

# MATHEMATICS

***Mathematics can be seen as a well-defined body of knowledge, as an abstract system of ideas, or as a useful tool. For most of us, it is probably a combination of these. However, there is little doubt that mathematical knowledge provides an important key to understanding the world in which we live. Mathematics is used in our lives when we buy produce in the market, consult a timetable, read a newspaper, time a process or estimate a length. Artists need to learn about perspective; musicians need to appreciate the mathematical relationships within and between different rhythms; economists need to recognize trends in financial dealings. Mathematics is prevalent in our lives and careers.***

Because individual students have different needs, interests, and abilities, Carmel High School provides a wide selection of courses. Each course is designed to meet the needs of a particular group of students. Therefore, great care is taken to select the course that is most appropriate for an individual student.

The following factors are considered when making recommendations for student coursework:

Performance in current and previous mathematics courses. Evaluation of their performance includes not only grade consideration, but also problem solving skills, perseverance and study skills.

The student's interest in mathematics.

The student's academic plans, in particular the subjects they wish to study in the future.

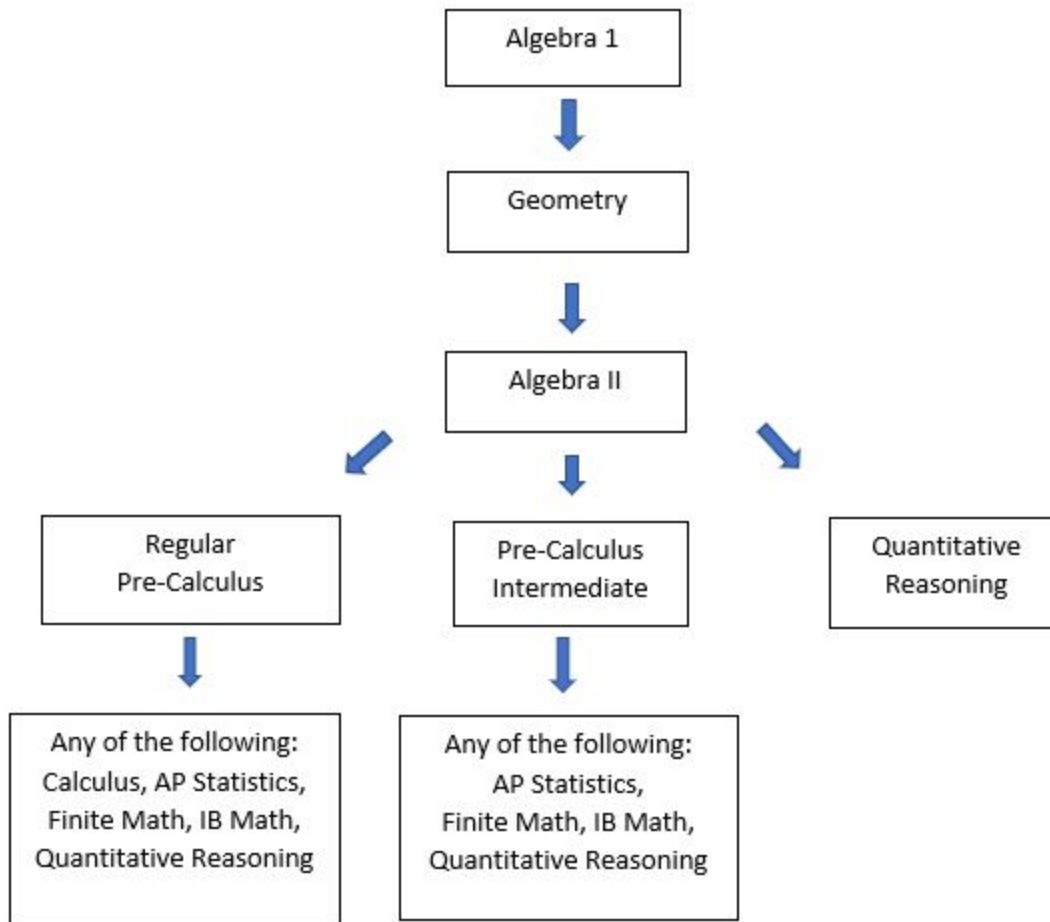
The student's career interests.

Students will be placed based on teacher recommendation. If the student has completed the prerequisite coursework but was not recommended for a particular course they can choose to complete a waiver form. Waiver forms can be obtained from their teacher, the math office or their counselor. Waivers must be submitted by the end of the school year. Waivers submitted over the summer will only be honored if it is determined that there is room in the class. Students are strongly encouraged to have a conversation with their teacher before pursuing the waiver process.

Students who have not completed the required prerequisite coursework may be able to qualify through placement testing. The student should contact the department chair to discuss this. Placement tests are given the first week in May.

In order to take two math classes during the same academic year, a student needs to get permission from the Department Chair. The student should contact the Department Chair in March or April.

Below is the traditional sequence of high school math courses. Please be aware that this can be adjusted based on individual student needs and goals. Parents and students are strongly encouraged to communicate with both their counselor and math teacher as they plan their math sequence.



### **RETAKEING MATH CLASSES:**

Students can opt to retake a math class if they are not satisfied with their performance. When retaking a class, the original grade and the grade earned will both be on the student's transcript however, the new grade will replace the old grade for the calculation of the GPA. Students can retake classes during the summer through Indiana Online Academy or during the school year in the classroom. Due to the sequential development of math courses, students may not move on to the next course if they are retaking a course. Students who earn below a C- are encouraged to retake the course before moving on to the next level. Students who fail a course will be required to retake it before moving on. Grades earned in repeated courses do not count toward athletic eligibility.

### **Algebra I and Algebra II Daily**

The Daily classes allow students to experience mathematics daily. Students enrolled in these classes meet with their teachers on both blue and gold days to receive additional support. Students work through the state standards for each course, with the teachers using the additional time to provide support and practice through supplemental materials and online resources as needed. Students taking a Daily course must be enrolled in both the classroom portion (Algebra I or Algebra II) and the Lab class (Algebra I Lab or Math Lab). Students taking this course are required to have the scientific calculator, TI-30XIIS.

**CREDIT FOR HIGH SCHOOL COURSES COMPLETED IN MIDDLE SCHOOL:**

Students who are enrolled at Carmel High School have the option of receiving credit for full-year high school courses in math and/or world languages which were completed during middle school with the following conditions:

The course taken in middle school must be equivalent to the high school course and cover the same academic standards. Grades and credits for the course must be included on the student's high school transcript and be factored into the student's cumulative GPA.

The student has the option of receiving math credit only if the student is enrolled in the next-level math course.

Parents and students may also choose to decline applying these credits toward the CHS diploma and to request they be removed from the CHS transcript. Procedures are in place for this. Please contact the student's counselor.

Incoming 9th graders with high school credit earned in middle school may retake those courses at Carmel High School. When retaking a course previously taken in middle school, the course, credit, and grade earned in middle school will not be a part of the Carmel High School transcript.

**ALGEBRA I 1-2 (2520)**

Classification: Regular

Prerequisite: Algebra I-1 is the prerequisite to Algebra I-2

Open to: 9, 10, 11, and 12

Credit: 2 RW

This course provides a formal development of the algebraic skills and concepts necessary for students who will take a geometry and Algebra II course and other advanced college-preparatory courses. The instructional program will provide for the use of algebraic skills in a wide range of problem-solving situations. Topics include: real numbers and expressions, functions, linear equations and inequalities, systems of equations and inequalities, solving and graphing quadratic and exponential equations and functions, and data analysis and statistics. *No student will be allowed to take Algebra I-2 before earning credit for Algebra I-1.*

Students taking this course are required to have the scientific calculator, TI-30XIIS.

**ALGEBRA II 1-2 (2522)**

Classification: Regular

Prerequisite: Algebra I-1 and Algebra I-2 required and Geometry 2 recommended

Open to: 9, 10, 11, and 12

Credit: 2 RW

Algebra II is a course designed to reinforce skills learned in Algebra I as well as introducing topics necessary for higher-level math courses. The topics given to high priority in Algebra II are solving all types of equations and inequalities, graphing functions, solving application problems, and an introduction to statistics and probability. Technology is integrated where appropriate. Students taking this course will be required to have a non-CAS scientific calculator. The recommended scientific calculator for the course is TI-30XIIS. Casio models will not be allowed. TI-nspires will be used in class, but students are not required to have their own.

**ALGEBRA II 1-2, Honors (2522)**

Classification: Honors Prerequisite:

Geometry 2, Honors

Open to: 9, 10

Credit: 2 PW

*NOTE: Students not meeting the prerequisite should contact the department chair to arrange a placement test. Waivers are not acceptable if the student hasn't taken honors geometry.*

This course is offered to students recommended as most able in mathematics because of its rigor and pace. The content of the course includes all topics in Algebra II, presented from a more abstract and theoretical standpoint. It is recommended that students not only have the Honors Geometry background, but also a strong showing in Honors/Advanced Algebra I. Students who take this course must have good number sense and be able to think critically. Advanced topics include linear programming, statistics, matrices and their applications and an in-depth analysis of a wide variety of functions.

Students taking this course will be required to have a scientific calculator, such as the TI-30XIIS, the TI-36X Pro cannot be used on assessments.

**GEOMETRY 1-2 (2532)**

Classification: Regular

Prerequisite: Algebra I-2

Open to: 9, 10, 11, and 12

Credit: 2 RW

The course presents a unified approach to plane and solid geometry. Emphasis is placed on the application of properties, postulates, and theorems of geometric figures in two and three dimensions. Topics include congruence, similarity, parallel lines, proofs, polygons, circles, volume and constructions.

Students taking this course will be required to have a scientific calculator, such as the TI-30XIIS or the TI-30XS Multiview.. There is an approximate fee for this course of \$5 for the geometry tool kit.

**GEOMETRY 1-2, Honors (2532)**

Classification: Honors

Prerequisite: Algebra 1-2

Open to: 9, 10

Credit: 2 PW

This course is designed to introduce the student to the vocabulary and concepts of plane geometry and to apply those concepts using the processes of logical reasoning to attain a better understanding of the world around them. The development of theorems will necessitate a working knowledge of measurement, congruence, similarity, parallelism, perpendicularity, sequences, perimeter, area, volume, trigonometry, and application of algebra concepts of geometry. The scope of Honors Geometry extends beyond the study of geometry with more emphasis on higher order thinking, identifying patterns as well as additional trigonometry and triangle applications. This course also has a strong emphasis on constructions and coordinate geometry.

Students taking this course will be required to have a scientific calculator such as the TI-30XIIS. There is an approximate fee for this course of \$5 for the geometry tool kit.

**PRE-CALCULUS: Algebra (2564) and PRE-CALCULUS: Trigonometry (2566)**

**INTERMEDIATE** (Semester 1: 2564, Semester 2 : 2566)

Classification: Regular

Prerequisite: Algebra II 2

Open to: 10, 11, 12

(Not open to students with credit in Pre-Calculus: Algebra, Pre-Calculus: Trigonometry, Pre-Calculus: Algebra Honors or Pre-Calculus: Trigonometry Honors)

Credit: 2 RW

Pre-Calculus Intermediate is a two semester course which is recommended for only those students who have maintained a "C" average or above in previous math courses.

First semester topics covered in this course include the theory of equations, exponential and logarithmic functions, polynomial and rational functions, and conics.. Second semester this course provides for the development of trigonometric functions, their properties and graphs, inverse trig functions, trig equations and identities, the Law of Sines and the Law of Cosines, as well as applications of the trig functions. Sequences and series will also be included in this course. This course is intended to prepare students for AP Statistics, Finite Mathematics, Quantitative Reasoning or IB Math. *This course does not fulfill the prerequisite for Calculus Survey/ M119, AP Calculus AB 1-2 or AP Calculus BC 1-2.*

Students taking this course will be required to have a scientific calculator, such as the TI-30XIIS.

**PRE-CALCULUS: ALGEBRA (2654) AND PRE-CALCULUS:TRIGONOMETRY(2566)**

(Semester 1: 2564, Semester 2 : 2566 )

Classification: Regular

Prerequisite: Algebra II- 2 or Algebra II- 2, Honors

Open to: 10, 11, and 12

Credit: 2 RW

Pre-Calculus blends all of the concepts and skills that must be mastered prior to the enrollment in a college-level calculus course or other college-level math courses. A functional approach provides for the integration of trigonometric concepts, relationships of equations and their graphs and applications of real world problems.

*Students are required to complete a summer review packet.*

Students taking this course will be required to have a scientific calculator, such as the TI-30XIIS.

**PRE-CALCULUS:ALGEBRA (2564) AND PRE-CALCULUS:TRIGONOMETRY (2556)**

**HONORS** (Semester 1: 2564, Semester 2 : 2566 )

Classification: Honors

Prerequisite: Algebra II- 2, Honors

Open to: 11

Credit: 2 FW

*Note: Students not meeting the prerequisite should contact the department chair to arrange a placement test. Waivers are not acceptable if the student has not taken Honors Algebra II 1-2.*

This course provides formal development of the algebraic, trigonometric, and other pre-calculus skills. These are the concepts necessary for the students who will take a calculus course and other college level mathematics courses. The instructional program will provide ways to use algebraic skills, graphic techniques, and a wide range of applications. Students will further develop an appreciation of the contributions made by mathematicians such as De Moivre and Euler. Topics include: algebra and coordinate geometry for preCalculus, algebraic and transcendental functions and graphs, analytic geometry and trigonometry, matrices, parametric equations, mathematical induction, binomial theorem, series, and sequences.

Students taking this course will be required to have a scientific calculator. They are also encouraged to have a TI-nspire CX CAS graphing calculator.

**STATISTICS 1-2, AP (2570)**

Classification: Advanced Placement

Prerequisite: Algebra II-2

Open to: 9, 10, 11, and 12

Credit: 2 FW

The course is a study of statistics for the motivated student. Its purpose is to introduce students to methods for collecting, analyzing, and drawing conclusions from data. The curriculum is aligned to the College Board guidelines and will discuss topics such as one and two-variable displays and descriptive statistics, linear and non- linear regression, sample surveys, experimental design, probability, sampling distribution and inference procedures. Students completing this course will be able to take the AP Statistics exam in May, part of which may be paid by the state when the student is currently enrolled in the course.

Students taking this course will be required to have a TI-nspire graphing calculator. It does not matter if it is the CAS or CX version.

**CAPSTONE RESEARCH 1-2, Advanced Placement (0551)/STATISTICS 1-2, Advanced Placement (2570)**

Classification: Advanced Placement

Prerequisite: 6 credits in English and Completion of AP Capstone Seminar 1-2 and Algebra II-2

Open to: 11 and 12 (participation will be limited)

Credit: 2 FW English/2 FW Math

This course will be taught collaboratively. The purpose of AP Stats is to help you develop analytical and critical thinking skills as you learn to describe data patterns and departures from patterns, plan and conduct studies, use probability and simulation to explore random phenomena, estimate population parameters, test hypotheses, and make statistical inferences. Given the focus on data analysis and its benefit to you as an AP Research student, who will be exploring an academic topic, problem, or issue that interests you and designing, planning, and conducting a year-long research-based investigation to address it, AP Stats becomes a great course to pair with AP Research. Essentially, AP Research requires you to collect data, communicate your findings, and then analyze that data; all skills that AP Stats can teach you. Additionally, for students considering AP Stats, pairing the course with AP Research allows you to understand and experiment with the best ways in which to analyze your data. Students taking this course will be required to have a TI-nspire graphing calculator. Either the CAS or non-CAS model is acceptable.

**FINITE MATHEMATICS 1-2, ACP M118 (2530)**

Classification: Dual Credit (May be taken for college credit)

Prerequisite: Pre-Calc/Trig 2 Intermediate or Pre-Calc/Trig 2

Open to: 11, 12

Credit: 2 FW

Finite Mathematics is a two semester course designed for students who will pursue careers that are not necessarily in the science field. The problem solving emphasis of the course is designed to apply the mathematical concepts to business, economics as well as the social, life and physical sciences. Topics include probability, linear programming and elementary statistics.

As part of the Advance College Project students who enroll in Finite Math may apply to earn three (3) hours of college credit through Indiana University at Bloomington under the title Mathematics (M118). Students would be charged reduced university tuition per credit hour and credits are transferable to several colleges and universities in the country. Each student who chooses to participate in the ACP program should inform his/her counselor at the time of scheduling. Fees will be due when billed by Indiana University. *Once a student application is accepted by the ACP office of IU, withdrawal from the M118 IU course is available in October.*

No calculator is required for this course.

**QUANTITATIVE REASONING (2550)**

Classification: Regular

Pre-Requisite: Algebra II 1-2

Open to: 11, 12 (Students must have successfully completed Algebra I 1-2, Geometry 1,2 and Algebra II 1-2)

Credit: 2 RW

Quantitative Reasoning is a one-year course focused on the study of numeracy, ratio and proportional reasoning, modeling, probabilistic reasoning and statistics. Students will build knowledge with basic mathematical/analytical concepts and operations. The class will focus heavily on problem solving with real life applications. It is designed to provide students with a coherent, useful and logical experience in which they can make use of their ability to analyze problem situations. This higher level math course aligns with college-level quantitative reasoning courses and is recommended for students who are not planning to pursue a degree in a STEM related field or do not anticipate a need for advanced mathematics in their future studies. *Students taking this course will be required to have a scientific calculator.*

**BRIEF SURVEY OF CALCULUS 1-2, ACP M119 (2544)**

Classification: Dual Credit (May be taken for college credit)

Prerequisite: Pre-Calculus/Trig 2

Open to: 11, 12 (not open to students with credits in AP Calculus AB or AP Calculus BC)

Credit: 2 FW

Brief Survey of Calculus is a two semester course which offers the student the opportunity to learn Calculus with emphasis on applications rather than theory. This course is recommended for only those students who have maintained a "B" average in previous mathematics courses. The course content includes functions, limits, derivatives, applications of the derivative and applications of integration. As part of the Advance College Project, students who enroll in Calculus Survey may apply to earn three (3) hours of college credit through Indiana University at Bloomington under the title Mathematics (M119). Students would be charged reduced university tuition per credit hour and credits are transferable to several colleges and universities in the country. Each student who chooses to take this course for college credit should inform his/her counselor at the time of scheduling. Fees will be due when billed by Indiana University *Once a student application is accepted by the ACP office of IU, withdrawal from the M119 course is available in October.* Students taking this course will be required to have a TI-nspire CX or TI-84 plus calculator.

**CALCULUS AB 1-2, AP/ACP M211 (2562)**

Classification: Advanced Placement

(May be taken for college credit)

Prerequisites: Pre-Calculus: Algebra and Pre-Calculus: Trigonometry or Pre-Calculus: Algebra Honors and Pre-Calculus: Trigonometry Honors

Open to: 11, 12

Credit: 2 FW

AP Calculus AB introduces the topics of differential and integral calculus. The course covers at least as much material as a standard first semester college calculus course. It is recommended for only those students who have maintained a high B average in previous math courses.

The curriculum is aligned to College Board guidelines. AP Calculus AB prepares the student to take the Advanced Placement Calculus AB exam in the spring. Students in this course are encouraged to take the AP exam, part of which may be paid by the state when the student is currently enrolled in the course. If students score well they may be awarded one semester of college credit. Students should check with their chosen universities to see how these credits may apply.

As part of the Advance College Project, students who enroll in AP Calculus AB may apply to earn four (4) hours of college credit through Indiana University's mathematics department. (Course number M211) Students would be charged reduced university tuition per credit hour and credits are transferable to several colleges and universities in the country. Each student who chooses to take this course for college credit should inform his/her counselor at the time of scheduling. Fees will be due within the first two weeks of the first semester. *Once a student application is accepted by the ACP office of IU, withdrawal from the M211 IU course is available in October.*

*\*\*The state will not supplement both the ACP credit and the AP exam. If students choose to do both, they will need to pay full price for the AP exam.*

*Students are required to complete a summer review packet.*

Students taking this course will be required to have a TI-nspire CX, TI-nspire CX CAS or TI 84 Plus graphing calculator.



### **CALCULUS BC 1-2, AP/ACP M211-212 (2572)**

Classification: Advanced Placement (May be taken for college credit)

Prerequisite: Pre-Calculus: Algebra Honors and Pre-Calculus: Trigonometry Honors

Open to: 11, 12

Credit: 2 FW

*Note: Students not meeting the prerequisite should contact the department chair to arrange a placement test. Waivers are not acceptable if the student has not taken Honors Pre-Calculus/Trig 1-2.*

AP Calculus BC is a college-level course designed for highly motivated math students. The student should be competent in a range of analytical and technical skills. The curriculum is aligned to College Board guidelines and covers the content of the standard first two semesters of college calculus. Students will be prepared for the AP Calculus BC exam in the spring and may earn up to two semesters of college credit. Students in this course are encouraged to take the AP exam, part of which may be paid by the state when the student is currently enrolled in the course. As part of the Advance College Project through Indiana University, students who enroll in AP Calculus BC may apply to earn four (4) hours of college credit each semester. Students would be enrolled in course numbers M211 and M212 and would be charged reduced university tuition per credit hour. Each student who chooses to participate in the ACP program should inform his/her counselor at the time of scheduling. Fees will be due when billed by Indiana University. *Once a student application is accepted by the ACP Office of IU, withdrawal from the course is available in October.*

*\*The state will not supplement both AP and ACP. If a student chooses to do both, they will be charged the full amount for the AP exam.*

Students taking this course will be required to have a TI-nspire CX CAS graphing calculator.

### **INTRODUCTION TO LINEAR ALGEBRA AND MULTIVARIABLE CALCULUS (2543)**

Classification: Honors

Prerequisite: AP Calculus BC 1-2

Open to: 11, 12

Credit: 2 FW

*Note: Waivers are not acceptable if the student has not taken AP Calculus BC 1-2*

This course is intended for students with a solid background in mathematics who are competent in a range of analytical and technical skills. The majority of these students will be expecting to include mathematics as a major component of their university studies, either as a subject in its own right, or within courses such as physics, engineering, and technology. Students enrolled in this class enjoy the challenges of mathematics and problem solving.

This course includes the beginning topics of college Linear Algebra and the third semester of college Calculus.

Students taking this course will be required to have a TI-nspire CX CAS graphing calculator.

**IB MATHEMATICS: Analysis and Approaches SL (2588)**

Classification: International Baccalaureate

Prerequisite: Algebra II-1-2 or Algebra II Honors 1-2

Open to: 11, 12

Credit: 2 semester course, 1 credit earned per semester (1 year course), Full Weight

This SL course blends all of the concepts and skills that must be mastered prior to the enrollment in a college-level math course. A functional approach provides for the integration of trigonometric concepts, relationships of equations and their graphs and applications of real world problems with a STEM approach. Students in this class will complete various projects in addition to traditional evaluations. The emphasis of this course is to help students obtain a well-rounded understanding of all topics. They will demonstrate this understanding through a mandatory exploration. The exploration is a thesis-like project where students will apply the math they've learned to an area of interest. Students enrolled in this course will be able to choose to take an external exam, either the SL exam at the end of this school year or continue on to IB MATHEMATICS: Analysis and Approaches HL 1-2 and take the HL exam at the end of the second year.

Calculator Requirement: TI-Nspire CX, or TI-Nspire CAS

**IB MATHEMATICS: Analysis and Approaches HL (2590)**

Classification: International Baccalaureate

Prerequisite: IB MATHEMATICS: Analysis and Approaches SL 1-2

Open to: 11, 12

Credit: 2 semester course, 1 credit earned per semester (1 year course), Full Weight

This HL course extends students' knowledge from **Analysis and Approaches SL**. This course is intended to follow **Analysis and Approaches SL**. It will review topics from the standard level course and delve deeper into the same syllabus content as the **Analysis and Approaches SL** Mathematics course description. This course will appeal to students with a good background in mathematics who are competent in a range of analytical and technical skills. This course will help students retain the Calculus they have learned in their sophomore and junior years and prepare them for further mathematics in college. Ample time will be given to explore each topic and to enhance students' understanding through the use of technology and explorations. Curriculum and assessments within this course are designed to prepare students for International Baccalaureate's evaluation of their work. While it is not required that students take the IB exam, students will be prepared for that end goal.

Calculator Requirement: TI-Nspire CX, or TI-Nspire CAS

**IB MATHEMATICS: Applications and Interpretations SL (2592)**

Classification: International Baccalaureate

Prerequisites: Algebra II-1-2 or Algebra II Honors 1-2

Open to: 11, 12

Credit: 2 semester course, 1 credit earned per semester (1 year course), Full Weight

This course is intended for students with varied backgrounds and abilities. More specifically, it is designed to build confidence and encourage an appreciation of mathematics in students who do not anticipate a need for mathematics in their future studies. Students taking this course need to be already equipped with fundamental skills, rudimentary knowledge of basic processes and a curiosity for how mathematics might impact their future. This course concentrates on mathematics that can be applied to contexts related as far as possible to other subjects being studied, to common real-world occurrences and to topics that relate to home, work, and leisure situations. The course requires students to produce a project, a piece of written work based on personal research, guided and supervised by the teacher. The project provides an opportunity for students to carry out a mathematical investigation in the context of another course being studied, a hobby or an area of interest of their choice using skills learned before and during the course. Curriculum and assessments within this course are designed to prepare students for International Baccalaureate's evaluation of their work. While it is not required that students take the IB exam, students will be prepared for that end goal. Students taking this course will be required to have a TI-nspire CX, TI-nspire CX CAS or TI 84 Plus graphing calculator.

**IB MATHEMATICS: Applications and Interpretations HL (2594)**

Classification: International Baccalaureate

Prerequisite: IB MATHEMATICS: Applications and Interpretations SL 1-2

Open to: 11, 12

Credit: 2 semester course, 1 credit earned per semester (1 year course), Full Weight

This HL course extends students' knowledge from **Applications and Interpretations SL**. This course is intended to follow **Applications and Interpretations SL**. It will review topics from the standard level course and delve deeper into the same syllabus content as the **Applications and Interpretations SL** Mathematics course description. This course is intended to meet the needs of students whose interest in mathematics is more practical than theoretical but seek more challenging content. Curriculum and assessments within this course are designed to prepare students for International Baccalaureate's evaluation of their work. While it is not required that students take the IB exam, students will be prepared for that end goal.

**ALGEBRA 1 Lab (2516)**

Classification: Supplemental

Prerequisite: Selection process

Open to: 9

Credit: 1 (elective) RW \*\*This credit will be awarded second semester

Algebra 1 Lab is a supplemental course. Students will be placed based on their performance in previous math classes and standardized test scores. The focus of this course is two-fold:

- 1) Students will work on strengthening the prerequisite mathematical and study skills needed to be successful in Algebra I
- 2) Students will be provided additional assistance with the material they are learning in Algebra I.

**APPLIED ALGEBRA I (2520A)**

Classification: Special Services

Prerequisite: None

Open to: 9,10

Applied Units: 4 Maximum. Meets the requirement for certificate of completion

Applied Algebra I formalizes and extends the mathematics students learned in the middle grades. Algebra I is made up of 4 strands: Numbers Sense, Expressions and Computation; Linear Equations, Inequalities, and Functions; Systems of Equations and Inequalities; and Quadratic and Exponential Equations and Functions. The strands are further developed by focusing on the content of the Algebra content connectors.

**APPLIED GEOMETRY (2532A)**

Classification: Special Services

Prerequisite: none

Open to: 11/12

Applied Units: 4 units maximum Requirement for the Certificate of Completion

Applied Geometry formalizes and extends students' geometric experiences from the middle grades. These critical areas comprise the Geometry course: Points, Lines, Angles, and Planes; Triangles; Quadrilaterals and Other Polygons; Circles; Transformations; and Three-dimensional Solids. The eight Process Standards for Mathematics apply throughout the course. Together with the content standards, the Process Standards prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.