

SCIENCE

Earth Science

1 credit / 9

The Earth Science course involves the study of the forces that have molded the earth and the universe. The geology of the earth, the chemistry and identification of minerals, the interpretation of topographic maps, the physics of stars and planets, and various topics in meteorology, oceanography and paleontology are integral topics students will explore in this course. Laboratory skills include observation, measurement, classification, prediction, data organization, and analysis. Students will sit for the Physical Setting: Earth Science Regents exam. Required of 9th graders who have completed Science 8 or Advanced Science 8.

Biology

1 credit / 9-10

The Biology curriculum follows the New York State Board of Regents Living Environment syllabus. Students are offered an introduction to the world of living things from both a microscopic and macroscopic perspective. Students will compare both the plant and the animal kingdoms from their simplest to their most complex forms and delve into their interrelationships and factors affecting their development. Topics also included are the basic biochemical aspects of life, genetics and evolution. Over 30 hours of laboratory experiences are provided. The student will sit for the Living Environment exam.

Prerequisite: Completion of Earth Science

Biology Honors

1 credit / 9-10

This enriched program introduces ninth graders to basic concepts in biology, biochemistry, anatomy and the physiology of cells and organisms. In addition it gives students the laboratory experience to prepare them to do independent projects in their future scientific endeavors. This course fulfills the requirement of the New York State Regents syllabus.

Prerequisite: Must meet local criteria, have the recommendation of the science department, and have successfully completed Earth Science and Algebra 1.

Chemistry

1 credit / 10-11

The Chemistry course stresses the major concepts covered in the NYS Physical Setting: Chemistry curriculum. Basic ideas and laboratory skills are developed through a series of related investigations. This is a survey course in inorganic chemistry with a brief introduction to organic chemistry. Topics include atomic and molecular structure, the periodic table, models of the gas, liquid and solid phases, acid/base chemistry, stoichiometry, oxidation-reduction, thermodynamics, kinetics/equilibrium and nuclear chemistry. Students will sit for the Physical Setting: Chemistry exam.

Prerequisite: Successful completion of Earth Science, Biology and Algebra 1.

Chemistry Honors

1 credit / 10-11

Students will engage in a heavily quantitative problem-solving approach. Strong math skills are required. This course presents a more detailed treatment of the subjects described in Chemistry Regents. A greater emphasis will be placed on the experimental evidence from which the laws are derived.

Prerequisite: Must meet local criteria, have the recommendation of the science department, and have successfully completed Earth Science and Biology, Algebra 1 and Algebra 2 or Geometry/Trig.

Introduction to Quantitative Science**1 credit / 11-12**

This program is offered to select students to fulfill their chemistry and physics requirement. The first semester seeks to provide students with a basic understanding of key topics in chemistry. The second semester of conceptual physics can be described as a course in the study of "how things work". This course will help the student to understand the "rules" governing motion, forces, and energy. All course work is supported by relevant project and laboratory experiences.

Prerequisite: Completion of Earth Science and Biology.

Conceptual Physics I and II**1/2 credit each/ 11-12**

These one semester courses offer a conceptual approach to the major topics in physics. Topics include classical mechanics, electricity, magnetism, and waves. Concepts are developed through laboratory experiences, activities, and mathematical problem solving.

Prerequisite: Completion of Earth Science, Biology and Chemistry.

Physics**1 credit / 11-12**

This course is a survey of the classical and modern laws that describe the behavior of matter and energy. The classical laws of mechanics (motion, forces, energy transformations) and electromagnetism (waves, electricity, magnetism) are examined and modified to allow introduction of newer quantum physics (standard model, photoelectric effect). Many of the laws derived will be demonstrated and verified through laboratory experiences. Juniors will sit for the Physical Setting: Physics exam.

Prerequisite: Successful completion of Earth Science, Biology, Chemistry, Algebra 1 and Algebra 2.

AP Physics 1**1 credit / 11-12**

This is an algebra based introductory college level physics course. Students will cultivate their understanding of physics through inquiry based lab investigations and significant problem solving as they explore topics such as: Newtonian Mechanics (including rotational motion), work, energy, power, mechanical oscillations (waves), sound, electric fields and simple circuits. Only those students who are truly self-directed, can work independently and enjoy mathematical problem solving should consider this course. Students will be taught to "justify" their mathematical reasoning in preparation for the AP exam in May.

Prerequisite: See AP Science Criteria.

Advanced Placement Biology**1 credit / 11-12**

This biology course is an advanced course for students who desire further training in biology in preparation for careers in the field of biology and for students who wish to take the Advanced Placement Examination in Biology, which is administered at the end of this course. Laboratory projects are included in the scheduling of this program. Students are also taught the process of scientific writing in preparation for the AP exam.

Prerequisite: See AP Science criteria.

Advanced Placement Chemistry**1 credit / 11-12**

This advanced placement course is the equivalent of 2 semesters of introductory college level chemistry, including the laboratory portion. The course which is heavily based on the mathematical relationships in chemistry, will include in greater depth all topics included in the first year course, as well as some new topics. There is a special emphasis on reaction chemistry, stoichiometry problems, thermodynamics and equilibrium applications. The college-level course includes a full laboratory program for which the student must write appropriate scientific abstracts. The Advanced Placement Examination is administered at the end of this course.

Prerequisite: See AP Science criteria.

Advanced Placement Environmental Science**1 credit / 11-12**

AP Environmental Science examines the complex relationships between organisms and the environment in which they live. The course combines aspects of biology, Earth science and chemistry to analyze environmental trends and data. Topics include: global warming, ozone depletion, geology, ecosystems, human population, agriculture, and energy. This is a college level science course.

Prerequisite: See AP Science criteria.

ELECTIVES**Independent Science Research****½ credit per year / 10-12**

This course is designed to give highly motivated and interested students an opportunity to perform independent science research in addition to the regular science sequence. Commit to 240 or more hours per school year (September to June) for their research work (this includes class time, assessment meetings, and all out of class time spent on the research). Summer research carries a commitment of a minimum 90 hours plus assessment time. The sophomore year will stress learning about research methods, choosing a topic, finding a mentor, doing a literature search, reading primary sources and developing a proposal. With successful completion of a research proposal, this course can develop into a three-year sequence, including summer/weekend research and the formulation of a written paper by senior year. Possible college credit may be granted through SUNY Albany. Note that this class meets every other day in the sophomore year and may delay the Health requirement until junior year.

Prerequisite: Successful completion of summer assignment and attendance at information session.

Astronomy**½ credit / 11-12**

Astronomy is an extension of the earth sciences designed for upper classmen. The level of the course will be geared to the backgrounds and interests of the students. Material covered will include an update on the contents of the solar system, evolution of stars and galaxies, celestial mechanics (motion and position of celestial bodies), dark matter, and astronomical instruments, observations and measurements. The course will look at new ways to visualize the fabric of the universe. Students will develop skills in naked eye observations of celestial objects.

Prerequisite: Satisfactory completion of Earth Science, Biology, and Chemistry. Physics is also recommended.

Meteorology (New Course)**½ credit / 11-12**

The meteorology elective is intended for upperclassmen who want to investigate how the “weather works”. The semester will begin with an overview on the fundamentals of meteorology including the formation of high and low pressure, nor’easters, tornadoes and hurricanes. The class then transitions into the world of weather modelling, as we explore how meteorologists make predictions in the short and long term. We will then touch on climate and global warming, before finishing the semester probing weather lore, or how generations before technology predicted the weather with only their natural surroundings.

Prerequisite: Satisfactory completion of Earth Science, Biology, and Chemistry. Physics is also recommended.

Human Physiology**½ credit / 11-12**

This course provides students with the opportunity to experience a 3rd semester of Biology. The curriculum stresses human anatomy (structure and arrangement of the body and its parts), human physiology (biological functions) and pathology (diseases related to malfunctions within man).

Prerequisite: Satisfactory completion of Earth Science, Biology, and Chemistry. Physics is also recommended.

Contemporary Issues in Science**½ credit / 11-12**

In this course students will examine current topics in science. Topics may include, but are not limited to, genetic engineering, organ transplants, reproductive technologies, animals in scientific research and health care. Students will analyze and evaluate all points of view to determine their stand on the issue. Current reading materials will help students to think critically about a variety of scientific issues.

Prerequisite: Satisfactory completion of Earth Science, Biology, and Chemistry. Physics is also recommended.

Forensic Science**1 credit / 12**

Forensic Science is the branch of science that interprets or establishes the facts in civil or criminal law cases. In this course the students will be introduced to scientific criminal investigation. The course involves the application of biological and chemical methods to the analysis of physical evidence. Some of the laboratory experiences will focus on determining physical properties of matter, hair and fiber analysis, fingerprint classification, and DNA fingerprinting.

Prerequisite: Senior standing. Satisfactory completion of Earth Science, Biology, Chemistry. Physics is also recommended.

Advanced Forensic Science**1 credit/ 12**

Advanced Forensic Science is a college level lecture/lab-based course that teaches the curriculum of the course offered at Syracuse University. Students pay a discounted fee (currently \$440) to Syracuse University at the beginning of the academic year and upon successful completion of the course (i.e. grade C or better) receive an official Syracuse University transcript with four college credits. Students will simultaneously earn one high school science credit. The advanced course is more enriched in content compared to the basic Forensic Science course and puts greater strength on the science behind the techniques used to solve criminal and civil questions. Students are expected to produce weekly lab reports and summaries of relevant court cases (i.e. case briefs). Exams are multiple choice and problem- solving, essay questions drawn from labs, textbook readings and classroom discussions. The course has a cumulative midterm and final exam.

Prerequisite: Senior standing, satisfactory completion of Earth Science, Biology, Chemistry and Physics (or concurrent enrollment in Physics). Department recommendation also required.

Organic Chemistry**½ credit / 11-12**

Built on the foundation of general chemistry, this one semester course will focus on the varied concepts of organic chemistry including the structure of basic molecules and functional groups such as alkanes, alkenes, alcohols, ketones, and esters. It will focus heavily on how structure affects the reactivity of molecules. Organic molecular sets will be used in this course to aid thorough understanding and visualization of three-dimensional structures. The use of specific related websites will be used to research chemical connections and material for projects and exams. This course is designed to give those students who wish to pursue a career in nursing, biological sciences, medicine, or chemistry a background in this difficult area of study. It will be taken with the understanding that the students will then go on to take the second half of the course, Biochemistry.

Prerequisite: Satisfactory completion of Regents Chemistry, (with a passing grade on the Chemistry Regents exam), Algebra 1, Algebra 2 and Geometry/Trigonometry. Physics is also recommended.

Biochemistry**½ credit / 11-12**

This is the second half of Organic Chemistry. This course will cover several organic chemistry topics such as organic acids, esters, amides and amines. Carbohydrates will also be studied.

Prerequisite: Organic Chemistry.

Please note that a Physics prerequisite for the electives may be fulfilled by taking Introduction to Quantitative Science, Conceptual Physics, Regents Physics, or AP Physics 1.

Marine Biology (new course)**1/2 credit / 11-12**

This course is designed for students with an interest in marine biology and oceanography and will provide an excellent background for further study of the oceans and the organisms that inhabit it. Major concepts include the study of: the interrelationship of marine and terrestrial environments, the geology of the oceans, marine organisms, and the ecology

of coral reefs. Students will learn about the physical structure and chemistry of the ocean, the diversity of ocean life, marine ecology, and the scope and impact of human interactions with the oceans. Laboratory activities reinforce concepts and principles presented. Laboratory activities, including the examination of marine specimens are utilized throughout this course to build upon student knowledge.

Prerequisite: Satisfactory completion of Earth Science, Biology, and Chemistry. Physics is also recommended.

PLTW: Introduction to Engineering Design

1 credit / 10-12

Introduction to Engineering Design (IED) is a high school level foundation course in the PLTW Engineering Program. In IED 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 (APB) 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. Through both individual and collaborative team activities, projects, and problems, students will solve problems as they practice common engineering design and development protocols such as project management and peer review. Students will develop skill in technical representation and documentation of design solutions according to accepted technical standards, and they will use current 3D design and modeling software to represent and communicate solutions. In addition the development of computational methods that are commonly used in engineering problem solving, including statistical analysis and mathematical modeling, are emphasized. Ethical issues related to professional practice and product development are also presented.

PLTW: Principles of Engineering

1 credit / 10-12

Principles of Engineering (POE) is a foundation course of the high school engineering program. This survey course exposes students to some of the major concepts that they will encounter in a post-secondary engineering course of study. Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of materials and structures, automation (robotics), and kinematics (New course).

Prerequisite/Co-requisite: *Physics or Approval by the Instructor*

Students entering IED or POE for the 1st time will be required to submit a 1 page letter to the science curriculum leader expressing their desire and interest in taking Engineering.

Please note that a Physics prerequisite for the electives may be fulfilled by taking Introduction to Quantitative Science, Conceptual Physics, Regents Physics, or AP Physics 1.

PLTW: Computer Integrated Manufacturing

1 credit / 12

Computer Integrated Manufacturing (CIM) is an advanced course of the high school engineering program. Students learn about manufacturing processes, product design, robotics, and automation. Students develop their knowledge and skills of Computer Aided Design and Manufacturing to produce products using a Computer Numerical Controlled (CNC) mill. Students apply the knowledge and skills gained in this course as they collaborate to design, build, and program factory system models. Students can earn a virtual manufacturing badge recognized by the National Manufacturing Badge system.

Prerequisite/Co-requisite: *Physics and at least one of the other PLTW Engineering classes (IED or POE) or Approval by the Instructor.*

Please note that a Physics prerequisite for the electives may be fulfilled by taking Introduction to Quantitative Science, Conceptual Physics, Regents Physics, or AP Physics 1.