

## Algebra 1

### Full Year - No Prerequisites

This course is the foundation for all other high school math courses. Algebra 1 covers topics including but not limited to linear relationships, exponential and quadratic relationships, advanced functions and equations, and data analysis.

## Algebra 1 Plus

### Full Year - No Prerequisites

This course is the foundation for all other high school math courses. It covers the same curriculum as the Algebra 1 course with greater emphasis on quadratic functions and equations, radical functions, rational functions, and real-life applications.

## Geometry

### Full Year - Algebra 1

This course will build upon Algebra 1 curriculum and is essential to further instruction in Algebra 2, Pre-Calculus, and beyond. The purpose of this course is to develop geometric relationships and deductive strategies that can be used to solve a variety of real-world and mathematical problems. Geometry covers topics including but not limited to geometric structure, congruence, similarity, and measurement.

## Geometry Plus

### Full Year - Algebra 1

This course will build upon Algebra 1 curriculum and is essential to further instruction in Algebra 2, Pre-Calculus and beyond. The purpose of this course is to develop geometric relationships and deductive strategies that can be used to solve a variety of real-world and mathematical problems. Geometry Plus covers the same curriculum as Geometry, with a greater emphasis on logic, proof, and constructions. The focus is on the student's continuous development of analytical and critical thinking through logical and spatial reasoning.

## Honors Geometry

### Full Year - Algebra 1 and Dept. Approval

This course will build upon Algebra 1 curriculum and is essential to further instruction in Algebra 2, Pre-Calculus and beyond. The purpose of this course is to develop geometric relationships and deductive strategies that can be used to solve a variety of real-world and mathematical problems. The topics covered in this course include all of those listed in Geometry and Geometry Plus. Students are expected to synthesize and apply the material beyond examples discussed in class.

## Algebra 2

### Full Year - Geometry

This course will build upon the Algebra 1 curriculum and is essential for further instruction in post Algebra 2 courses. Algebra 2 covers topics including but not limited to: extension of the properties of the real number system, linear and quadratic relations and inequalities, polynomials, radical and inverse functions, complex numbers, logarithmic and exponential functions, and rational functions.

## Algebra 2 Plus

### Full Year - Geometry

This course will build upon the Algebra 1 curriculum and is essential for further instruction in other mathematical and scientific fields. This course covers the same curriculum as Algebra 2, with a greater emphasis on the depth of the questions asked.

## Honors Algebra 2

### Full Year - Minimum of a "B" in Hon. Geometry & Dept. Approval

The purpose of this course is to continue the study of Algebra and to provide the foundation for applying algebraic skills to other mathematical and scientific fields. This course covers the same curriculum as Algebra 2 Plus as well as trigonometric functions, formulas, graphs, and identities. Topics are taught at a greater depth than Algebra 2 Plus. Students are expected to synthesize and apply the material beyond examples discussed in class.

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## Trigonometry

### Semester - Algebra 2

This course will be devoted to an introduction to Trigonometry where students will study right triangle trigonometry, non-right triangle trigonometry, the unit circle, trigonometric graphs, and vectors.

## Selected Topics in Mathematics

### Semester - Algebra 2

The purpose of this course is to strengthen and build on students' understanding of topics covered in previous math classes. Topics covered include quadratic functions, polynomial functions, radical functions, rational functions, sequences, series, probability, and statistics.

## Statistics With Applications

### Semester - Selected Topics in Mathematics

This course will focus on developing fundamental understandings of the statistics and probability that students will encounter in everyday life. Topics covered will include probability models, descriptive statistics, hypothesis testing, and confidence intervals. An emphasis will be placed on applications of these topics to real world situations.

## Personal Finance

### Semester - Open to Seniors Only

Personal Finance will be reserved for seniors. The course will be comprised of financial planning, investing, creating a budget, and understanding financial vocabulary and the world of banking, credit, and taxes. Additionally, students in this course will read the book *Richest Man in Babylon*.

## Functions, Statistics and Trigonometry

### Full Year - Algebra 2

This course is a study of the theory and applications of polynomials, trigonometric identities, vectors, statistics, and rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions. Graphing calculators will be used extensively in this course. The successful student in this course will be well prepared for more advanced topics. FST is equivalent to a Plus-level Precalculus course.

## Honors Pre-Calculus

### Full Year - Minimum of a B in Algebra 2 and Dept. Approval Required

The purpose of this course is to prepare students for a Calculus course. The course includes all of the topics listed in Functions, Statistics and Trigonometry, as well as matrices, polar coordinates, analytical Geometry and discrete math. Students will demonstrate their mastery via projects that synthesize and apply the material beyond examples discussed in class.

## Descriptive Statistics and Probability

### Semester - Functions, Statistics and Trigonometry

This course explores all areas of descriptive statistics, such as different ways to display data, measures of center and variability, the normal distribution, and linear regression. Students will study several types of sampling methods and learn the differences between studies and experiments. Students will also learn how to find compound and conditional probabilities.

## Intro to Calculus

### Semester - Descriptive Statistics and Probability

This course is designed to introduce students to fundamental calculus procedures and to prepare them for a rigorous college level course in calculus.





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## Inferential Statistics

### Semester - Descriptive Statistics and Probability

This course builds upon all the ideas learned in Descriptive Statistics and Probability. Students will be expected to go beyond describing data, using and applying the information and skills from semester one to draw conclusions about what they observe. Topics will include random variables, sampling distributions, confidence intervals, and hypothesis tests. Students will learn and apply different distributions of data, including the Normal distribution, t-distribution, and chi-squared distribution.

## Honors Probability and Statistics

### Semester - Descriptive Statistics and Probability

In this course students explore binomial distribution, the normal distribution, confidence intervals, hypothesis testing, t-distribution, chi-square distribution, correlation, regression, and multiple regression. Students will learn how to calculate confidence intervals and employ hypothesis testing. This course will make extensive use of graphing calculators and Excel spreadsheets. Students are expected to synthesize and apply the material beyond examples discussed in class.

## Applications of Calculus: Business

### Semester - Intro to Calculus Required

This course is intended for those studying business, economics, or other related business fields. The following topics are presented with applications in the business world: functions, graphs, limits, exponential and logarithmic functions, differentiation, integration, partial derivatives, and optimization. Topics also include total cost, variable cost, average cost, marginal cost, total revenue, marginal revenue, and average revenue.

## Honors Calculus A

### Semester - Minimum of a "B" in Honors Pre-Calculus and Department Approval

This course will introduce students to calculus from an algebraic, numerical, and graphical perspective. Topics covered include continuity and limits, differentiation techniques and applications including implicit and logarithmic differentiation, exponential and logarithmic functions, simple differential equations, and definite and indefinite integrals. Students are expected to synthesize and apply the material beyond examples discussed in class.

## Honors Seminar Calculus B

### Semester - Minimum of a "B" in Honors Calculus A and Department Approval

This course is a continuation of Honors Calculus A. Students will further their study of definite and indefinite integrals; additional topics include integration techniques and applications, the calculus of parametric, vector, and polar functions, sequences, and series, including Taylor and MacLaurin series. Students are expected to synthesize and apply the material beyond examples discussed in class.

## Honors Seminar Multivariable Calculus

### Semester - Honors Seminar Calculus B

This course studies the calculus of the 3D world. Topics covered include differential and integral calculus of functions of two or three variables, partial derivatives, multiple integrals, Green's, Stokes's, and Divergence Theorems, calculus of vectors and paths in two and three dimensions. The course will conclude with an introduction to first and second order differential equations. Students are expected to synthesize and apply the material beyond examples discussed in class.



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## Honors Seminar Differential Equations

### Full Year - Honors Seminar Calculus B

Differential Equations is the study of equations involving rates (derivatives); Linear Algebra is the study of linear systems and vector spaces. Combining these courses will allow us to study systems of differential equations. This course will cover first-order differential equations, linear systems and matrices, vector spaces, higher order differential equations, eigenvectors, linear systems of differential equations, and Laplace Transforms. The emphasis is on application; as such, graphical interpretation and engineering application will be the focus and not the theory. Students are expected to synthesize and apply the material beyond examples discussed in class.

## Honors Web Application Programing

### Full Year - Honors Computer Science 2 required

Students will learn how to create fully functioning web applications using a variety of programming languages. Languages taught in this course include server-side languages such as PHP, client-side languages such as JavaScript, languages for database information retrieval such as SQL/MySQL, and markup languages such as HTML and CSS.

## Honors Computer Science 1

### Full Year - Must be enrolled in Honors Geometry or Higher

Honors Computer Science 1 focuses on developing reasoning skills and algorithmic thinking. Python, a programming language renowned for its simplicity and ease of use, is taught to develop student competency in software development. Topics such as simple data types and structures (booleans, integers, floats, strings, lists, and tuples), loops, function development, control statements, and recursion will be taught. This course is a strong introduction to the computing science field with a particular emphasis on software development.

## Honors Computer Science 2

### Full Year - Honors Computer Science 1 Required

Honors Computer Science 2 is a course similar in structure to Computer Science 1 Honors in so far as a subset of similar topics are taught (loops, functions/methods, control statements, recursion). The major difference, though, is that the class is taught in the Java programming language. Java, a purely object-oriented language, requires the teaching of object-oriented topics such as Java class design, object references, polymorphism, the substitution principle, inheritance, and interfaces. Java is an industry standard, and thus this class provides a solid exposure to college-level concepts.

## Digital Logic 1

### Semester 1 - Co-requisite Honors Algebra 2 OR Algebra 2 Plus with Instructor Approval

This course will introduce students to the elements of circuit design and implementation. Topics will include number systems, logic, gate minimization techniques including Boolean Algebra, DeMorgan's Theorem, and Karnaugh mapping, binary arithmetic, multiplexers, flip-flops, memory, and finite state machines.

## Digital Logic 2

### Semester 2 - Digital Logic 1 and Instructor Approval

Digital Logic 2 builds on the concepts and skills developed in Digital Logic 1. Students will work with sensors and motors, write code for microcontrollers such as the Arduino, and learn the fundamentals of soldering to create permanent designs. This course will place a greater emphasis on independent projects that synthesize the concepts learned over the semester.





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## Honors Seminar Artificial Intelligence and Computational Modeling 1

**Semester 1 - One semester of Calculus required**

The first semester of this two-semester sequence will focus on computational modeling using Python. This course integrates concepts from calculus, statistics, linear algebra, and computer science through the lens of real-world scenarios. There will be an emphasis on numerical methods for solving differential equations. In addition, students will be introduced to statistical methods to analyze large data sets along with specific techniques from linear algebra.

## Honors Seminar Artificial Intelligence and Computational Modeling 2

**Semester 2 - Hon Sem AI & Computational Modeling 1**

Extending the first semester experience, this course will introduce students to the fundamentals of artificial intelligence, focusing on machine learning techniques and training, neural networks and deep learning, and applications of machine learning to real-world problems.

**Algebra 1, Algebra 2 and Geometry** are offered at the **survey level**.

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**Survey-level classes** are specifically designed for students with diagnosed learning disorders. In a survey-level course, access to the curriculum is more readily available through smaller class sizes, more direct instruction, guided practice, and scaffolding of lessons.





A group of five students, three boys and two girls, are sitting at a wooden table in a classroom. They are all smiling and looking towards the camera. One boy is writing in a notebook, and another is holding a small electronic device. There are various items on the table, including papers, a pen, and some small electronic components. The background shows a classroom setting with shelves and posters.

# Physics & Aviation

## Physics

**Full Year - No Prerequisites**

The course is focused on physics concepts and methods. Students will be solving problems utilizing the processes of technicians, engineers, and scientists. The students test hypotheses, apply conceptual understanding, conduct experiments, design and modify models, test and assess improvements, and analyze results. The students utilize data acquisition and analysis skills to formulate decisions and draw conclusions. The physics program employs a project based inquiry approach to learning the concepts and applications of physics.

## Honors Physics

**Full Year**

**Must be concurrently taking higher level math course (Honors Geometry, Honors Algebra 2, etc.)**

Honors Physics is a course designed to prepare students for advanced studies in the sciences in a career-related field. A general outline of the topics includes mechanics (kinematics & dynamics), harmonic motion, waves, optics, sound, electricity, and magnetism. Experimental processes will be examined in a more detailed manner. Honors Physics utilizes mathematics, including Algebra II and Trigonometry, on a regular basis and students selecting this course of study must be proficient in advanced mathematics.

## Material Science Engineering

**Full Year - No Prerequisites**

This course will focus on engineering basics, metals, polymers, ceramics, composites, and smart materials. Students will learn how to modify materials to change their characteristics, learn how to characterize materials and perform tests to access the use of materials to suit specific purposes, such as applying your knowledge to making a skateboard or new material for a heart valve.

## Honors Seminar in Physics - Mechanics

**Semester**

**Honors Physics, Calculus, Instructor Approval Required**

This class has been developed to cover the material of an introductory college physics course. The study of mechanics includes the description of motion, the analysis of motion using Newton's laws, and the application of the three major conservation laws to a wide range of systems. Familiarity with differential calculus is assumed, and all the topics studied will make use of this level of math.

## Honors Seminar in Physics - Electricity & Magnetism

**Semester - Honors Seminar in Physics - Mechanics, Calculus, Instructor Approval Required**

We continue our study in physics, this time with a focus on Electromagnetism. Topics to be covered include Coulomb's Law, electrostatics, Gauss's Law, electric potential and capacitance, DC circuit analysis, magnetic fields and induction, and AC circuits analysis. Electromagnetism plays a key role in our society and technology historically, currently, and in our future. Successful completion of this course provides a solid foundation for anyone considering physics, engineering, or any other physical science-based STEM discipline for their future endeavors.

## Honors Seminar in Physics - Modern Physics

**Semester - Honors Seminar in Physics - Mechanics, Calculus, Instructor Approval Required**

We continue our study of physics, introducing the subjects of Special Relativity, Quantum Mechanics, and Cosmology. Acquaintance with differential and integral calculus is assumed, as well as introductory classical mechanics & electromagnetism. Quantum Mechanics and Relativity play a key role in our society and technology historically, currently, and in our future and are essential ingredients in contemporary theories of fundamental physics. Successful completion of this course provides a solid foundation for anyone considering physics, engineering, or any other physical science based STEM discipline for their future endeavors.

# Physics & Aviation

## Astronomy - Solar System

### Semester 1 - Co-requisite Algebra 2

Astronomy, the study of the universe, was the first science, and it remains a cutting edge and viable research discipline even today. In the first semester, we study the solar system from the Sun to the Kuiper belt and everything in between.

## Astronomy - Evolution of the Universe

### Semester 2 - Co-requisite Algebra 2

In the second semester, we look at cosmology, the study of the cosmos. We take a look at different types of galaxies and also black holes, pulsars, quasars, gamma ray bursts, and other denizens of the universe.

## Aviation 101

### Semester - No Prerequisites

This is the first of a six-semester elective program in which students will be introduced to aviation, aeronautical, and aerospace science. Taught as a project-based class, this introductory course will study the history of flight, physics of flight, aircraft systems, engines, instruments, air traffic control procedures, and weather. Included in the course are several field trips to local airports and IFLY along with guest lessons from local pilots and aeronautics engineers. Students will have the opportunity to apply their knowledge through approximately 5 hours in a full-motion Cessna 172 flight simulator.

## Aviation 201

### Semester - Aviation 101

In this project-based course, students will study the history of the space program, satellites, rocketry, human physiology and space flight, long term space projects such as the Mars mission, ISS, and a possible moon base. Students will continue their flight training in the flight simulator over the semester.

## Aviation 301

### Semester - Aviation 201

This course covers the physics of flight using mathematical formulas to determine lift, thrust, drag coefficients, and surface area to weight ratios. We will begin the process by developing engineering skills through short-term projects and experiments. The focus is to develop the skills of would-be pilots and engineers. Topics such as electrical systems, airport security, and airport design will also help students prepare for the next step in becoming a pilot.

## Aviation 401

### Semester - Aviation 301

This course emphasizes aeronautical and aerospace engineering. Students will learn about keeping a professional engineering journal as they take on 4-5 design challenges. Examples of these design challenges may include creating and testing airfoils using 3D printing and designing and building a working wind tunnel.

## Aviation 501

### Semester - Aviation 401 & Dept. Approval Required

This course teaches students the fundamentals of cross-country flying, which includes planning a route of flight, navigating a route of flight, interpreting aviation weather reports/maps, and preparing the aircraft's weight and balance. Students will obtain approximately 10 hours in a Cessna 172 full-motion simulator, and by the end of the course should be able to perform a solo flight in the simulator without instructor input.

## Aviation 601

### Semester - Aviation 501 & Dept. Approval Required

In this course, the emphasis will be on preparing the student to successfully complete the Private Pilot Written Exam. Students will utilize the flight simulator for approximately 10 hours to practice their private pilot maneuvers or be introduced to instrument flying, which is flying exclusively by the use of instruments and without the use of outside references to maintain aircraft control.

