

# Science - Electives

## Science - Electives Courses

### Advanced Biology 1

Advanced Biology 1 is designed to give students a foundation in biological concepts as well as the opportunity to apply principles of experimental design in laboratory settings and on a required student project. Advanced Biology includes the same major areas of study as Biology 1 but with enrichments and extensions to each curriculum objective and associated specialty program.

This course has an associated Standards of Learning (SOL) test. Students will participate in this test to satisfy federal testing requirements.

**Credits** 1

**Grades**

9, 10, 11, 12

**Course Designation**

Weighted (0.5W)

**Schools**

Battlefield High School

Colgan High School

Forest Park High School

Freedom High School

Gainesville High School

Hylton High School

Osborn Park High School

Patriot High School

Woodbridge High School

**Prerequisites**

None

**Notes**

This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in division-approved activities that provide comparable learning experiences.

### Advanced Chemistry 1

Advanced Chemistry 1 is designed to give students a foundation in chemical concepts as well as the opportunity to apply principles of experimental design in laboratory settings and on a required student project. Advanced Chemistry includes the same major areas of study as Chemistry 1 I but with enrichment and extensions to each curriculum objective.

This course has an associated Standards of Learning (SOL) test. Students will participate in this test only if they have not yet earned a verified science credit for graduation.

**Credits** 1

**Grades**

10, 11, 12

**Course Designation**

Weighted (0.5W)

**Schools**

Battlefield High School

Colgan High School

Forest Park High School

Freedom High School

Gainesville High School

Hylton High School

Osborn Park High School

Patriot High School  
Potomac High School  
Woodbridge High School

**Prerequisites**

[Algebra 1](#)

One laboratory science

## Advanced Earth Science 1

Advanced Earth Science 1 is a lab-based course designed to give students a foundation in earth science concepts and as well as the opportunity to apply principles of experimental design in laboratory settings and on a required student project. Advanced Earth Science includes the same major areas of study as Earth Science 1 but with enrichment and extensions to each curriculum objective. This course has an associated Standards of Learning (SOL) test. Students will participate in this test only when they have not yet earned credit for graduation.

**Credits 1**

**Grades**

9, 10, 11, 12

**Course Designation**

Weighted (0.5W)

**Schools**

Battlefield High School  
Brentsville District High School  
Colgan High School  
Freedom High School  
Hylton High School  
Patriot High School  
Potomac High School  
Woodbridge High School

**Prerequisites**

None

## Biology 2: Anatomy and Physiology

Biology 2: Anatomy and Physiology is an academically rigorous second-level laboratory biology course. While suitable for any high school student, it is designed specifically for those who are interested in pursuing careers in biological studies and medical fields. Participants will investigate and understand cell histology and cellular processes, the purpose and the organization of various body systems, the biochemical processes essential for life, and common human health issues.

**Credits 1**

**Grades**

11, 12

**Schools**

Battlefield High School  
Colgan High School  
Forest Park High School  
Freedom High School  
Osborn Park High School  
Patriot High School  
Woodbridge High School

**Prerequisites**

[Biology 1](#) or [Advanced Biology 1](#)

**Notes**

Course work in [Chemistry 1](#) is recommended.

This course utilizes animal dissection techniques as a major instructional strategy. Students who conscientiously object to these exercises will participate in division-approved activities that provide comparable learning experiences.

## Biology 2: Ecology

Ecology is an academically rigorous, in-depth, second-year study of biological and ecological principles governing higher levels of organization (populations, communities, ecosystems). Concepts that will be covered include adaptation and natural selection; the physical environment and climate; population ecology, growth models, and life history patterns; communities, competition, parasitism, mutualism, and human interactions; ecosystem productivity, energy flow, nutrient cycling, and biogeochemical cycles; and biogeography, biodiversity, and global environmental change. The science of ecology is dedicated to an understanding of the relationships between organisms and their environment and is often at the center of public policy disputes related to the environment; therefore, students will learn how ecological research is becoming increasingly important and prominent throughout the world. Student participation in outdoor field activities is expected.

**Credits** 1

**Grades**

11, 12

**Schools**

Forest Park High School

Freedom High School

Gainesville High School

Gar-Field High School

Potomac High School

Unity Reed High School

**Prerequisites**

[Biology 1](#)

[Earth Science 1](#) or [Chemistry 1](#) (advanced level courses are acceptable alternatives.)

## Biology 2: Genetics

This course builds on the foundational principles of genetics and introduces students to important modern topics including genome sequencing, predictive medicine, epigenetics, bioinformatics, etc. Students will develop understanding of analytical approaches now being used across the spectrum of the biological disciplines (e.g., markers, genetic dissection, genetic engineering, etc.). In addition, the course will address perilous misconceptions that have been documented by researchers as common among the current U.S. population.

**Credits** 1

**Grades**

11, 12

**Schools**

Osborn Park High School

**Prerequisites**

[Biology 1](#) or [Advanced Biology 1](#)

## Biology 2: Survey of Advanced Topics in Biology

Biology 2: Survey of Advanced Topics in Biology is an academically rigorous, in-depth, second-year study of selected areas of biology that allows highly motivated students to delve more deeply into life systems and processes. Extensive laboratory work is part of this course. Emphasis is placed on research skills and techniques.

**Credits** 1

**Grades**

11, 12

**Schools**

Forest Park High School

Freedom High School

Gar-Field High School

Hylton High School

Patriot High School

Woodbridge High School

**Prerequisites**

[Biology 1](#) or [Advanced Biology 1](#)

**Notes**

Course work in [Chemistry 1](#) is recommended.

This course utilizes animal dissection techniques as a major instructional strategy. Students who conscientiously object to these exercises will participate in division-approved activities that provide comparable learning experiences.

## Chemistry 2: Forensic Sciences and Chemical Analysis

Chemistry 2: Forensic Sciences and Chemical Analysis course includes central concepts concerning the history of forensic sciences, the chemical analysis of forensic evidence, and crime scene management. Students will apply the Locard's Principle in the observation, acquisition, and analysis of forensic evidence. Major focus is placed upon the understanding of science as an active process including the application of instrumental methods of analysis such as ultraviolet, visible, infrared and fluorescence spectrophotometry, gas chromatography, and thin layer chromatography to the classification of physical evidence. In addition, techniques of analytical chemistry are utilized to investigate the chemical composition of blood, latent fingerprints, hair and fiber evidence, toxicology, soil samples, questioned documents, and other types of trace evidence.

**Credits 1****Grades**

10, 11, 12

**Schools**

Battlefield High School

Brentsville District High School

Freedom High School

Gainesville High School

Gar-Field High School

Hylton High School

Patriot High School

Unity Reed High School

Woodbridge High School

**Prerequisites**

[Biology 1](#)

[Chemistry 1](#)

## Earth Science 2: Astronomy

Astronomy is a second level Earth Science course designed to be a more in-depth, mathematical treatment of the astronomical concepts presented in the introductory Earth Science 1 course. Topics such as the universe, universal laws, galaxies, stellar evolution, the solar system and its motion, and the exploration of space will be discussed.

**Credits 1****Grades**

11, 12

**Course Designation**

Virtual Prince William (VPW)

**Schools**

Battlefield High School

Brentsville District High School

Colgan High School

Forest Park High School

Freedom High School

Gainesville High School

Gar-Field High School

Hylton High School

Osborn Park High School

Patriot High School

Potomac High School

Unity Reed High School

Woodbridge High School

**Prerequisites**

[Environmental Science](#) or [Earth Science 1](#) and [Biology 1](#)

**Notes**

Course work in [Chemistry 1](#) is recommended.

## Earth Science 2: Oceanography

Oceanography is a second level Earth Science course designed to be a more in-depth treatment of the oceanography concepts presented in the introductory Earth Science 1 course. It is a broad survey course dealing mainly with physical oceanography and covering such topics as the geology and geography of ocean basins; physical properties of sea water; marine chemistry; salinity and density; circulation of the oceans, waves and tides; and oceanographic instruments, tools, and methods. Emphasis is also placed on ocean policy and ocean ecology.

**Credits 1****Grades**

11, 12

**Schools**

Battlefield High School

Brentsville District High School

Colgan High School

Forest Park High School

Freedom High School

Gar-Field High School

Hylton High School

Osbourn Park High School

Patriot High School

Potomac High School

Unity Reed High School

Woodbridge High School

**Prerequisites**

[Environmental Science](#) or [Earth Science 1](#) and [Biology 1](#)

**Notes**

Course work in [Chemistry 1](#) is recommended.

## Earth Science 2: Physical Geology

Physical Geology is a second level earth science course designed to be a more in-depth treatment of the geology concepts presented in the introductory Earth Science course. Topics of study include but are not limited to plate tectonics theory; interrelationships between humans and the geological environment that affect ground water resources; runoff and erosion; waste disposal; energy resources and food production; time/space relationships in the earth record; and geomorphology.

**Credits 1****Grades**

11, 12

**Schools**

Osbourn Park High School

**Prerequisites**

[Environmental Science](#) or [Earth Science 1](#) and [Biology 1](#)

**Notes**

Course work in [Chemistry 1](#) is recommended.