

Science Curriculum

Coursework within the Science Department is designed to meet the following goals:

1. To help students acquire a robust understanding of the content within the particular discipline being studied.
2. To help students acquire the process skills of practicing scientists, including observation, data collection and analysis, formation of data based conclusions, and the mathematical manipulation of data.
3. To help students acquire an understanding of how science works – including an awareness of the limits of science.
4. To help students acquire an understanding of current issues, especially environmental issues within the particular discipline being studied.

All science students should have a simple scientific calculator.

302/303 Biology **9th Grade**

1 credit

Through lecture, individual and small group activities, and laboratory activities, students will acquire an understanding of the major concepts of biology, including the nature and practice of science, the cell theory and basic cell functions, photosynthesis, respiration and other cycles, and genetics and biotechnology. This course places particular focus on cell biology. In addition, two major themes, environmental stewardship and evolutionary theory will permeate the aforementioned content.

Fundamental academic skills will be explicitly taught and will include note taking, strategies for effective test preparation, memorization strategies, and methods for extracting information from science texts, other books, and articles. Students will be required to type a two-page paper on a topic designated by the instructor.

Students will be given multiple opportunities to practice the skills used by scientists. These skills include making observations, organizing data, and drawing databased conclusions.

328/329 AP Biology **11th-12th**

1 credit

*Prerequisites: successful completion of **Biology and Chemistry or Honors Chemistry.***

Through varied approaches and activities, students will be prepared to take the Advanced Placement Biology exam in spring. **AP Biology** is a college level course. Therefore, students are expected to have mature academic skills. Lecture content and laboratory work will be challenging.

322/323 Chemistry **10th – 11th Grades**

1 credit

*Prerequisite: **Biology***

Through lecture, individual, small group, and laboratory activities, students will acquire an understanding of the key concepts of chemistry, including principles of measurement, the atomic theory, basic quantum theory, chemical equations, mole calculations, gas laws, the kinetic theory, stoichiometry, solutions chemistry (including units of concentration), thermochemistry, nuclear chemistry, and basic organic chemistry.

Note-taking skills, tools for effective test preparation, strategies for solving word problems using algebra, and methods of extracting information from science resources will be emphasized.

Students will be given multiple opportunities to practice the skills used by scientists. These skills include observation, organization of data, graph construction and interpretation, mathematical manipulation of data, mathematical evaluation of data, and the drawing of data-based conclusions.

324/325 Honors Chemistry
10th Grade **1 credit**

*Prerequisite: **Biology***

This challenging level of chemistry is structured to cover key concepts faster, in greater depth and with greater mathematical rigor. It includes the use of physical, graphical, and mathematical models. As a result, strong algebra skills are required.

326/327 AP Chemistry
11th-12th Grade **1 credit**

*Prerequisite: Successful completion of **Chemistry** or **Honors Chemistry***

Through a variety of approaches, students will be prepared to take the Advanced Placement Chemistry test given each spring.

AP Chemistry is comparative to an introductory college chemistry course. Students enrolled in this course will be expected to have mastered a wide range of academic skills including algebra. This course meets for one and a half periods.

346/347 Physics
11th-12th Grade **1 credit**

*Prerequisites: **Chemistry** or **Honors Chemistry** plus a grade of "C" or better in **Algebra I**.*

Through lecture, individual, small group, and laboratory activities, students will learn the key concepts of physics; for example, kinematics, Newton's laws, energy, momentum, gravitation, waves, and electricity.

Students will acquire their understanding of concepts through lab investigations, small group activities and projects, classroom problem-solving, and instructor presentations and demonstrations. Oral presentations and oral lab reports will be done and some formal lab reports will also be required.

344/345 AP Physics B
11th-12th Grade **1 credit**

*Prerequisites: **Chemistry** or **Honors Chemistry** plus above average capabilities in **Algebra I**.*

Through a variety of approaches, students will be prepared to take the **Advanced Placement Physics** exam in spring.

AP Physics is comparable to a college physics class in its use of algebra and trigonometry. Students must be fluent in the use of algebra. Students enrolled are expected to have a wide range of academic skills. Both the lecture content and lab work will be sophisticated. *The AP College Board recommends a year of **Physics** before enrolling in this course.* However, 80% of the students in the United States take **AP Physics B** as a first-year physics course.

AP Physics B meets for one and a half periods.

350/351 Earth Science
10th-12th Grade **1 credit**

*Prerequisite: **Biology and Chemistry** or **Honors Chemistry**.*

Through lecture, individual, small group, and laboratory activities, students will gain an understanding of the major concepts of earth science, including the rock cycle, plate tectonics, characteristics and classification of rocks, minerals, and soils, crystal formation and growth, gems/ores, physical/mechanical weathering, mass wasting, the water cycle and river characteristics, glacial and wind erosion and deposition, topography, volcanism, historical geology, meteorology, oceanography, astronomy (including comparative planetology and cosmology), and environmental stewardship. Students will be required to develop sets of dichotomous keys to use to identify rocks and minerals. These keys will be tested, refined, and used for at least two performance-based tests.

352/353 Environmental Science

11th-12th Grades

1 credit

Prerequisite: Chemistry or Honors Chemistry

Environmental Science is interdisciplinary: it embraces a wide variety of topics from different areas of student. Several major themes cut across these many topics. These themes provide a foundation for the structure of this course: science as process, energy conservation in ecological processes, Earth as one interconnected system, human influence on natural systems, cultural and social context of environmental issues, and sustainable systems. Students will study these topics through lecture, individual and group activities, and laboratory activities. At least one formal report will be required for successful completion of the course. Participation in class discussions and activities is vital.