

SCIENCE

The science department at AVHS offers core science instruction in the four major disciplines of science: Biology, Chemistry, Earth and Space Science, and Physics. Students are required to take three years of science with one year in Earth Science (On-Level or Honors), one year in a biology course (On-Level, Honors, or AP), and one year of chemistry or physics. Apple Valley High School science staff recommend students intending to enroll in college consider taking four years of science including the core earth science, biology, chemistry, and physics courses.

In addition, the department offers electives designed to enrich or enhance the science interest of students. Electives in ecology and earth science focus on specific topics at greater depth. These classes are generally one trimester long and are open to all students of the appropriate grade level. CIS Human Physiology, Advanced Placement® Biology, Advanced Placement® Chemistry, and Advanced Placement® Physics are designed to give students who are deeply interested in science or who might be planning on a career in science the opportunity to earn college credit through examination or course completion.

Many Science Elective Courses provide excellent exposure to ideas central to various careers or career preparation, including:

CIS Physiology - Health Professions, Athletic Training

AP Biology - Biologist, Pharmacist, Medicine, Biomedical Engineering

AP Chemistry - Chemist, Engineering, Medicine, Pharmacist, Materials Science, Food Science

AP Physics - Engineering

Aquatic Ecology - Naturalist, Environmentalist, DNR Enforcement, Environmental Policy Writer, Fisheries Biologist, Fisheries Technician, Fishing Industry Sales, Professional Fisherman, Work at a Zoo.

Astronomy - Researcher, Space Exploration, Aerospace Engineering and Mechanics, Astrophysics, Astronaut

Environmental Studies - Naturalist, Environmentalist, DNR Enforcement, Environmental Policy Writer. Environmental Engineer

Field Geology - Geologist, Geophysicist, Energy Engineer, Water Resources

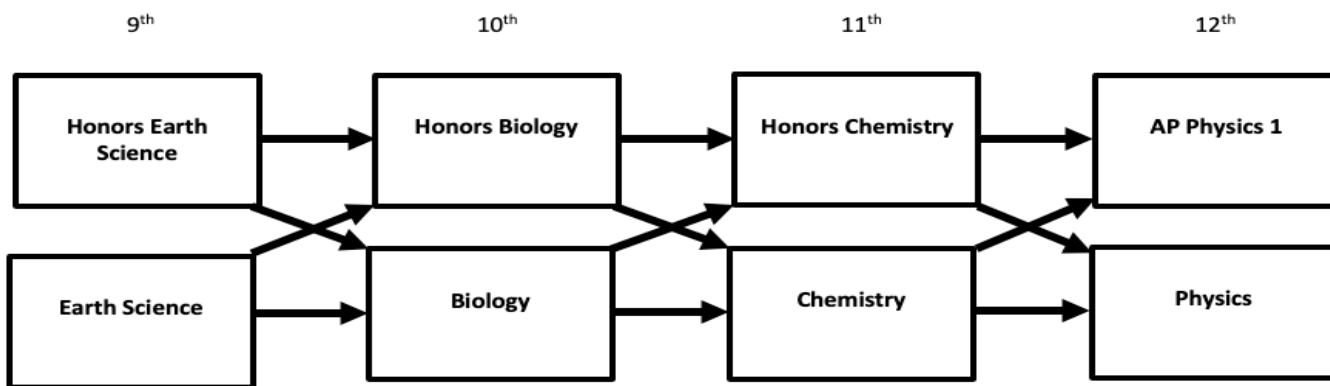
Climate and Atmospheric Science - Researcher, Weather Forecasting, Weather Broadcasting, Disaster Planning, Meteorologist

Science Olympiad - All STEM Careers, Engineering, Medicine, Health Professionals, Materials Science, Food Science, Geologist, Chemist, Pharmacist, Astronomy, Environmentalist, Computer Programming, Forensics, Aerospace

Terrestrial Ecology - Naturalist, Environmentalist, DNR, Environmental Policy Writer, Landscaping, Wildlife Biologist, US Forest Service, Conservationist for Organizations such as Ducks Unlimited or Pheasants Forever, Work at a Zoo.

Science courses are not sequential, and many can be taken at any time during a student's time at AVHS. (Students should pay attention to both science and math prerequisites for some courses) As a result, there are many paths students could take through the science curriculum at AVHS. A few of these paths are shown and described on the following pages.

Traditional Paths:



Other Science Electives (first year available):

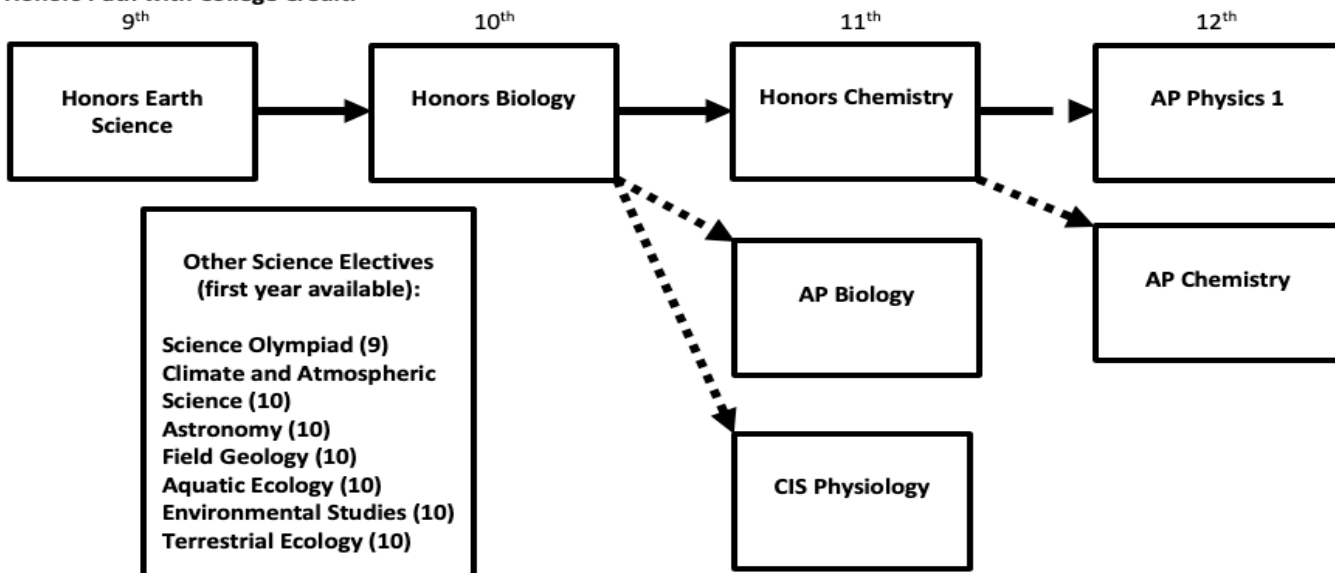
- Science Olympiad (9)
- Climate and Atmospheric Science (10)
- Astronomy (10)
- Field Geology (10)
- Aquatic Ecology (10)
- Environmental Studies (10)
- Terrestrial Ecology (10)
- CIS Physiology (11)
- AP Biology (11)
- AP Chemistry (11)
- AP Physics (11)

CHECK COURSES FOR PREREQUISITES!

Who might consider these pathways:

- Any Student

Honors Path with College Credit:



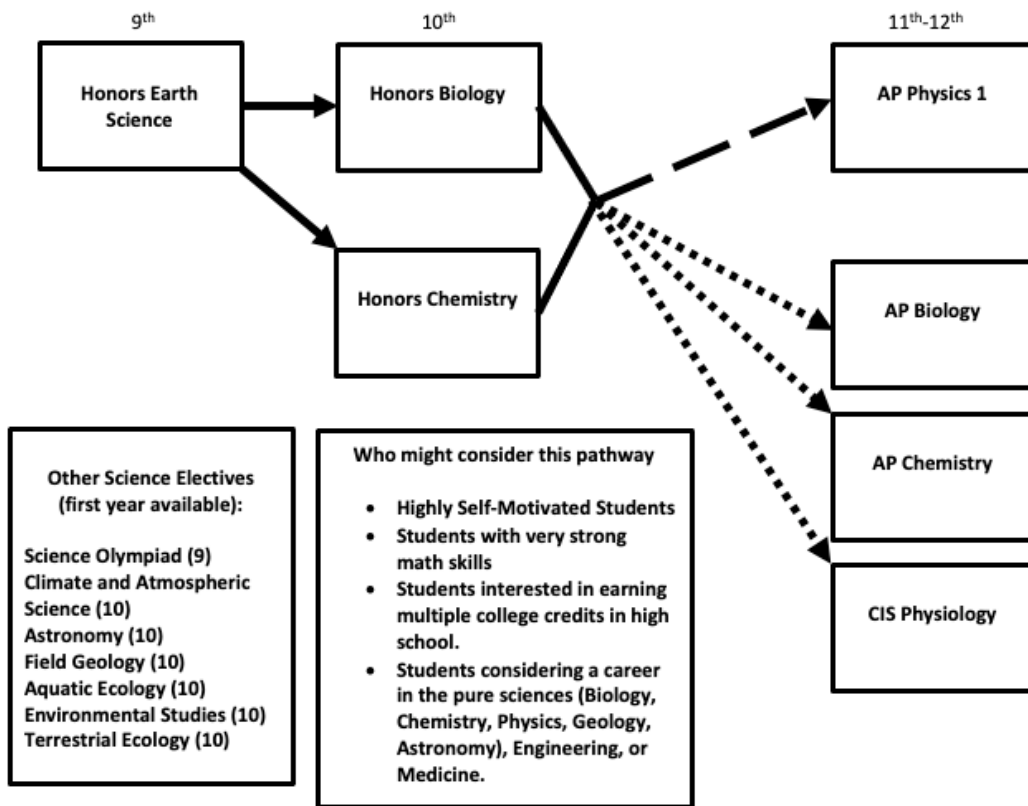
Other Science Electives (first year available):

- Science Olympiad (9)
- Climate and Atmospheric Science (10)
- Astronomy (10)
- Field Geology (10)
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- Environmental Studies (10)
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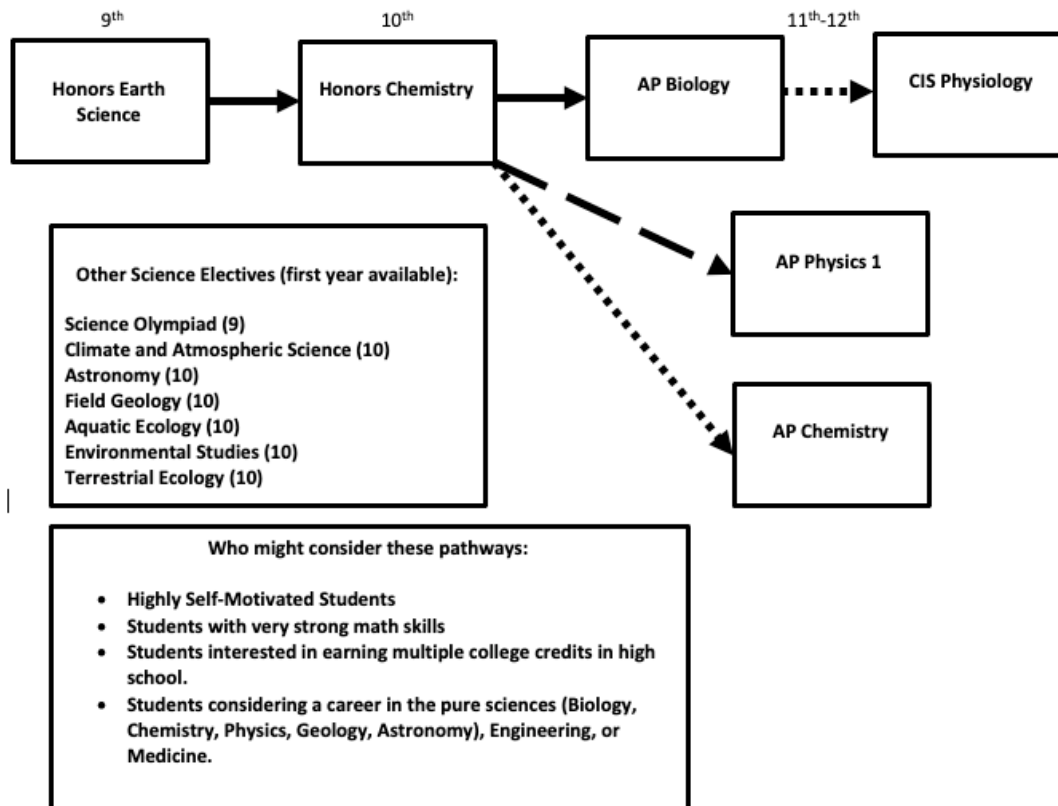
Who might consider this pathway:

- Motivated Students
- Students with strong math skills
- Students interested in earning college credits in high school.
- Students considering a career in the pure sciences (Biology, Chemistry, Physics, Geology, Astronomy), Engineering, or Medicine, or other Health Care Professions.

More Challenging Honors Path: Gets to AP courses quicker.



Most Challenging Honors Paths: Gets to AP courses fastest.



Biology F-5051, W-5052, S-5053

Grades 10-11-12

Prerequisite: None

Biology is a year-long course that helps students develop an understanding of living organisms. This class is recommended by the Science Department for most 10th grade students. Laboratory activities are an integral part of each topic studied. The state standards for biological science will be covered in this course. Those students wishing to take an accelerated version of this course should consider Honors Biology. Topics addressed are: scientific method, chemistry of life, cells, cells and energy, mitosis, and meiosis; genetics, protein synthesis, evolution, classification, and ecology; ecology, homeostasis, immune, nervous, respiratory and circulatory systems, and plant/animal kingdom.

Honors Biology F-5061, W-5062, S-5063

Grade: 10-11-12

Prerequisite: Strong performance in Earth Science or Honors Earth Science.

Honors Biology is a year-long course that will focus on an in-depth study of the 9-12 Minnesota Standards for Life Science. This course provides students with an advanced understanding of the fundamental processes of all living things. Topics include ecology, biological molecules, enzymes, respiration, photosynthesis, and the molecular basis of inheritance and human systems. Students are expected to take an active role in class discussions as well as demonstrate critical thinking in conducting their own investigations. With additional study, students may choose to take the AP[®] Biology exam. During the spring, students are expected to participate in the fetal pig dissection lab.

Advanced Placement[®] Biology F-5100, W-5101, S-5102

Grades: 11-12

Prerequisite: Strong performance in Biology, Honors Biology, or Honors Chemistry

This course is equivalent to a two-semester college introductory biology course usually taken by biology majors during their first year of college. It is a rigorous course that requires advanced reading and study skills. Students will develop a conceptual framework for modern biology and an appreciation of science as a process. Bioinformatics (the application of statistics and computer science to molecular biology) will be used to analyze biological data throughout the course. Topics covered in this course are chemistry and life, cells, cellular energy, heredity, molecular genetics, evolutionary biology, diversity of organisms, structure and function of plants and animals, and ecology. One goal of this course is to prepare students to take the Advanced Placement exam in May and students in this class will register for and take the AP exam in May. There is a fee for this exam. Students may help by supporting a Lab Consumable Materials Fund to enhance their lab experience beyond the required curriculum (chemical and specimen costs).

Chemistry F-5071, W-5072, S-5073

Grades: 10-11-12

Prerequisite: None

Chemistry is a year-long course investigating the composition of matter and the changes in matter during chemical reactions to help us describe what objects are made of and how matter creates the world around us. Finding problems, making solutions, innovations, collaboration, and lab work are an integral part of the course. This course is appropriate for and designed for any college bound student. Students interested in studying STEM intensive fields such as pharmacy, physics, chemistry, biology, medicine, and engineering and nursing should take Honors Chemistry.

Honors Chemistry F-5077, W-5078, S-5079

Grades: 10-11-12

Prerequisite: None

Honors Chemistry is a year-long course, investigating the composition of matter and the changes in matter during chemical reactions. It helps us describe what objects are made of and how matter creates the world around us. Topics are similar to those covered in Chemistry, however, the approach is more math-intensive and concepts are explored in greater depth. This course is appropriate for and designed for students interested in studying STEM intensive fields such as pharmacy, physics, chemistry, biology, engineering and nursing in college.

Advanced Placement® Chemistry F-5081, W-5082, S-5083

Grades: 11-12

Prerequisite: Strong performance in Chemistry or Honors Chemistry

AP® Chemistry is a year-long course designed to be the equivalent of a general chemistry course taken during the first year of college. It should be taken as a second-year chemistry course at the high school. Content centers on four major ideas in chemistry: Scale, Proportion, and Quantity of Matter, Structure and Properties of Matter, Transformations of Matter, and Energy Changes of Matter. Lab skill development and scientific problem solving are also emphasized, including a focus on guided inquiry. Upon completion, students may elect to take the AP® Chemistry exam. Performance on this exam can earn a student college credit or advanced college placement, depending on the policies of the university or college.

General Physics F-5087, W-5088, S-5089

Grades: 10-11-12

Prerequisite: **Teacher recommendation only. Students may not self-enroll**

General Physics is a year-long, hands-on course that focuses on learning physics concepts and how they relate to everyday life. Extensive knowledge of math is not required. The main topics of study will be motion, forces, energy, electricity, magnetism, sound and light. Highlights of the year include an annual egg crash competition and rocket launching

Physics F-5091, W-5092, S-5093

Grades: 10-11-12

Prerequisite: Completion of or concurrent enrollment in Algebra 2

Physics is a year-long course recommended for any student who is planning to go to college. In this course, students investigate everyday phenomena in an attempt to explain and describe these phenomena. We do this through direct experimentation and by learning from others. It is recommended that you take all three trimesters of the course. Topics include motion, forces, energy, electricity, waves, sound, light, and optics. Woven throughout these topics is an emphasis on experimental design and design thinking.

Advanced Placement® Physics 1: Mechanics F-5094, W-5095, S-5096

Grades: 10-11-12

Prerequisite: Algebra 2 Completed or Concurrently Enrolled in Algebra 2

This year-long course is a thorough introduction to the principles of physics for students planning to major in a science or engineering related field. For non-science college majors, this course may meet college science requirements for colleges or universities. AP Physics 1 is an algebra-based physics course that explores topics such as: Kinematics; Newton's Laws of Motion; Work, Energy and Power; Systems of Particles and Linear Momentum; Circular Motion and Gravitation; Simple Harmonic Motion; and Torque and Rotational Motion. This course promotes scientific inquiry in an engaging and rigorous setting. You will design and perform labs. While math skills are important, your ability to explain and discuss physics concepts is essential.

College in the Schools (CIS) - Human Physiology, Technology and Medical Devices F-5064, W-5065, S-5066

Grades: 11-12

Prerequisite: Minimum B+ in Biology and concurrent enrollment in Chemistry

CIS Human Physiology, Technology and Medical Devices is a year-long course. The course is the study of the organization, structure, function, and interrelationships of the major systems of the human body and their response to disease. This course is a lab and activity-based course (including dissections) that requires memorization, reading, and note-taking skills. This college-credit course is recommended for students with an interest in pursuing a medical or health care career. The fall trimester covers body orientation and nomenclature, histology, the integumentary system, bones, the skeletal system, and joints. The winter trimester covers muscle anatomy and physiology. The spring trimester covers the nervous system, blood, and the cardiovascular system. This course uses a college-level textbook.

General Science of Earth F-5031, W-5032, S-5033

Grades: 9-10-11-12

Prerequisite: **Teacher recommendation only. Students may not self-enroll**

General Science of Earth is a year-long class designed to help certain 9th through 12th grade students meet a year of their science requirement. Students will be exposed to the major concepts in biology, chemistry and physics in an integrated manner. Student learning experiences will be at a practical level with a minimum of mathematics. Topics in the first trimester deal with the scientific method, phenology, and basic concepts in environmental science. Topics also include the concepts of chemistry, chemistry in the environment and environmental issues.

Climate and Atmospheric Science 5041

Grades: 10-11-12

Prerequisite: Earth Science

In this class students will gain a better understanding of the components that make up weather and climate. Students will gain knowledge on how our atmosphere interacts with the other "spheres" of Earth, such as land, water, ice, etc...They will also learn about weather phenomena, the differing climates of Earth and how Earth's climate has changed from the past to the present, and into the future. This is a good course for those interested in climate science, atmospheric science and meteorology.

Astronomy 5045

Grades: 10-11-12

Prerequisite: Earth Science

Students in this class study our solar system. They learn how telescopes work, study about early astronomy, the solar system, galaxies and current space programs like Space X, Blue Horizon, NASA, etc. Students will learn to tell star time, study deep space objects, discuss ideas about the nature and origin of the universe and extraterrestrial life.

Field Geology 5046

Grades: 10-11-12

Prerequisite: Earth Science

This course will study the Geology and landscapes of Minnesota. Students learn about rocks and minerals mined and used in our state. Students will also learn about Minnesota's past landscape as told by rocks and glacial evidence. You will also learn how glaciers shaped Minnesota. Students will look at environmental issues which impact our state, including groundwater and mining.

Aquatic Ecology 5055

Grades: 10-11-12

Prerequisite: None

This course is designed to study aquatic ecosystems including ponds, lakes, streams, and salt water. Topics include physical and chemical properties of water, collection and identification of aquatic organisms, aquatic food chains, and human effect on aquatic ecosystems. Field trips will be taken to the AVHS pond, a lake, and a stream where students will be wading, collecting, observing, and handling organisms, and to the Minnesota Zoo to observe the ocean ecosystem.

Environmental Studies 5057

Grades: 10-11-12

Prerequisite: None

This course is designed to introduce the student to the problems humans have created on earth as a result of technical development and ever-increasing population growth. Sources, types, and effects of pollutants, as well as climate change will be examined. Throughout the course, we will examine the intersection of civil rights and environmental issues. Classroom discussions, problem solving techniques, critical thinking, and classroom projects will be utilized to analyze possible causes and solutions to these environmental problems.

Terrestrial Ecology 5059

Grades: 10-11-12

Prerequisite: None

Basic ecological concepts are studied using lab exercises, one field trip, population studies, and class discussions. Food webs, food chains, biomes, and energy cycles are included. Topics of ecological change and the evolution of populations are also studied. Students are encouraged to enroll in Aquatic Ecology and Environmental Studies.

Science Olympiad 5060

Grades: 9-10-11-12

Prerequisite: None

This Science elective course is designed to encourage students to explore Science, Technology, Engineering and Inquiry related to the competition-based Science Olympiad program. Students will use their skills and knowledge to explore a choice of challenges ranging from testing their knowledge of all science topics like astronomy, biology or inquiry, to honing their lab skills in chemistry or physics, to building devices, vehicles and structures to meet specific requirements. A variety of STEM skills are integrated throughout this course.