

# Science Department



The study of Science at Hillsboro-Deering High School offers a variety of courses directed toward students of varying interest and abilities. In addition to skills and knowledge goals, students are presented with opportunities to develop attitudes for productive citizenship through the study of issues and careers in science. Critical thinking will be developed through challenging lab and group work.

## Requirement for Graduation:

**3 credits**

*Physical Science, Biology* and one additional **Lab Science** are required for graduation. Students will be asked to show their understanding through written labs and tests as well as preparing and presenting demonstrations in all courses. Generally, freshmen will take *Physical Science*, sophomores will take *Biology*, and juniors encouraged to take *Chemistry*.

### 400 - Physical Science

**Full Year**

**1 credit**

*Required: 9<sup>th</sup> grade*

Physical Science is a required class for all freshmen and is designed to introduce students to the integration of content and laboratory science at the secondary level. This course will introduce students to the physical sciences of chemistry, space science, physics and earth science with specific focus on critical-thinking and problem-solving skills using the scientific method. Laboratory investigations will be an integral part of the student's learning process. Additionally students will focus their studies on process skills and application. Topics include matter, chemical reactions, atoms, bonding, the life cycle of star and origin of the universe, motion, forces and energy, waves, electromagnetic spectrum, plate tectonics, and formation of the earth.

### 402 - Biology

**Full Year**

**1 credit**

*Recommended: 10<sup>th</sup> Grade; Prerequisite: Physical Science*

Biology will explore and investigate the process of life. Students will observe the interaction between living organisms and how they relate to non-living factors in nature. Critical thinking will be developed through challenging labs and group work. Students will be asked to show their understanding through written labs and tests as well as preparing and presenting demonstrations. Proper lab procedures and the use of microscopes as a learning tool are important parts of this course. This course will cover how organisms are organized, both internally and externally, how they maintain homeostasis and metabolism and how they respond to stimuli, how organisms grown and develop, how they reproduce and change over time.

### 403 - Honors Biology

**Full Year**

**1 credit**

*Recommended: 10<sup>th</sup> grade*

*Prerequisite: Teacher recommendation for advanced coursework*

Honors Biology is intended for students who wish to increase and challenge their skills and abilities with a quicker pace and a more in depth study of Biology. Topics in this course will be examined in greater detail than in a regular Biology class, expecting students to understand and apply concepts at an advanced level. This course is designed to prepare students for further post-secondary studies of Biology. In this class students will explore and investigate the process of life. Students will observe the interaction between living organisms and how they relate to non living factors in nature. Critical thinking will be developed through challenging labs and group work. Students will be asked to show their understanding through written labs and tests as well as preparing and presenting demonstrations. Proper lab procedures and the use of microscopes as a learning tool are important parts of this course. Students will begin the course by learning proper lab techniques and how to investigate science problems. The course will then cover how organisms are organized, both internal and externally, and how they respond to stimuli, how organisms maintain homeostasis and metabolism. Students will explore how external factors affect photosynthesis and cellular respiration and how organisms grow and develop over the span of their lifetime.

**409 - Chemistry** **Full Year** **1 credit**

**Recommended:** 11<sup>th</sup> or 12<sup>th</sup> grade; **Prerequisite:** *Physical Science and Algebra I*

Chemistry is a college preparatory course intended to help students prepare academically for college. Along with the fundamental concepts of general chemistry, an emphasis will be placed on laboratory techniques, critical-thinking skills, and problem-solving. The laboratory component of the course is designed to engage the student in learning chemistry concepts by doing chemistry. Topics include atomic theory, atoms, nuclear chemistry, chemical and physical properties of matter, periodic table, chemical reactions, organic chemistry.

**404-AP Chemistry** **Full Year** **1 credit**

**Recommended:** 11<sup>th</sup> or 12<sup>th</sup> grade; **Prerequisite:** *Physical Science, Geometry and teacher recommendation*

AP Chemistry will cover content equivalent to what is presented in two semesters of college general chemistry. Upon successful completion of this course and achievement of a satisfactory score on the AP Chemistry Examination, students may have the opportunity to receive general chemistry credits or place out of general chemistry classes and move into more advanced science courses during their first years in college. Students will review concepts presented during their first course of high school chemistry including problem solving skills, data collection, significant figures, stoichiometry, and the basics of the periodic table, general properties of matter, chemical reactions, solutions, properties of gases and thermochemistry before focusing in on a more in-depth examination of the periodic table and chemical bonding. Students will explore solids and liquids, properties of solutions, reactions of acids and bases, chemical kinetics, equilibria, spontaneity, free energy, entropy, and electrochemistry during the second half of this course. An emphasis will be placed upon problem-solving skills, descriptive chemistry, development and use of models to explain chemical principles, and the prediction of products in chemical reactions.

**Science Electives**

**408 – Physics** **Full Year** **1 credit**

**Recommended:** 11<sup>th</sup> and 12<sup>th</sup> grade; **Prerequisite:** *Physical Science and Algebra II (or concurrent enrollment)*

Physics is the study of matter and its motion in the physical world. Emphasis is largely placed on applying laboratory techniques, critical-thinking skills and problem-solving skills in Physics. Topics include but are not limited to Motion Mechanics; Newton's Laws of Motion; Vector notation; Projectile Motion, Gravitation; Work and Energy; Electricity; Magnetism; Wave and Energy transfer; Sound and Light; Quantum Theory.

**405 - Anatomy and Physiology** **Full Year** **1 credit**

**Prerequisite:** 11<sup>th</sup> or 12<sup>th</sup> grade, *Biology and teacher recommendation for advanced coursework*

Anatomy and Physiology is an advanced course for students with a strong interest in life sciences. This class provides students with an overview of the structures (anatomy) and functions (physiology) of the amazing human! This course is an advanced elective that requires dissection labs. Students will be required to know many parts of the body and demonstrate their understanding of how these structures function in maintaining homeostasis. Topics will include tissues, skin, skeletal, muscular, cardiovascular systems, digestive, respiratory, reproductive, lymphatic & immune, endocrine, nervous and urinary systems.

**406 - Environmental Science: Land, Air and Water** **Half Year** **½ credit**

**Recommended:** 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade; **Prerequisite:** *Physical Science*

Environmental Science: Land, Air and Water is an elective course for students who are interested in environmental studies, in particular those that revolve around the Earth. Students will study the interrelationships of organisms and their environment. Topics will include the study of geochemical cycles including the water, carbon, nitrogen, and phosphorous cycles, ecosystems and the biomes of the world, and atmosphere, climate and weather. Students will be involved in field investigation, laboratory exploration, and independent research projects.

**421 - Environmental Science: Energy** **Half Year** **½ credit**

**Recommended:** 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade; **Prerequisite:** *Physical Science*

Environmental Science: Energy is an elective course for students who are interested in environmental studies, in particular those that revolve around sources of energy, alternative forms of energy and the sustainability of our environment. Topics will include fossil fuels, alternative sources of energy including solar, wind, geothermal and

nuclear. Students will analyze and describe how human activity affects the flow of energy in an ecosystem. Students will be involved in field investigation, laboratory exploration, and independent research projects.

**422 - Environmental Science: Population and Global Impact**                    **Half Year**                    **½ credit**  
**Recommended: 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade; Prerequisite: Physical Science**

Environmental Science: Population and Global Impact is an elective course for students who are interested in environmental studies, in particular the impact of mankind. Students will study the change over time of populations due to natural selection, evolution and the impact of humans. Topics will include the study habitat destruction, pollution and the consumption of resources. This class will also include aspects of environmental protection, habitat management, environmental regulations and public policy. Students will be involved in field investigation, laboratory exploration, and independent research projects.

**407 - Zoology**                    **Half Year**                    **½ credit**  
**Recommended: 11<sup>th</sup> and 12<sup>th</sup> grade; Prerequisite: Biology**

Zoology is designed for students who enjoy learning about the diversity of living things. Students will explore the variety of life from sponges to whales. Students will explore the nine major phyla including porifera, cnidarian, platyhelminthes, nematoda, mollusca, annelida, athropoda, echinodermata and chordata. Students will have the opportunity to design and complete individual projects. The development of simple organisms to complex living things will be investigated through labs, observations, reading of scientific articles and research.

**423 - Botany**                    **Half Year**                    **½ credit**  
**Recommended: 11<sup>th</sup> and 12<sup>th</sup> grade; Prerequisite: Biology**

Botany is designed for students who enjoy learning about the diversity of living things. Students will explore the variety of plant life from microscopic organisms to the structure and function of plant parts. Students will explore protists, fungi, seedless plants and seed bearing plants. Students will have the opportunity to design and complete individual projects. The development of simple organisms to complex living things will be investigated through labs, observations, reading of scientific articles and research.

**411 – Science in Society Seminar**                    **Half Year**                    **½ credit**  
**Recommended: 11<sup>th</sup> and 12<sup>th</sup> grade; Prerequisite: Biology**

Science in Society Seminar is a course designed to examine science topics in the news. Students will be expected to make connections between science and the world in which they live. This class will be based on hot button issues in today's society, such as genetic engineering, global warming, stem cell research, nuclear power plants and more. This will be a discussion based class which includes research papers and presentations.

**412 - Genetics**                    **Half Year**                    **½ credit**  
**Recommended: 11<sup>th</sup> and 12<sup>th</sup> grade; Prerequisite: Biology, Algebra II and a teacher recommendation**

Genetics is intended to connect biology to real life while providing a more in-depth and comprehensive study of genetics and genetic diseases. The class will have a major research component, utilizing case studies to better understand the probabilities and “luck of the draw” behind reproduction. It is designed for students who are interested in learning about themselves, their family and an introduction to some of the concerns to be addressed before procreation. Topics will include a brief review of Mendelian genetics, exceptions to Mendel's laws, genetic mutations and an in depth coverage of genetic diseases.

**410- Forensics**                    **Half Year**                    **½ credit**

Forensic science is one of the fastest growing fields in the country. It is a vital part of the criminal justice system. The course will encourage students to think critically to solve problems. It will incorporate math, biology, chemistry, earth science, physics, and technology and writing skills. Topics covered in this course will include evidence collection, blood spatter, DNA fingerprinting, impression evidence, hand writing analysis, fingerprint analysis, etc. It will include hands-on activities, labs, interactive activities, and case studies.