

PVHS Science Department

2008-09 Course Descriptions

Biology 1	This course is designed to meet college entrance requirements as a laboratory science. The material presented in the course includes Cell Biology and Basic Chemistry, Plant Growth and Development, Genetics, Evolution and Natural selection, Reproduction, Physiology of the Human Body and corresponding functions and ecology. The approach taken in this discipline reflects the needs of a student interested in a general survey class in the field of Biology. Students enrolled in Biology 1 may continue into Chemistry and Physics.
Biology 1 Honors	Biology Honors is an academically challenging course that is designed to prepare students for the Advanced Placement Biology (Biology 2 AP*) course that follows. This course is aligned with the California State Standards for Biology. The course is formulated to fulfill the California State and University of California requirements for a laboratory life science. Covering the major themes or concepts of biology, the first semester surveys biochemistry and energy, including photosynthesis, fermentation, and respiration. It also investigates the structure and function of the cell, genetics, origin of life, and evolution. The second semester includes ecology, human physiology, classification and plant physiology. Laboratory investigations are an integral part of this course.
Biology 2	Biology 2 is a year-long course that is a continuation of Biology 1. The material presented in this course focuses on systematics and taxonomy of the six kingdoms of life, anatomy and physiology of organisms, and current advancements in the field of biology. This course incorporates the major themes of biology: Science as a Process, Evolution, Energy Transfer, Continuity and Change, Interdependence in Nature, Structure and Function, and Science, Technology, and Society. Biology 2 meets college entrance requirements as a lab science.
Biology 2 AP	This AP Biology Course is designed to be the equivalent of a two-semester college introductory biology course usually taken by biology majors during their first year. This course meets the college requirements in laboratory science and prepares students for the Advanced Placement Examination in biology. Emphasis is placed upon seven major themes in biology (1) science as a process, (2) evolution, (3) energy transfer, (4) continuity and change, (5) relationship of structure to function, (6) regulation, and interdependence in nature, and (7) technology and science. The overlaying concepts that are stressed include three major units of concentration – (1) molecules and cells, (2) heredity and evolution, and (3) organisms and populations. In addition, twelve required labs are conducted to prepare students for college level study.
Chemistry	This course is designed to meet college requirements as a lab science. This course will cover and investigate the periodic table, atomic structure, chemical bonding, the conversion of matter and energy, stoichiometry, gases and their properties, acids, bases, solutions, chemical thermodynamics, rates of reactions, chemical equilibrium, nuclear processes, and introduces organic and biochemistry. Experiments, mathematical calculations and models are used to attain an understanding of the concepts, principles, and theories of chemistry.
Chemistry 1 Honors	This course is designed to meet college requirements as a lab science. Students enrolled in this course should have a high ability level for science as the rigorous nature of the course is designed for those opting to take Chemistry 2AP* and other advanced science courses. This course will cover and investigate the periodic table, atomic structure, chemical bonding, the conservation of matter and energy,

	<p>stoichiometry, gases and their properties, acids, bases, solutions, chemical thermodynamics, rates of reactions, chemical equilibrium, nuclear processes, and introduces organic and biochemistry. Coverage of the material in this course will be more in-depth and emphasize more problem solving than the Chemistry 1 course. Experiments, mathematical calculations and models are used to attain an understanding of the concepts, principles, and theories of chemistry.</p>
Chemistry 2 AP	<p>This college-level course is designed for serious-minded science students, and uses a college-level examination (Advanced Placement Chemistry exam). Theory and problem solving are stressed. This course covers and investigates the periodic table, atomic structure, types of chemical reactions, chemical bonding, the conservation of matter and energy, stoichiometry, gases and their properties, liquids and solids, acids, bases, solutions, chemical thermodynamics, rates of reactions, chemical equilibrium, electrochemistry, nuclear processes, and introduces organic and biochemistry. Experiments, mathematical calculations, and models are used to promote an understanding of the concepts, principles, and theories of chemistry.</p>
Civil Engineering Architecture Design	<p>This two-semester course includes the roles of Civil Engineers and Architects, Project Planning, Site Planning, Building Design and Project Documentation and Presentation.</p>
Developmental I Physiology & Sports Medicine	<p>Developmental Physiology and Sports Medicine covers the anatomy and physiology of the adolescent human body. It includes the many systems of the body and how these systems interact with each other specifically through athletics. Additional topics are introduced that are integral to understanding sports medicine such as nutrition, sports injury, prevention, treatment, substance abuse, first aid and CPR.</p>
Digital Electronics	<p>This course introduces students to Digital Electronics, and prepares students with the foundations of engineering at high levels of rigor and relevance consistent with the current standards. The course introduces fundamentals, number systems, gates, Boolean Algebra, adding, flip-flops, registers and microprocessors, and concludes with a capstone project. Course format will include lectures, discussions, labs and computer labs, projects and outside research. The course features activities-based, project-based, and problem-based learning</p>
Earth Science	<p>Earth Science is a comprehensive year-long college foundation science course preparing students for college courses and careers in geology, mineralogy, oceanography, astronomy, meteorology, ecology, mining and environmental studies. This course incorporates the CA Content Standards for Earth Science and provides the students with a broad-based background and appreciation of their ever-changing planet and its place in the universe.</p>
Engineering Design & Development	<p>In this capstone course, teams of students apply principles developed in the core PLTW classes to solve a problem of their own choosing. Guided by a community mentor, they brainstorm possibilities, research current patents, construct a working model, test the model in real life situations or simulations, document their designs, and present and defend the design to a panel.</p>
Environmental Science AP	<p>The Environmental Science AP course is designed to be the equivalent of a one semester, introductory college course in environmental science and is intended to enable students to undertake, as first-year college students, a more advanced study of topics in environmental science. In both breadth and level of detail, the content of the course reflects what is found in many introductory college-level environmental science courses.</p>

Introduction to Engineering Design	This course introduces students to Engineering design. The course introduces the history, sketching and visualization, geometric and modeling concepts, then follows up with practical assembly, model analysis and documentation, presentation, production and marketing skills. Course format will include lectures, discussions, labs and computer labs, projects and outside research.
Life Science	Students will apply the scientific method to evaluate life's structure, chemistry, and its relationship to the environment. Content covers material required on the California Life Science Standards test. Topics include Cell Biology, Genetics, Physiology, Ecology, Evolution, and Investigation and Experimentation.
Marine Biology	Marine Biology is a laboratory science course designed to introduce the student to the features, basic processes, and unique biology of the marine environment in order to understand the ocean's potential as a resource, and enhance awareness of the value and fragility of the ocean, its inhabitants and its ecosystems. An investigative approach to learning about the ocean and its inhabitants is stressed in this course.
Marine Biology Honors	Marine Biology is a laboratory science course designed to introduce the student to the features, basic processes, and unique biology of the marine environment in order to understand the ocean's potential as a resource, and enhance awareness of the value and fragility of the ocean, its inhabitants and its ecosystems. An investigative approach to learning about the ocean and its inhabitants is stressed in this course. Students perform directed and independent research on specific marine organisms and include in-dept analysis and presentation of findings. Laboratory activities include dissection, data collection, and analysis based on experiments that develop scientific investigation and critical thinking. This course is an advanced level science course with emphasis and workload comparable to an introductory college class.
Physics A	Physics is a college preparatory lab science course focusing on topics including mechanics, electricity and magnetism, light and electromagnetic radiation, sound and waves, heat and thermodynamics.
Physics B AP	Physics B Advanced Placement is an in-depth introduction to physics that includes topics in both classic and modern physics. Topics covered also include acceleration, work mechanics, electricity and magnetism, light and electromagnetic radiation, sound and waves, heat and thermodynamics. The basic ideas of calculus are introduced in connection with physical concepts. Understanding of the basic principles involved and the ability to apply these principles in the solution of problems are major goals of the course.
Physics C AP	Physics C Advanced Placement parallels college courses covering Newtonian Mechanics and Classical Electricity and Magnetism, which serve as a foundation in physics for students majoring in the physical sciences or engineering. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problem solving.
Physics PVIT	Physics is a college preparatory lab science course focusing on topics including mechanics, electricity and magnetism, light and electromagnetic radiation, sound and waves, heat and thermodynamics.
Physiology & Anatomy	This course is designed to meet college requirements as a biological laboratory science. The content covers the 10 major organ systems of the human body and focuses on two main themes: the relationship of structure to function and homeostasis. The laboratory experiments include histological or tissue examination, skeletal parts, major muscle groups, etc. There are also a series of dissections to accompany the major organ systems including a study of the sheep brain, mammalian kidney, and a

beef heart.

Principles of Engineering

This course is designed to introduce students to the foundation principles of engineering and to give students opportunities to begin applying those principles to real-life problems. Students will learn that the engineering process is multi-faceted, combining physical science knowledge, mathematical insight, creative design, organization skills, communication skills, data analysis and documentation, and critical thinking. Students will engage in problem-solving activities and project development that will require them to build expertise in all of the facets of engineering mentioned above. Course format will include lectures, in-class use of various technologies, group projects, discussions, problem-solving sessions, lab experiments, and outside research.

Scientific Research 1-4

The Science Research is a one-to-four year sequential course designed for highly motivated students to advance an understanding of research methodology in the natural and social sciences. The course is directed to those students who wish to pursue excellence and progress into advanced areas of original research. Emphasis is on both laboratory and bibliographic research and will cover the California Science Content Standards for experimental design. This course engages students to work in conjunction with research scientists and professionals within their field of work. Students problem solve individual and group labs, write a research paper, analyze past and present scientific research for scientific methods, and discuss solutions to current dynamic issues. In addition, students undertake independent research in mathematics, life sciences, physical sciences, or social science.