

# SCIENCE

(three credits required)

The sequence of the science curriculum is biology, geophysical science and chemistry. It is strongly recommended that all students take a fourth year of science. All science courses include laboratory investigations that require participation and written records of data obtained.

## Biology

This college preparatory lab science provides a framework that teaches students major concepts such as characteristics of life, cell structure, energy/matter flow, heredity, evolution, adaptation, diversity of life, levels of organization. Skills such as data analysis, inquiry, the scientific method, understanding patterns and cycles, classification, comparing and contrasting, and modeling are taught throughout this year long course.

## Honors Biology

This honors course is designed to challenge the student. It emphasizes critical thinking and application of concepts. Students are expected to be capable of independent work and will be required to cover the same core concepts covered in Biology but at a much faster pace and in greater detail. Topics that are covered are: experimental design, characteristics of life, ecology, introduction to chemistry, study of the four major macromolecules, DNA structure and protein synthesis, mitosis and cancer, viruses and bacteria, genetics, meiosis, biotechnology, evolution, photosynthesis and cellular respiration, and taxonomy.

## Geophysical Science

This is an introductory course in physical science with an emphasis in geology, astronomy, physics, chemistry, and meteorology. Concepts covered include scientific methods, energy and motion, electricity and magnetism, matter, the periodic table, chemical bonds, chemical reactions, plate tectonics, the formation of the solar systems, galaxies, the universe, star cycles, land and water features and their formation, and weather formation and prediction. Laboratory explorations of each topic area give students real-life applications of science.

## Honors Geophysical Science

This is an introductory course in physical science with an emphasis in geology, astronomy, physics, chemistry, and meteorology. Concepts covered include scientific methods, energy and motion, electricity and magnetism, matter, the periodic table, chemical bonds, chemical reactions, plate tectonics, the formation of the solar systems, galaxies, the universe, star cycles, space time, land and water features and their formation, and weather formation and prediction. Laboratory explorations of each topic area give students real-life applications of science. This honors course emphasizes the inquiry method. The topics are covered in more depth and students are expected to work independently. The course requires outside reading and writing assignments.

## Chemistry

Chemistry includes a study of measurement skills, atomic structure, the periodic table, bonding, stoichiometry, states of matter and kinetic theory, solutions, acids, bases and equilibrium and simple chemical and nuclear reactions. Mathematical relationships of chemical reactions and mathematical descriptions of gas behavior are studied under experimental conditions and in problem-solving situations. This course includes much laboratory experience designed to reinforce course content as well as lab report composition to reinforce writing skills in a cross-curricular format. *Prerequisite: Successful completion of Biology & Geophysical Science, and successful completion of or concurrent enrollment in Algebra II.*

## Honors Chemistry

Chemistry is the study of matter/energy and the changes that occur as substances interact. Topics include but are not limited to: data analysis, history of chemistry, lab safety, atomic theory, chemical reactions, stoichiometry, thermodynamics, gases, chemical kinetics, acid-base interactions, and nuclear chemistry. The course focuses on learning how to problem solve creatively and analytically using both qualitative and quantitative methods. Classroom discussion will be reinforced in laboratory experiences. The course is rigorous, fast-paced, and designed as a college-preparatory course. Students entering the course should be proficient in algebra and have scored well in the chemistry section of geophysical science.

## Advanced Placement Chemistry

AP Chemistry is equivalent to a first year college chemistry aligned with College Board standards to prepare students for the AP exam in May. The course is structured to teach students to think creatively and analytically when problem solving. Core concepts, quantitative methods, and lab techniques of chemistry are integrated to maximize understanding of the subject matter. Six College Board "Big Ideas," that students should come to understand throughout the course, will guide the structure. The rigor, depth, and speed of material are comparable to a college course. This is not intended to be a first-year chemistry course and is meant to follow either College Prep Chemistry or Honors Chemistry.

## Advanced Placement Biology

This is an inquiry-based, second year course in biology which prepares students for the national AP Biology exam given during the second week of May. This exam tests a student's ability to explain, analyze and interpret biological processes and phenomena. The syllabus is a compilation of topics covered by 300 colleges belonging to the College Board. Topics include biochemistry, cells, energetics, heredity, molecular genetics, evolution, diversity of organisms, structure and function of plants and animals and ecology. Students will design and complete many laboratory investigations throughout the course. These topics are covered in depth and at the pace of a college-level course so there is a good deal of independent work and out-of-class study time required. A college textbook and lab manual are used. *Prerequisite: Successful completion of Biology and completion of or concurrent enrollment in Chemistry*

## Human Anatomy and Physiology

Anatomy and Physiology is a lecture/discussion course for students who have successfully completed a year of biology. This full year course includes the study of cell physiology, histology and a detailed study of each organ system. There is extensive lab work and students should be aware that this course includes a detailed dissection of mammalian organs & animals. Outside reading relating to current medical advances is required. *Prerequisite: Successful completion of or concurrent enrollment in Chemistry*

## Honors Human Anatomy and Physiology

Anatomy and Physiology is a lecture/discussion course for students who have successfully completed a year of biology. This full year course includes the study of cell physiology, histology and a detailed study of each organ system. The honors level takes the organ systems a step further by analyzing how stresses, such as exercise, affects the functioning of the system. There is extensive lab work and students should be aware that this course includes a detailed dissection of mammalian organs & animals. Outside reading relating to current medical advances is required.

*Prerequisite: Successful completion of or concurrent enrollment in Chemistry*

## Physics

Physics relies on developing problem-solving skills via concepts. It is a lab science which requires some mathematical skills. This course focuses on motion, Newton's laws, energy, momentum, gravity, light and sound, electricity and magnetism, radioactivity, fission and fusion. Physics is recommended for students who wish to pursue engineering, pharmacy or pre-medicine in college.

*Prerequisite: Successful completion of chemistry.*

## Advanced Placement Physics I

This course is a one year introductory algebra-based physics course. Topics covered include linear and projectile motion, forces, energy, momentum, rotation, simple resistor circuits and Coulomb's law of electrostatic force. There will be an emphasis on problem solving skills as well as laboratory skills. AP Physics I is a course that is recommended for students wishing to enter medicine, pharmacy, engineering, chemistry or physics. *Prerequisite: Successful completion of or concurrent enrollment in Trigonometry.*

## Advanced Placement Physics II

This course is the second year algebra-based course which follows AP Physics I. Topics covered include fluid dynamics, thermodynamics, electrostatics, capacitor circuits, magnetism, optics and modern physics. There will be an emphasis on problem solving skills as well as laboratory skills. AP Physics II is recommended for students wishing to enter medicine, pharmacy, engineering, chemistry or physics. *Prerequisite: Successful completion of or concurrent enrollment in Trigonometry as well as successful completion of AP Physics I.*

## Advanced Placement Physics C

AP Physics C is a one year calculus-based physics course. Topics covered include review of some AP Physics 1 concepts. These reviewed topics will be studied in much more depth than in AP Physics 1 and will include the use of calculus. Additional topics studied include: unit vector notation and vector math, simple differential equations, more complex force systems, a calculus interpretation of air resistance, a calculus interpretation of work and energy including potential energy functions, two dimensional collisions and center of mass motion, rotational dynamics including angular momentum, universal gravitation including Kepler's Laws and complex spring systems. There will be an emphasis on problem solving and laboratory experiments including data analysis and interpretation and abstract writing. Students will even completely design their own lab procedures. This course is targeted at students wishing to study engineering and physics. *Prerequisite: Successful completion of Chemistry, AP Physics I and successful completion of or current enrollment in Calculus.*

## Advanced Placement Environmental Science

AP Environmental Science is a yearlong course designed to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. Students will learn to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them. A major topic discussed throughout the year is climate change; its causes, the effects, and the courses of action available. This is an interactive course that requires time on a few weekends. Time after school and the occasional field trip during the school day can also be expected. *Prerequisite: Successful completion of or concurrent enrollment in Chemistry*

## Astronomy

Astronomy is a one semester introductory course, and a prerequisite to the SSE I course offered in the spring. Topics which will be discussed include: the history and evolution of astronomy, planets (both characteristics and formation of the solar system), solar and stellar evolution, galaxies and topics in cosmology including the Big Bang Theory, evolution of the universe, dark matter and dark energy. Current topics in astronomy will also be discussed. There are no prerequisites for this course. It is offered in 2018-2019 and 2020-2021.

## Forensic Science

This semester course is designed to provide students with a basic introduction to forensic science and how it is used in criminal/legal investigations. Information discussed will cover the theories, concepts, and practices used in the analysis of physical evidence performed in crime laboratories, and the fundamentals of crime scene investigation. Typical topics covered will be: evidence collection, fiber and textile analysis, fingerprinting, DNA evidence, drug identification, toxicology, handwriting analysis, counterfeiting, soil examination, forensic anthropology, and many others. It is offered in 2019-2020 and 2021-2022.

*Prerequisite: Successful completion of or concurrent enrollment in Chemistry.*

## Marine Geology

This semester course focuses on the marine environment. Topics discussed include the formation of the oceans, oceanic features, waves, tides, and marine organisms. Emphasis will be placed on current events and laboratory experiences. This course is designed primarily for juniors and seniors.

It is offered in 2018-2019 and 2020-2021, and will not be offered in 2019-2020.

*Prerequisite: Successful completion of or concurrent enrollment in Chemistry.*

## Physical Geology

This course is a one semester lab-based introduction to geology class. In this class, students will learn about the identification of rocks and minerals as well as their role in the geologic process. Students will study Earth processes such as volcanism, weathering, sedimentation, metamorphism, the role of water and ice in sculpting the landscape, earthquakes, plate tectonics and more. It is offered in 2019-2020 and 2021-2022.

## Pathology: The Study of Disease

One semester elective credit in the sciences. The class will be focused on case studies of mystery diseases categorized by type. It begins with a unit on the immune system and then branches out to case studies about various diseases by category. The categories would include: viral diseases, bacterial diseases, parasitic diseases, genetic disorders, autoimmune disorders, and cancer. The class would be mostly project based built around the case studies in the different categories. Students will explore causes, symptoms, diagnoses, and treatments of disease. By the end of the course, students will gain skills in analysis, research, collaboration, presentation, and problem solving.

It is offered in 2018-2019 and 2020-2021, and will not be offered in 2019-2020.

*Prerequisite: A or B in CP Biology, A, B, or C in Honors Biology*

## Nutritional Science

The course provides an introduction to the concepts underlying the science of nutrition. The basics of nutrition including macronutrient needs and nutritional deficiencies are highlighted. Additional topics covered are food safety, the supplement industry, and food labels. Current nutrition controversies will be addressed. The course will have a large focus on learning how to review scientific literature and presentation of the research. Students will also become proficient in Microsoft Excel as they prepare and analyze diets using the exchange system. It is offered in 2018-2019 and 2020-2021, and will not be offered in 2019-2020.

## Introduction to Engineering Design

Introduction to Engineering Design (IED) is a high school level foundation course. In this course, students are introduced to the engineering profession and a common approach to the solution of engineering problems, an engineering design process. Utilizing the activity-project-problem-based teaching and learning pedagogy, students will progress from completing structured activities to solving open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.

Course open to 11<sup>th</sup> and 12<sup>th</sup> grade students and is a full year course.

*Prerequisite: completion of or concurrent enrollment in Algebra II*