



## ADVANCED PLACEMENT ENVIRONMENTAL SCIENCE

*Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.*

### COURSE DESCRIPTION

Advanced Placement Environmental Science is a college-level course that deals with advanced concepts in environmental science in detail. The course is designed in accord with the requirements of the College Board. Students are expected to take the Advanced Placement Environmental Science Examination at the end of the course.

### COURSE GOALS

- Provide students with scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world
- Identify and analyze environmental problems both natural and human-made
- Evaluate the relative risks associated with natural and man-made problems
- Examine a variety of solutions for resolving and/or preventing natural and man-made problems

### PREREQUISITES

Biology and Chemistry

### OPTIONS FOR NEXT COURSE

Advanced Placement Biology (Biology and Chemistry prerequisite)  
Advanced Placement Chemistry (Chemistry prerequisite)  
Advanced Placement Physics (Algebra II/Trigonometry prerequisite)  
Earth Science  
Oceanography (Earth Science prerequisite)  
Astronomy (Earth Science prerequisite)  
Physics (Algebra II prerequisite or co-requisite)

### REQUIRED STUDENT TEXTBOOK AND LABORATORY MANUAL

*Living in the Environment*, G. Tyler Miller (Thomson Brooks/Cole Learning, 2009)  
*Living in the Environment – Laboratory Manual*, G. Tyler Miller (Thomson Brooks/Cole Learning, 2007)

### MINIMUM REQUIREMENTS

- Read and outline assigned chapters in the textbook on a daily basis
- Complete all homework assignments/projects in a timely manner
- Participate in the laboratory activities, prepare written laboratory reports, and adhere to all safety procedures
- Read science journals, magazines, and books to expand the ideas and topics presented in class
- Demonstrate knowledge and understanding of all core objectives through laboratory investigations, projects, oral and/or written tests, quizzes, and reports

## The Knowledge, Skills, and Attitudes That Comprise the Advanced Placement Environmental Science Course are Summarized as Follows:

### I. Scientific Analysis

- A. Observing the natural world and developing hypotheses
- B. Collecting data through observation and controlled experiments
- C. Modeling
- D. Critical interpretation of data

### II. Interdependence of Earth's Systems: Fundamental Principles and Concepts

- A. The flow of energy: forms and quality of energy, energy units and measurement, source and sinks, conversions
- B. The Cycling of Matter: water, carbon, major nutrients (nitrogen and phosphorous), differences between cycling of major and trace elements
- C. The Solid Earth: Earth history and geologic time scale, Earth dynamics: plate tectonics, volcanism, the rock cycle, soil formation
- D. The Atmosphere: atmospheric history (origin, evolution, composition, and structure), atmospheric dynamics (weather, climate)
- E. The Biosphere: organisms (adapters to their environments), populations and communities (exponential growth, carrying capacity), ecosystems and change (biomass, energy transfer, succession), evolution of life (natural selection, extinction)

### III. Human Population Dynamics

- A. History and Global Distribution: numbers, demographics (such as birth and death rates), patterns of resource utilization
- B. Carrying Capacity - Local, Regional, Global
- C. Cultural and Economic Influences

### IV. Renewable and Nonrenewable Resources: Distribution, Ownership, Use, Degradation

- A. Water: fresh (agricultural, industrial, domestic), oceans (fisheries, industrial)
- B. Minerals
- C. Soils: soil types, erosion and conservation
- D. Biological: natural areas, genetic diversity, food and other agricultural products

- E. Energy: conventional sources, alternative sources
- F. Land: residential and commercial, agricultural, and forestry, recreational, and wilderness

### V. Environmental Quality

- A. Air/Water/Soil: major pollutants, effects of pollutants on a variety of systems (aquatic systems, vegetation, natural and man-made features, and wildlife), pollution reduction, remediation, and control
- B. Solid Waste: types, sources, amounts, current disposal methods and their limitations, alternatives
- C. Impact on Human Health: agents (chemical and biological), effects (acute, chronic, dose-response relationships), relative risks (evaluation and response)

### VI. Global Changes and Their Consequences

- A. First-order Effects: atmosphere ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{O}_3$ ), oceans (surface temperatures, currents, sea level), biota (habitat destruction, loss of biodiversity, introduced exotics)
- B. Higher-order Interactions:  $\text{CO}_2$  and photosynthesis, ocean currents and climate/biological communities, ultraviolet light and cell damage

### VII. Environment and Society: Trade-Offs and Decision Making

- A. Economic Forces: cost-benefit analysis, marginal costs, ownership, and externalized costs
- B. Cultural and Aesthetic Considerations
- C. Environmental Ethics
- D. Environmental Laws and Regulations: international, national, regional

### VIII. Choices for the Future

- A. Conservation
- B. Preservation
- C. Restoration
- D. Remediation
- E. Sustainability

## LABORATORY AND FIELD INVESTIGATIONS

The AP Environmental Science course includes a strong laboratory and field investigation component. The goal of this component is to compliment the classroom portion of the course by allowing students to learn about the environment through firsthand observation and experimentation.



# **VIRGINIA BEACH CITY PUBLIC SCHOOLS**

A H E A D O F T H E C U R V E

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**The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.**

## **DEPARTMENT OF CURRICULUM AND INSTRUCTION**

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