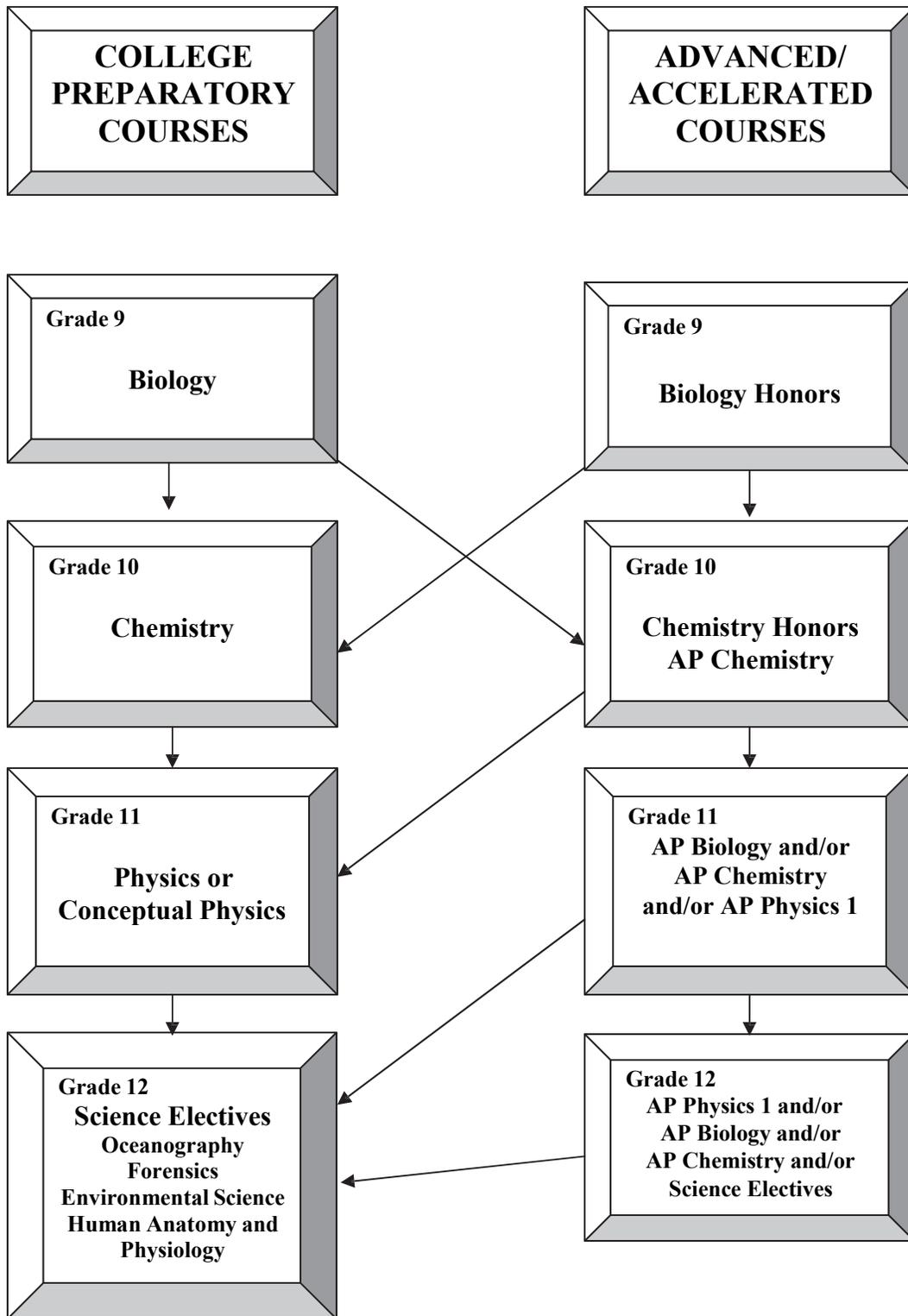


## SCIENCE COURSE SEQUENCE



## SCIENCE COURSE DESCRIPTIONS

All core science courses, including Advanced Placement courses, given on a full-year basis will carry 6.0 graduation credits and meet 6 periods a week, including one day per week of double-lab period. Science elective courses given on a semester basis will carry 2.5 credits, except Human Anatomy and Physiology, which will carry 5.0 credits.

### **BIOLOGY HONORS (0442)**

**6.0**

This is a more rigorous approach to the study of living things than Biology (described below). Emphasis will be on biochemistry, molecular biology, genetics, ecology, and the unifying concepts applicable to all life forms. In addition, the study of the diversity and function of organisms will be undertaken. Laboratory work will involve living and preserved materials as well as chemical materials and scientific instruments. Comprehensive lab reports will be required.

**Prerequisite:** 92 or higher in 7<sup>th</sup> and 8<sup>th</sup> grade science; Geometry completed or taken concurrently and recommendation of 8<sup>th</sup> grade science teacher.

### **BIOLOGY (0460)**

**6.0**

This is a full-year course about living things, their diversity, and how they function. It is for the student who wants a general knowledge of the living world. It includes discussion of many of the important concepts of modern biology, including biochemistry, cell structure and function, genetics, molecular biology, and ecology. Hands-on laboratory work is an important part of this course offering.

### **CHEMISTRY HONORS (0445)**

**6.0**

This is a full-year course in chemistry for the science-oriented college-bound student. It includes a study of the composition of matter, its properties, and how matter undergoes change and interacts with other kinds of matter. The unifying principles of the subject are developed in a logical way with extensive laboratory work, during which the student will handle various chemical materials and scientific instruments, providing a basis for this development. This offering involves a rigorous mathematical approach. Therefore, successful completion of Algebra 1 and Geometry is required.

This course also stresses higher-order thinking skills and excellent reading comprehension. Comprehensive lab reports will be required for laboratory activities.

**Prerequisite:** B+ or better in Biology Honors; Algebra 2 completed or taken concurrently; teacher recommendation.

**CHEMISTRY (0462)****6.0**

This is a comprehensive full-year course in chemistry. It includes a study of matter - its composition, properties, and interactions as described by modern chemical theories, and a discussion of how these principles apply to contemporary issues. While primarily intended for the non-science college-bound student, the treatment is sufficiently theoretical and mathematical to meet the needs of students who later choose to enter a science career. Laboratory work, in which the student handles chemical materials and scientific instruments, supplemented by teacher lecture-demonstrations, constitutes an important part of this course.

**Prerequisite:** Algebra 2 completed or taken concurrently.

**ENVIRONMENTAL SCIENCE (H0423)****2.5**

Environmental Science is a one-semester elective course that studies the interaction between living things and the environment, especially the impact that humans have on these components. Students will study the concepts and methods used to determine the complicated interactions present in nature, and identify several important environmental problems and how they impact humans and other organisms. The course focuses on several topics, including an examination of different ecosystems, water quality and air pollution, finite mineral and energy resources, conservation, and how humans directly affect the environment.

**Prerequisite:** Successful completion of biology and chemistry is required.

**HUMAN ANATOMY AND PHYSIOLOGY (0401)****5.0**

Human Anatomy and Physiology is a full year course available to grades eleven and twelve, and is recommended for students that may be considering a career in a health-related field. The course will be a rigorous study of human body systems with emphasis on anatomical identification, physiological functions and diseases. Each system will be studied in detail and laboratory experiences will be designed to enhance understanding of the system. Labs will involve the detailed microscope study of cells and tissues, including pathology. Physiological function will be related to anatomical structures throughout the course. Some dissection of animal systems will be included to enhance students' knowledge. Technology in the form of software, Internet resources and mobile laptops will be an integral part of the course. Career opportunities will be explored through field trips, speakers, and visits to local university lectures.

**Prerequisite:** Students must have successfully completed Biology and Chemistry and have a serious interest in the subject. Recommendation from a prior science teacher is required.

**FORENSICS (0444)****2.5**

Forensic science is the application of science to issues of law. The course will be primarily laboratory based, with students expected to use knowledge from biology, mathematics, and the physical sciences to analyze evidence from crime scenes. The course should offer students the opportunity to utilize critical thinking skills developed in their previous science and mathematics courses, and apply those skills to interesting real-world situations. Students will use a variety of materials that show them how the analysis of various materials (hair, paint, drugs, etc.), insect analysis, blood analysis, DNA evidence, and toxicology studies all help to solve crimes. Students will be expected to work together to analyze, solve, and communicate their findings to the rest of the class. This will be a semester elective course, meeting for 5 periods a week for one semester, 2.5 credits.

**Prerequisite:** Successful completion of biology and chemistry is required.

**OCEANOGRAPHY (0419)****2.5**

Oceanography is a semester course that studies the phenomena of the oceans. It is intended to be an introduction to the physical, geological, chemical, and biological aspects of the greater portion of our earth's surface. Course requirements include a field trip to a local shore area, as well as some laboratory work.

**Prerequisite:** Two years of science.

**CONCEPTUAL PHYSICS (0467)****6.0**

This is a comprehensive full year course that covers the central concepts of physics. Using basic computational skills, students are introduced to important fundamental topics such as kinematics, the laws of motion, work and energy, momentum, universal gravitation, thermodynamics, light and sound waves, and electricity and magnetism. By treating physics conceptually, these topics are presented in everyday language, with equations used to guide thinking. Experimentation and student observation are used to introduce and demonstrate concepts; whenever possible the connections between physics concepts and everyday life will be emphasized. Using information from their textbook, hands-on laboratory activities, demonstration, and experiences in their own lives, students will gain a better understanding of the world around them.

**Prerequisite:** One year of science; Algebra 1 completed or taken concurrently.

**PHYSICS (0465)****6.0**

This is a full-year course designed to offer students an introduction to the basis upon which scientists make mathematical descriptions of systems as they appear in nature. Laboratory work and problem-solving techniques are stressed. Students should have had thorough preparation in mathematics prior to entry into this course. The methods and theorems of algebra and geometry are used in problem solving. An understanding of simple trigonometric principles is helpful although not required.

**Prerequisite:** Chemistry completed or taken concurrently; Pre-Calculus completed or taken concurrently is required.

**ADVANCED PLACEMENT PHYSICS 1 (0463)****6.0**

This full-year course is an algebra-based, introductory college-level physics course that explores topics such as Newtonian mechanics; work, energy, and power; mechanical waves and sound; and introductory simple circuits. Through inquiry-based learning, students will develop critical thinking and reasoning skills. The course will meet for 6 periods per week, with one double-lab period. All students enrolling in AP Physics must satisfactorily complete a summer assignment prior to the beginning of the school year.

**Prerequisite:** All AP Physics 1 candidates must have completed high school courses in biology, chemistry, and geometry. In addition, they must have completed Algebra 2, or be taking it concurrently.

**The Advanced Placement Examination is paid for by the Springfield Board of Education, and all students are required to take the examination in this course. In order to earn advanced placement weighting for this class, students must take the Advanced Placement Physics 1 examination offered by the College Board in May.**

## **ADVANCED PLACEMENT CHEMISTRY (0461)**

**6.0**

This full-year, laboratory course provides students with a foundation to support future advanced course work in chemistry. Through inquiry-based learning, students develop critical thinking and reasoning skills. Students acquire an understanding of chemistry and science practices as they explore topics such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium. The course will meet 6 periods per week, with one double-lab period.

The program is designed to prepare students to take the AP Chemistry Examination. All students enrolling in AP Chemistry must satisfactorily complete a summer assignment prior to the beginning of the school year.

**Prerequisite:** All AP Chemistry candidates must have successfully completed a general high school chemistry course and Algebra 2.

**The Advanced Placement Examination is paid for by the Springfield Board of Education, and all students are required to take the examination in this course. In order to earn advanced placement weighting for this class, students must take the Advanced Placement Chemistry examination offered by the College Board in May.**

## **ADVANCED PLACEMENT BIOLOGY (0459)**

**6.0**

The Advanced Placement Biology course is an introductory college-level biology course. Students develop an understanding of biology through inquiry-based investigations as they explore the following topics: evolution, cellular processes—energy and communication, genetics, information transfer, ecology, and interactions. After showing themselves to be qualified on the Advanced Placement Examination, some students, as college freshmen, are permitted to undertake upper-level courses in biology or register for courses for which biology is a prerequisite. Other students may have fulfilled a basic requirement of a laboratory-science course and will be able to undertake other courses to pursue their major.

The AP Biology course differs significantly from the usual first high school course in biology with respect to the kind of textbook used, the range and depth of topics covered, the kind of laboratory work done by students, and the time and effort required of students. All students enrolling in AP Biology must satisfactorily complete a summer assignment prior to the beginning of the school year.

**Students taking AP Biology are eligible to gain college credit at Seton Hall University through the college's "Project Acceleration." If the student does not attend Seton Hall University, the credits earned through this program may be transferred to other colleges. There is an associated cost to enroll students in the program.**

**Prerequisite:** All AP Biology candidates must have completed high school courses in biology and chemistry.

**The Advanced Placement Examination is paid for by the Springfield Board of Education, and all students are required to take the examination in this course. In order to earn advanced placement weighting for this class, students must take the Advanced Placement Biology examination offered by the College Board in May.**