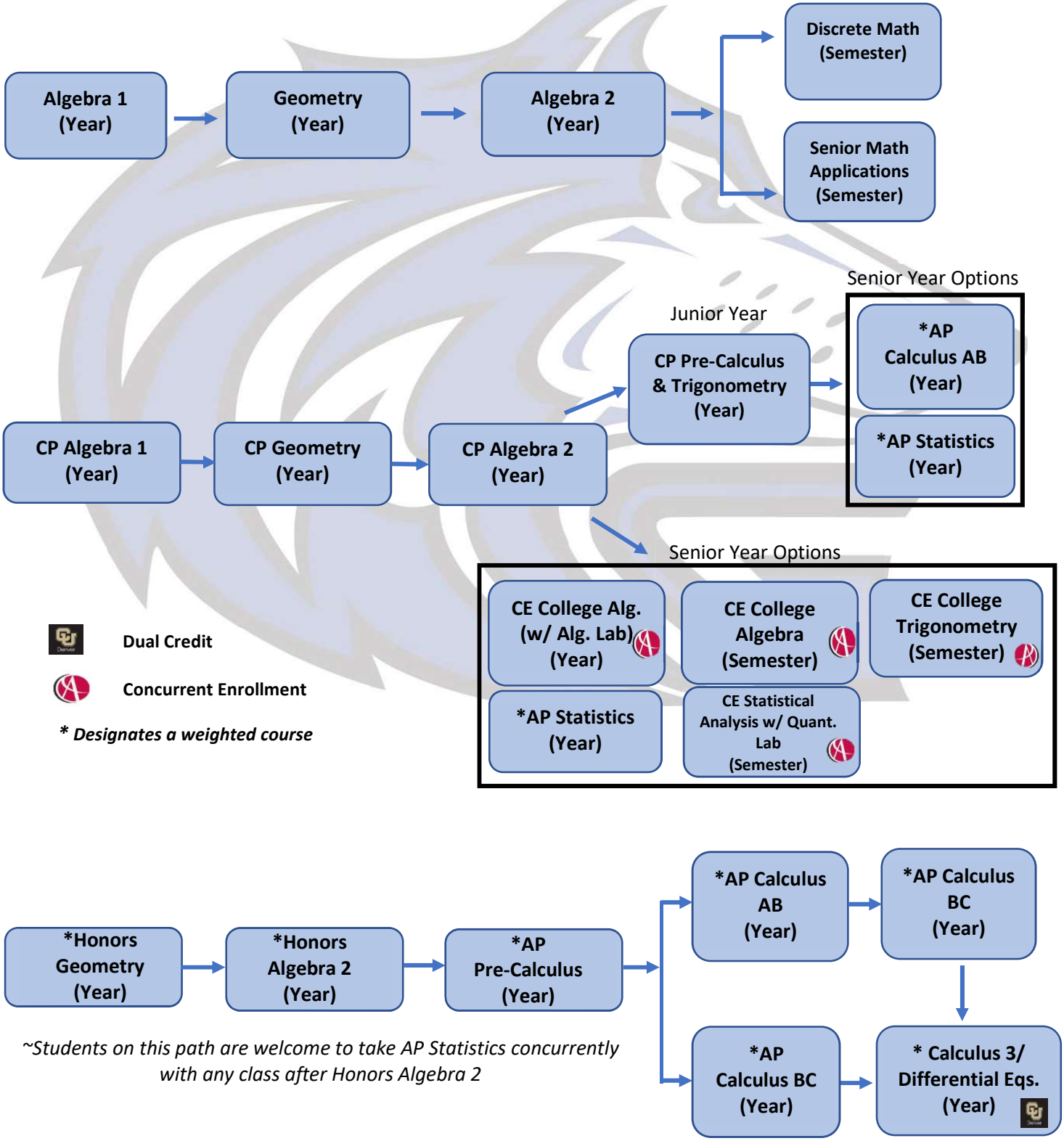
MATHEMATICS



~Students on this path are welcome to take AP Statistics concurrently with any class after Honors Algebra 2

MATHEMATICS COURSE DESCRIPTIONS

Grandview students are required to take 3 credits of mathematics for graduation. In light of increasing expectations for acceptance to in-state colleges and with our focus on "Commitment to Core" at Grandview High School, all students are strongly encouraged to take four years of mathematics. Course offerings in mathematics provide ample opportunity for students to meet this expectation and prepare for college or other post-high school options.

The math program at Grandview is divided into three sequences, each traditional in nature. See the department flowchart for more specifics about the courses offered in each of these sequences. It is our goal to have all students complete Algebra 1 by the end of their freshman year. Students interested in mathematics, engineering, and science-related careers should consider taking courses in the rigorous Honors Sequence that leads to AP Calculus BC. Students desiring to major in mathematics at the university level should also consider AP Statistics.

Graphing calculators are powerful learning tools in both math and science classrooms and are used extensively throughout the math and science curricula at Grandview. We believe the purchase of a graphing calculator is an investment in a solid high school education. Grandview math and science teachers are proficient using the TI-84 series of calculators for class demonstrations and activities. See your teacher for purchase information.

ALGEBRA 1 **Grade Level: 9** **Year: 1 Credit**
Prerequisites: 8th grade Math or Pre-Algebra and teacher recommendation

The purpose of this course is to reinforce and extend the mathematics that students learned in the middle grades, to build a strong algebraic foundation. The content of Algebra 1, students solve equations in multiple capacities and apply linear models to data that exhibit a linear trends. Additionally, students engage in methods for solving, and applying quadratic functions, and become familiar with the usefulness of multiple forms of quadratic functions. Students will also be exposed to the exponential functions and other content important for a strong foundation to be successful in Geometry and Algebra 2. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 1 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

CP ALGEBRA 1 NCAA **Grade Level: 9** **Year: 1 Credit**
Prerequisites: 8th grade Math or Pre-Algebra and teacher recommendation

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The content of Algebra 1, students explore many examples of functions -- and analyze them in numerous ways, making connections between them. Extending the statistics studied in Grade 8, students apply linear models to data that exhibit a linear trend, and mathematically analyze how well the model fits the data. Additionally, students engage in methods for analyzing, solving, and applying quadratic functions, and become familiar with the usefulness of multiple forms of quadratic functions. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 1 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

GEOMETRY **Grade Level: 10 - 11** **Year: 1 Credit**
Prerequisites: Algebra 1X2 or CP Algebra 1 and teacher recommendation

The high school Geometry course formalizes and extends students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships. In this course, rigid and non-rigid transformations are the frame through which students build and prove the concepts of congruence and similarity. Previous experiences with proportional reasoning and the Pythagorean theorem lead students to understand the trigonometry of right triangles, and to find unknown measures in general triangles. The geometry of two- and three-dimensional figures is the focus, including work and analysis in the coordinate plane. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Geometry as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

CP GEOMETRY NCAA **Grade Level: 9 – 11** **Year: 1 Credit**
Prerequisites: CP Algebra 1 and teacher recommendation

College-bound students are strongly encouraged to take this course. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving toward formal mathematical arguments and proof. In this course, rigid and non-rigid transformations are the frame through which students build and prove the concepts of congruence and similarity. Students apply similar reasoning to geometric constructions. Previous experiences with proportional reasoning and the Pythagorean theorem lead students to understand the trigonometry of right triangles, to find unknown measures in general triangles. The geometry of two- and three-dimensional figures is the focus, including work and analysis in the coordinate plane. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Geometry as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

***HONORS GEOMETRY** NCAA **Grade Level: 9 – 11** **Year: 1 Credit**
Prerequisites: CP Algebra 1 with B average and teacher recommendation

Students will study geometry topics at an advanced proficiency level. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving toward formal mathematical arguments and proof. In this course, rigid and non-rigid transformations are the frame through which students build and prove the concepts of congruence and similarity. Previous experiences with proportional reasoning and the Pythagorean theorem lead students to understand the trigonometry of right triangles, to find unknown measures in general triangles. The geometry of two- and three-dimensional figures is the focus, including work and analysis in the coordinate plane. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Geometry as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

ALGEBRA 2 **Grade Level: 11 – 12** **Year: 1 Credit**
Prerequisites: Geometry and teacher recommendation

Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 2 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

CP ALGEBRA 2 NCAA **Grade Level: 10 – 12** **Year: 1 Credit**
Prerequisites: CP Geometry and teacher recommendation

College-bound students are strongly encouraged to take this course. Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and continue to expand their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Functions are studied in relation to one another by analysis of multiple representations of functions with unrestricted and restricted domains. Students further develop their statistical knowledge by studying the collection, analysis and interpretation of data, and the connections to probability. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 2 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations

***HONORS ALGEBRA 2** NCAA **Grade Level: 9 – 11** **Year: 1 Credit**
Prerequisites: Honors Geometry with B average and teacher recommendation

Advanced math students will be challenged in this rigorous course. Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and expand their abilities to model situations and solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Functions are studied in relation to one another by analysis of multiple representations of functions with unrestricted and restricted domains. Students extend their understanding of the trigonometric ratios and circles from geometry, and use the coordinate plane to model periodic phenomena with trigonometry. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 2 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

CP PRE-CALCULUS & TRIGONOMETRY NCAA **Grade Level: 10 – 12** **Year: 1 Credit**
Prerequisites: CP Algebra 2 with grade of C or better and teacher recommendation

In Pre-Calculus, students prepare for calculus by studying the characteristics and behaviors of various mathematical functions, polar and parametric equations, vectors, inequalities, series and sequences, limits, derivatives, and, time allotting, concepts of probability and statistics, and mathematical induction. Students will use graphing calculators extensively in this class.

***AP PRE-CALCULUS** NCAA **Grade Level: 10 – 12** **Year: 1 Credit**
Prerequisites: Honors Algebra 2 with B average and teacher recommendation
Fee: See AP Section for exam fee information

Students with strong mathematical ability who are planning on college studies in mathematics, the sciences, engineering, or business should consider taking this rigorous math course. In this class, students will prepare themselves for calculus by studying function characteristics and behavior, polar and parametric equations, vectors, inequalities, series and sequences, limits, derivatives, and -- time allotting -- concepts of probability and statistics, and mathematical induction. The next recommended course is Advanced Placement Calculus.

DISCRETE MATH NCAA **Grade Level: 12** **Semester: 0.5 Credit**
Prerequisites: Algebra 2

This course is a survey of investigations of topics from modern mathematics. Major units include basic probability, social choice (voting systems, weighted voting systems fair division, and apportionment) and graph theory (Euler and Hamilton paths and circuits, shortest paths, optimum networks, and scheduling and conflict problems). Emphasis is on investigation, analysis, and communication.

SENIOR MATH APPLICATIONS **Grade Level: 12** **Semester: 0.5 Credit**
Prerequisites: Algebra 2

Senior Math Applications is a consumer mathematics course which teaches practical concepts such as: methods of compensation, taxes, banking services, loans and credit cards, budgets, spending decisions, car and home ownership, insurance and investments. It will also incorporate some real- world statistics.

***AP CALCULUS AB** NCAA **Grade Level: 11 – 12** **Year: 1 Credit**
Prerequisites: Pre-Calculus with grade of B or better and teacher recommendation
Fee: See AP Section for exam fee information

Students will learn both the theoretical foundations and proper techniques of both differential and integral calculus and apply them extensively in problem-solving contexts. The course follows the College Board AP Calculus AB syllabus and prepares students for the AP examination to be taken in May. Students considering further study in math and science are strongly encouraged to take one of our two calculus classes. Graphing calculators are required for this class.

***AP CALCULUS BC** NCAA **Grade Level: 11 – 12** **Year: 1 Credit**

Prerequisites: Honors Pre-Calculus with grade of B or better and teacher recommendation
Fee: See AP Section for exam fee information

This is the more rigorous of the two calculus courses. Students will learn both the theoretical foundations and proper techniques of both differential and integral calculus and apply them extensively in problem-solving contexts. The course follows the College Board AP Calculus BC syllabus and prepares students for the AP examination to be taken in May. Students considering further study in math and science are strongly encouraged to take one of our two calculus classes. Graphing calculators are required for this class.

***AP STATISTICS** NCAA **Grade Level: 11 – 12** **Year: 1 Credit**
Prerequisites: CP Algebra 2 with grade of B or better and teacher recommendation
Fee: See AP Section for exam fee information

This college-level statistics course is designed to provide students with the major concepts and tools for collecting and analyzing data and drawing good conclusions from it. Students are exposed to four major themes: exploration of data, planning and carrying out a study, statistical modeling, and statistical inference. The TI-84 Plus graphing calculator is required for this class.

***DIFFERENTIAL EQUATIONS/CALCULUS 3 HONORS** NCAA **Grade Level: 11 – 12** **Year: 1 Credit**
Prerequisites: AP Caluculus BC and teacher recommendation
Fee: See AP Section in Intro plus fee from CU Denver

During the first semester, students will study the calculus of 3 dimensions, including vectors in 3-space, vector-valued functions, functions of several variables, multiple integration, and vector analysis. Second semester topics include solving exact first-order differential equations, first order linear differential equations, second-order homogeneous and nonhomorgeneous linear equations, , and series solutions of differential equations. Students who successfully complete this class receive undergraduate credit from The University of Colorado Denver. Students will be required to purchase their textbooks and pay for processing of the university credit. *Credit through University of Colorado Denver is available for students who qualify for this course (fee required).

CE COLLEGE ALGEBRA W/ ALG. LAB (Yearlong) NCAA **Grade Level: 12** **Year: 1 Credit (+5 college cred.)**
Prerequisites: Algebra 2 and teacher recommendation. May require a qualifying score on standardized tests: ACT or SAT.

This course aligns with the Community College of Aurora courses MAT 1340 with MAT 030. This course focuses on a variety of functions and the exploration of their graphs. Topics include: equations and inequalities, operations on functions, exponential and logarithmic functions, linear and non-linear systems, and an introduction to conic sections. This course includes extra time to support skill development for the pre-requisite skills needed to complete College Algebra. The Colorado Commission on Higher Education has approved MAT 1340 for inclusion in the Guaranteed Transfer Pathway program in the GT-MA1 category.

CE COLLEGE ALGEBRA NCAA **Grade Level: 12 Semester: 0.5 credit (+4 college cred.)**
Prerequisites: Algebra 2 and teacher recommendation. May require a qualifying score on standardized tests: ACT or SAT.

This course aligns with the Community College of Aurora courses MAT 1340 with MAT 030. This course focuses on a variety of functions and the exploration of their graphs. Topics include: equations and inequalities, operations on functions, exponential and logarithmic functions, linear and non-linear systems, and an introduction to conic sections. This course includes extra time to support skill development for the pre-requisite skills needed to complete College Algebra. The Colorado Commission on Higher Education has approved MAT 1340 for inclusion in the Guaranteed Transfer Pathway program in the GT-MA1 category.

CE COLLEGE TRIGONOMETRY NCAA **Grade Level: 12 Semester: 0.5 credit (+3 college cred.)**

Prerequisites: Algebra 2 and teacher recommendation. May require a qualifying score on standardized tests: ACT or SAT or the completion of College Algebra

This course aligns with the Colorado Community College of Aurora course MAT1420. Topics include trigonometric functions (with graphs and inverse functions), identities and equations, solutions of triangles, complex numbers, and other topics as time permits. Graphing calculator required. The Colorado Commission on Higher Education has approved MAT 1420 for inclusion in the Guaranteed Transfer Pathway program in the GT-MA1 category.

CE STATISTICAL ANALYSIS W/ QUANT. LAB NCAA **Grade Level: 12 Semester: 0.5 credit (+4 college cred.)**
Prerequisites: Algebra 2 and teacher recommendation. May require a qualifying score on standardized tests: ACT or SAT

This course aligns with the Colorado Community College of Aurora course MAT 1260 and 0020. The course introduces descriptive and inferential statistics, with an emphasis on critical thinking and statistical literacy. Topics include methods of data collections, presentation and summarization, introduction to probability concepts and distributions, and statistical inference of one or two populations. This course uses real world data to illustrate applications of a practical nature. The Colorado Commission on Higher Education has approved MAT 1260 for inclusion in the Guaranteed Transfer Pathway program in the GT-MA1 category.