

# Course Descriptions

## Science

<b>BIOLOGICAL/LIFE COURSES</b>	<b>AHS</b>	<b>CHS</b>	<b>CAMS</b>	<b>JHS</b>	<b>LHS</b>	<b>MHS</b>	<b>PHS</b>	<b>RHSA</b>	<b>RHS</b>	<b>WHS</b>
Anatomy & Physiology		•	•	•	•	•	•			•
Anatomy & Physiology (Honors)			•	•	•	•				•
Biology 1				•						•
Biology 2				•						•
Biology 1-2	•	•	•	•	•	•	•	•		•
Biology Accelerated		•	•	•		•	•	•		•
Biology (AP)		•		•	•	•	•			•
Biomedical Research							•			
Forensic Science					•	•	•			
Biology IB HL 1				•						
Biology IB HL 2				•						
Life Science 1-2	•	•		•	•				•	
Marine Biology 1-2	•	•		•	•	•	•			•
Marine Biology Accelerated						•				•
Zoology				•	•					
<b>PHYSICAL/EARTH COURSES</b>	<b>AHS</b>	<b>CHS</b>	<b>CAMS</b>	<b>JHS</b>	<b>LHS</b>	<b>MHS</b>	<b>PHS</b>	<b>RHSA</b>	<b>RHS</b>	<b>WHS</b>
Automotive and Transportation Technology				•						
Chemistry 1-2	•	•	•	•	•	•	•	•		•
Chemistry 1-2 (Honors)		•	•	•	•	•	•			•
Chemistry 3-4										
Chemistry (AP)				•	•	•	•			•
Earth Science 1-2				•					•	
Environmental Science				•		•				
Environmental Science (AP)		•		•	•	•	•	•		•
Geology							•			
Chemistry IB HL 1				•						
Chemistry IB HL 2				•						
Introduction to Digital Circuits & Robotics							•			
Introduction to Engineering		•					•			
Laboratory Earth Science 1-2		•		•	•	•	•			•
Laboratory Physical Science 1-2							•			
Physical Oceanography					•					•
Physical Science 1-2	•									
Physics 1-2		•	•	•	•	•	•	•		•
Physics 1-2 (Honors)						•				•
Physics "B" (AP)			•	•	•		•			•
Physics "C" (AP)						•	•			
PLTW: Introduction to Engineering Design										
PLTW: Principles of Engineering										
PLTW: Digital Electronics										
PLTW: Computer Integrated Manufacturing										
PLTW: Engineering Design & Development										
Principles of Engineering 1-2		•								
Directed Research in Science			•							

• Course offered  
IB Int'l. Bac.  
Biotechnology

AHS Avalon High School  
CHS Cabrillo High School  
CAMS California Academy of Math & Science  
JHS David Starr Jordan High School  
LHS Lakewood High School

MHS Robert A. Millikan High School  
PHS Polytechnic High School  
RHSA Renaissance High School for the Arts  
RHS Will J. Reid High School  
WHS Woodrow Wilson Classical High School

*Each science course offered will satisfy one of the two years of Science (biological/life and/or physical/earth) required for graduation, unless otherwise noted.*

**\*\*Courses do not meet NCAA or UC requirements.**

## BIOLOGICAL/LIFE SCIENCES

### **Anatomy and Physiology** \_\_\_\_\_ **3813**

#### **Anatomy and Physiology (Honors)** \_\_\_\_\_ **3815**

**Length of Course:** 2 Semesters

**Grade Level Options:** 10, 11, 12

**Prerequisites:** A grade of "C" or better in Biology, SSC 5-6 or teacher recommendation (Honors requires science grade of "B" and science teacher recommendation.)

This course is a study of the structures and functions of the human body, and their interrelationships. Content is built around major biological concepts which include: historical perspectives, mathematical and analytical skills, and interdisciplinary approaches to discovery. Concepts are reinforced with a strong emphasis on laboratory experiences, outside research, and the integration of all sciences. Dissection of preserved organisms is part of the laboratory experience. The honors level course differs from the regular course by having both a greater breadth of topics and greater depth of coverage of the content.

*These courses will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

Honors credit may not be available for Grades 9&10

### **Biology 1** \_\_\_\_\_ **3860**

#### **Biology 1 SDAIE** \_\_\_\_\_ **3862**

**Length of Course:** 2 Semesters

**Grade Level Options:** 9-12

**Prerequisite:** Algebra 1-2 or AB (can be concurrently enrolled)

This course is the first year of a two year course that studies the origins, structures, functions, reproduction, growth, development, interactions and behaviors of living things. Content is built around major biological concepts which include: historical perspectives, mathematical and analytical skills, and interdisciplinary approaches to discovery. The major biological concepts explored include the classification of organisms, cell structure and function, the change and diversification of organisms, ecosystems and their interactions, and the influence of humankind on ecosystems. Concepts are reinforced with a strong emphasis on laboratory experiences and the integration of all sciences. Applications of concepts to society, individuals, and technology are included.

*This course will meet one semester of the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved – .5 CR/YR Max

### **Biology 2** \_\_\_\_\_ **3864**

#### **Biology 2 SDAIE** \_\_\_\_\_ **3866**

**Length of Course:** 2 Semesters

**Grade Level Options:** 9-12

**Prerequisite:** Algebra 1-2 or CD (can be concurrently enrolled) with a C or better, and Biology 1

This course is the 2nd year of the Biology 1-2 sequence which studies the origins, structures, functions, reproduction, growth, development, interactions and behaviors of living things. Content is built around major biological concepts which include: historical perspectives, mathematical and analytical skills, and interdisciplinary approaches to discovery. The major biological concepts explored include the classification of organisms, cell structure and function, the change and diversification of organisms, ecosystems and their interactions, and the influence of humankind on ecosystems. Concepts are reinforced with a strong emphasis on laboratory experiences and the integration of all sciences. Applications of concepts to society, individuals, and technology are included.

*This course will meet one semester of the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved – .5 CR/YR Max

### **Biology 1-2** \_\_\_\_\_ **3801**

#### **Biology 1-2 ACCESS** \_\_\_\_\_ **3800**

#### **Biology Accelerated** \_\_\_\_\_ **3803**

#### **Biology 1-2 SDAIE** \_\_\_\_\_ **3802**

#### **\*\*Biology 1-2 SDAIE/PLS** \_\_\_\_\_ **3816**

**Length of Course:** 2 Semesters

**Grade Level Options:** 9, 10, 11, 12

**Prerequisite:** Algebra 1-2 or Algebra CD (can be taken concurrently), or Science teacher recommendation (Accelerated requires Algebra completed with a "C" or better.

This course is a study of the origins, structures, functions, reproduction, growth, development, interactions and behaviors of living things. Content is built around major biological concepts which include: historical perspectives, mathematical and analytical skills, and interdisciplinary approaches to discovery. The major biological concepts explored include the classification of organisms, cell structure and function, the change and diversification of organisms, ecosystems and their interactions, and the influence of humankind on ecosystems. Concepts are reinforced with a strong emphasis on laboratory experiences and the integration of all sciences. Applications of concepts to society, individuals, and technology are included. The accelerated level course differs from the regular course by having both a greater breadth of topics and greater depth of coverage of the content. It also utilizes a college level textbook to help facilitate these differences.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

*This course is also available as a four semester course (2 semesters Biology 1, 2 semesters Biology 2)*

## Biology (AP) 3807

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Biology 1-2 with a "B" or better & parents permission, Chemistry recommended

This course studies the conceptual framework, knowledge, and analytical skills to develop student understanding of the rapidly changing science of biology. The four areas emphasized are molecular and cellular biology; genetics and evolution; organismal and population biology; and laboratory work.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at most of the nation's colleges and universities.*

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Biology IB HL 1 3861

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11  
**Prerequisite:** Biology 1-2 and Chemistry 1-2 with a "C" or better

An upper level biology course which is part of the International Baccalaureate Program that studies concepts of biology, such as: cells, the chemistry of life, genetics, ecology, evolution, human health and physiology. Concepts learned during the course will be applied in the laboratory setting and through the completion of activities. This course will prepare students to take the IB Biology exam at the higher level.

*This course will meet the "d" or "g" entrance requirements for the University of California and California State University systems.*

NCAA Approved

## Biology IB HL 2 3863

**Length of Course:** 2 Semesters  
**Grade Level Options:** 12  
**Prerequisite:** IB Biology HL I with a "C" or better

An upper level biology course which is part of the International Baccalaureate Program that studies extended topics in general biology. Students will study, in detail the following topics: nucleic acids and proteins, cell respiration and photosynthesis, genetics, human reproduction, the immune system, the physiology of the nervous system and excretion, as well as plant science. Students will perform laboratories and activities based on the content. This course prepares students to take the IB Biology exam.

*This course will meet the "d" or "g" entrance requirements for the University of California and California State University systems.*

NCAA Approved

## Biomedical Research 3799

**Length of Course:** 2 Semesters  
**Grade Level Options:** 12  
**Prerequisite:** Lab Physical Science, Biology, Honors Chemistry 1-2, Algebra 1-2, or Algebra CD, Geometry 1-2 with a "C" or better.

Biomedical Research is a course offered, by application, to twelve exceptional science students in their senior year. The current shortage of physicians entering biomedical research in this country has reached crisis proportion, and the National Institutes of Health are promoting various educational efforts to remedy the problem. This course, which represents a joint effort by the General Clinical Research Centers of Cedars-Sinai and Harbor-UCLA Medical Centers and Long Beach Polytechnic High School, is designed to provide a meaningful and multifaceted introduction to the field of clinical, biomedical research to high school students who might, through early exposure, be influenced to direct their career efforts toward clinical research. The course strongly supports and extends the entire first strand of LBUSD Science Standards, Investigation and Experimentation. Both didactic and clinical components are incorporated into the curriculum, which spans two semesters. The didactic component includes such topics as bio-statistics, ethical considerations in research, human subject safety requirements, and public health issues. The clinical component involves the placement of teams of two students, or "buddy teams," with a physician researcher/ mentor who is currently working on National Institutes of Health-funded research protocols. Once weekly the students will travel to the hospital site to work with the mentors on the protocol. At the program's culmination, the students will prepare and present a professional quality poster (or PowerPoint) explaining their protocol to a group of research physicians, the school site administrator and teacher, members of the Cedars-Sinai Volunteer Office, Office of Research from Cedars, and other interested staff.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

## Forensic Science 4062

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11, 12  
**Prerequisite:** Biology or Chemistry with a "C" or better, or science teacher recommendation

Forensic Science is the application of science to the law. This course is designed for students interested in learning the theoretical science concepts pertaining to forensic science. This course will be a laboratory class involving scientific investigations using microscopy, chromatography, comparative analysis techniques, electrophoresis, spot tests, qualitative analysis, mass comparisons, density analysis, and other qualitative and quantitative examinations.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

**Life Science 1-2** \_\_\_\_\_ **4001**  
**\*\*Life Science SDAIE** \_\_\_\_\_ **4003**  
**\*\*Life Science SDAIE/PLS** \_\_\_\_\_ **4005**  
**(\*\*Life Science SDC** \_\_\_\_\_ **5000)**

**Length of Course:** 2 Semesters  
**Grade Level Options:** 9, 10, 11, 12  
**Prerequisite:** None

This course studies basic life forms. Students recognize the interdependence of living organisms and the importance of maintaining a balance in nature. Students develop awareness of growing technological advances and possible career choices. Understanding is enhanced by involving students in the inquiry approach. Laboratory activities are used whenever possible.

*Meets the Life Science graduation requirement*

**Marine Biology 1-2** \_\_\_\_\_ **3809**  
**Marine Biology 1-2 Accelerated** \_\_\_\_\_ **3811**  
**Marine Biology Access** \_\_\_\_\_ **3812**

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Biology 1-2 with a "C" or better, or science teacher recommendation (Accelerated requires a grade of "B" or better and science teacher recommendation.)

These courses of study include physical oceanography, marine ecology, evolution of marine species, and marine flora and fauna. In addition to familiarizing students with the features of the marine environment which is an integral part of Southern California, this course helps to acquaint students with the ecology of other marine ecosystems, and occupational opportunities present in the field of marine biology and oceanography. Dissection of preserved organisms, field research, and scientific reporting are all part of the laboratory experience. The accelerated level course differs from the regular course by having both a greater breadth of topics and greater depth of coverage of the content.

*These courses will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

*NCAA Approved*

**Zoology** \_\_\_\_\_ **3842**

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11, 12  
**Prerequisite:** Biology 1-2 with a "C" or better, or science teacher recommendation

Students in this course study animal classification, ecology, anatomy, and physiology. The unity and diversity of animal life and the complimentary of structure and function are basic themes. Dissection of preserved organisms is part of the laboratory experience.

*This course will meet the "d" or "g" requirement for the University of California and California State University Systems.*

*NCAA Approved*

## PHYSICAL/EARTH SCIENCES

**\*\*Automotive and Transportation Technology** \_\_\_\_\_ **2680**

**Length of Course:** 2 semesters  
**Grade Level Options:** 9, 10, 11, 12  
**Prerequisite:** Algebra 1-2 or Algebra CD, computer experience, Electronics 1-2

This course enables students to achieve understanding of fundamental physical processes and critical thinking skills as they apply to automobiles and transportation through laboratory-based experiences as well as classroom instruction. This course emphasizes theory and hands-on lab work including 1) a study of the various principles, designs and construction of large and small internal combustion engines and their drive trains and components; 2) the automobile chassis and devices relating to it; 3) the theory, operation, maintenance, adjustment, and repair of the support systems of an automobile, and 4) metallurgy, origins of materials, and space. The course presents a practical approach to the physical/earth sciences. A final project is required in the second semester.

*Meets Physical Earth Science graduation requirement*

**Chemistry 1-2** \_\_\_\_\_ **3831**  
**Chemistry 1-2 SDAIE** \_\_\_\_\_ **3836**  
**Chemistry 1-2 Access** \_\_\_\_\_ **3830**

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Algebra 1-2 or Algebra CD with a "C" or better or science teacher recommendation

This course studies fundamental chemical concepts, such as atomic theory, the mole, energy relationships, oxidation-reduction, chemical bonding, equilibrium, periodicity, solutions, and acids-bases. Unifying principles are developed through experiments and observations in the laboratory. Applications of concepts to society, individuals, and technology are also included.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

*NCAA Approved*

**Chemistry 1-2 (Honors)** \_\_\_\_\_ **3832**

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Algebra 1-2 or Algebra CD and Geometry 1-2 with a "B" or better and concurrent enrollment in 3rd year math

In Chemistry 1-2 Honors, the same concepts will be covered as in Chemistry 1-2, but in greater depth and will be supplemented by additional laboratory experiences using more advanced instrumentation and tech-

nology. Also, in Chemistry 1-2 Honors, there is a greater emphasis on mathematical formulation of principles, and the application of mathematical interpretation of chemistry concepts. A college level textbook and supplemental materials facilitate these differences.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Chemistry (AP) ————— 3835

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Chemistry 1-2 with a grade of "C" or better or science teacher recommendation

This course provides the conceptual basis, content knowledge and methodological skills for understanding the theoretical aspects of general chemistry. Topics such as the structure of matter, kinetic theory of gases, chemical equilibria, chemical kinetics, and the basic concepts of thermodynamics are presented in-depth.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at most of the nation's colleges and universities.*

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Chemistry IB HL 1 ————— 3824

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11  
**Prerequisite:** Biology 1-2 and Chemistry 1-2 with a "B" or better or science teacher recommendation

This course is an upper level chemistry course which is part of the International Baccalaureate Program that covers general chemistry procedures and terms, stoichiometry, atomic theory, periodicity, bonding, states of matter, energetics, kinetics, equilibrium, acids and bases, oxidation/reduction, and organic chemistry. This course prepares students to take the IB Chemistry exam at a higher level.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Chemistry IB HL 2 ————— 3822

**Length of Course:** 2 Semesters  
**Grade Level Options:** 12  
**Prerequisite:** IB Chemistry HLI with a "C" or better

This course is an upper level chemistry course which is part of the International Baccalaureate Program that covers stoichiometry, atomic theory, periodicity, bonding states of matter, energetics, kinetics, equilibrium, acids and bases, oxidation/reduction, organic chemistry, human biochemistry, and medicines/ drugs. This course

completes the preparation for students to take the IB Chemistry exam.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Earth Science 1-2 ————— 4008

### Earth Science SDC ————— 5411

**Length of Course:** 2 Semesters  
**Grade Level Options:** 9-12  
**Prerequisite:** None

Earth Science 1-2 is laboratory-based approach to the California High School Earth Science Content Standards. Students should spend approximately forty percent (40%) of their class time engaged in hands-on activities. Introductory principles of astronomy and earth sciences will be explored, including the solar system, cosmology, plate tectonics, energy, biogeochemical cycles, the atmosphere, and California geology. Constructivist methods of teaching are employed to ensure the best possible comprehension and retention of science concepts. Science activities will be based on the California Science Content Standards as delineated in the California Science Framework and will apply the skills and techniques outlined in the Investigation and Experimentation Strand of the Content Standards.

*Meets Physical/Earth Science graduation requirements*

## Environmental Science (AP) ————— 4030

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10-12  
**Prerequisite:** Biology and Algebra 1-2 or CD with a "C" or better and a UC "g" or "d" level course in physical or earth sciences

The goal of the AP Environmental Science course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world; to identify and analyze environmental problems both natural and human-made; to evaluate the relative risks associated with these problems; and to examine alternative solutions for resolving and/or preventing them.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at **most** of the nations colleges and universities.*

*This course will meet "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Environmental Science ————— 4031

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11-12  
**Prerequisite:** Biology and Algebra 1-2 or CD with a "C" or better and a course in physical or earth sciences

This Environmental Science course is a standards-based study of the relationship between humans and the world in which we live. It is a multidisciplinary science that is



based on the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.

*This course will meet "g" entrance requirement for the University of California and California State University systems.*

## Geology ————— 4064

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10-12  
**Prerequisite:** Previous science course with a "C" or better, or science teacher recommendation

This course studies the basic principles of physical and historical geology. Students participate in lab intensive instruction that emphasizes local, regional and global geologic features. The students develop an awareness of the importance of the Earth Sciences to society and are exposed to many possible geologic career opportunities.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Introduction to Digital Circuits and Robotics ————— 2713

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11-12  
**Prerequisite:** Algebra 1-2 or Algebra CD and Electronics 1-2 with a "B" or better

This course presents the foundation of physics, math, logic, and material science concepts employed in the design, manufacture, and implementation of electronic digital systems as used in micro-controllers, control systems and computers and their economic impact on the "wealth" of the nation. The use of physics, math logic and material science concepts are used to design, construct and implement digital logic circuits. This course will serve as an introductory foundation for students pursuing careers in math, science, engineering and related fields. The material will be presented in a serial manner, the sequence of concepts will build upon the previously presented. Class time and grade will be divided between lectures and labs, 50% for each.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

## Introduction to Engineering ————— 2716

**Length of course:** 2 Semesters  
**Grade Level Option:** 9-10  
**Prerequisite:** Algebra 1-2 or Algebra AB (can be concurrently enrolled)

Introduction to Engineering is a physical science course targeted to 9th and 10th grade students inter-

ested in an engineering career. Because engineering is a field of many disciplines, the course will address those physics concepts which are universal to all disciplines. These concepts include: force, work, rate of change, energy, amplifiers and controllers. Connections and applications will be made to the engineering disciplines of: mechanical, civil, mineral and mining, industrial, manufacturing, electrical, computer, optical, acoustical, aerospace, chemical, metallurgy, materials and ceramics.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

## Introduction to Engineering Science ————— 2717

**Length of course:** 2 Semesters  
**Grade Level Option:** 9  
**Prerequisite:** Algebra 1-2 or Algebra CD

This interdisciplinary course teaches hands-on physical science, mechanics, electronics, computers, and engineering design. Engineering related coverage of material from the following physical science areas: astronomy and optics, electromagnetic spectrum, electricity and magnetism, forces and motion, thermofluid systems, and materials science. Basic mechanical devices (levers, gears, pulleys, springs, etc.) and linkages are mathematically described and examined in lab work. An introduction to basic electronics is given and students learn to breadboard practical circuits. A computer for every student, networked together, allows for computer delivered instruction, simulations, engineering application training, and introductory programming lessons. Students get an introduction to the design process and technical project documentation. They participate in design teams to brainstorm, design and build a hardware project (e.g., a rocket launch complex, including: two multiple-rail launch stands, an electrical launch control box, and tools for predicting and measuring rocket maximum altitude). Students develop technical team management skill while preparing a professional presentation of their final design package to be given to an outside audience of college engineering students.

*This course meets the "g" requirement for the University of California and California State University systems.*

NCAA Approved

## Laboratory Earth Science 1-2 ————— 4009

**Laboratory Earth Science 1-2 SDAIE** ————— 4006  
**Laboratory Earth Science SDAIE/PLS** ————— 4025

**Length of Course:** 2 Semesters  
**Grade Level Options:** 9-12  
**Prerequisite:** Previous science and Algebra 1-2 or Algebra CD (can be concurrent) with a "C" or better, or science teacher recommendation

Laboratory Earth Science 1-2 is laboratory-based approach to the California High School Earth Science Content Standards. Students should spend approximately

fifty percent (50%) of their class time engaged in investigative activities. Introductory principles of astronomy and Earth sciences will be explored in detail, including the solar system, cosmology, plate tectonics, energy, biogeochemical cycles, the atmosphere, and California geology. Students will evaluate evidence from experiments and technology used by scientists to understand the nature of the universe and the Earth. They will also explore how basic interactions of matter and energy control global activity in the atmosphere, hydrosphere, lithosphere, and biosphere. Constructivist methods of teaching are employed to ensure the best possible comprehension and retention of science concepts. Science activities will be based on the California Science Content Standards as delineated in the California Science Framework and will apply the skills and techniques outlined in the Investigation and Experimentation Strand of the Content Standards.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Laboratory Physical Science — 4015

### Laboratory Physical Science ACC — 4014

**Length of Course:** 2 Semesters  
**Grade Level Options:** 9, 10, 11, 12  
**Prerequisite:** Previous science and Algebra 1-2 or Algebra CD (can be concurrent) with a "C" or better, or science teacher recommendation

This course is designed to meet the needs of students who are strong in science, yet seek preparation for chemistry or physics coursework. It enables students to achieve understanding of the most fundamental physical processes and scientific thought through laboratory-based experiences as well as classroom instruction. The content emphasizes conceptual physics, chemistry, and geoscience that relates to everyday life. Application of these areas to technology and social concerns are also included. The course represents a practical, rather than theoretical approach to the physical sciences.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Physical Oceanography — 4026

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Previous science and Algebra 1-2 or Algebra CD (can be concurrent) with a "C" or better, or science teacher recommendation

Students study the earth and ocean basins, waves and tides, physical and chemical properties of seawater, oceanic circulation, and ocean transportation. This course also helps to acquaint students with the occupational opportunities present in the marine sciences and related fields.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Physical Science 1-2 — 4011

### Physical Science 1-2 SDAIE — 4013

### Physical Science 1-2 SDAIE/PLS — 4010

### (\*\*Physical Science 1-2 SDC — 5012)

**Length of Course:** 2 Semesters  
**Grade Level Options:** 9, 10, 11, 12  
**Prerequisite:** None

This course studies the characteristics and utilization of matter and energy, the composition and uses of common materials, forces and motion, and the expanding field of space technology. Included are studies of the earth's history, natural features, climate, astronomy, and oceanography. Students develop awareness of growing technological advances and possible career choices. Understanding is enhanced by involving students in the inquiry approach. Laboratory activities are used whenever possible.

*Meets the Physical/Earth Science graduation requirement*

## Physics 1-2 — 3841

### Physics 1-2 Honors — 3837

**Length of Course:** 2 Semesters  
**Grade Level Options:** 10, 11, 12  
**Prerequisite:** Algebra 1-2 or Algebra CD and Geometry 1-2 with a "C" or better, or science teacher recommendation. Honors requires a "B" or better.

This course is a standards-based study of fundamental physics concepts, such as measurement, calculation, and graphing in kinematics and dynamics, propagation and conservation of energy and momentum, gravitation and orbital mechanics, heat and thermodynamics, waves, optics, electromagnetic phenomena, and relativity and quantum physics. Emphasis is placed on the utilization of mathematical, analytical, data acquisition, graphical, and communication skills as well as interdisciplinary approaches to discovery. Concepts and skills are reinforced by a strong emphasis on hands-on laboratory experiences and the integration of other branches of science. Applications to society, individuals, and the utilization of technology are included. Physics fulfills both the physical science high school graduation requirement and the UC/CSU "d" laboratory science requirement. A course in the biological sciences is also needed to complete the minimum graduation requirement for high school.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Physics "B" AP — 3839

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11, 12  
**Prerequisite:** Algebra 1-2 or Algebra CD, Geometry 1-2, and Intermediate Algebra with grades of "B" or better

This course covers a comprehensive list of topics from both classical and modern physics at a college freshman level in preparation for the Advanced Placement Exam. A knowledge of algebra and basic trigonometry is re-

quired; the basic ideas of calculus may be introduced in connection with physical concepts, such as acceleration and work. Understanding of the basic principles involved and ability to apply these principles in the solution of problems are major goals of the course.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at **most** of the nation's colleges and universities.*

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Physics "C": Mechanics AP — 3840

**Length of Course:** 2 Semesters

**Grade Level Options:** 11, 12

**Prerequisite:** Calculus or concurrent enrollment

This course provides the conceptual basis, content knowledge, and methodological skills for understanding the theoretical and analytical aspects of general physics. Emphasis is on mechanics and/or electricity and magnetism in preparation for the AP Physics C Examination. Other topics can include kinetic theory and thermodynamics, waves and optics, and modern physics.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at **most** of the nation's colleges and universities.*

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Physics "C": Electricity & Magnetism AP — 3843

**Length of Course:** 2 Semesters

**Grade Level Options:** 11, 12

**Prerequisite:** Calculus or concurrent enrollment

AP Physics C is a national calculus-based course in physics. This course is equivalent to the pre-engineering introductory Physics course for the university students. The emphasis is on understanding of the concepts and skills and using concepts and formulae to solve problems. Laboratory work is an integral part of this course. Students engage in inquiry-based activities to develop their understanding of the material of the course. Students work together in small groups to solve problems. Students present solutions to the class.

*Students who pass the AP exam have the opportunity to earn credit or advanced standing at **most** of the nation's colleges and universities.*

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## Principles of Engineering 1-2 — 3898

**Length of course:** 2 Semesters

**Grade Level Option:** 11-12

**Prerequisite:** Intermediate Algebra 1-2 and Chemistry with a "B" or better

This course surveys the major areas of engineering including civil, mechanical, electrical and chemical.

It brings math, science and technology together and enhances general technological/scientific literacy. Students will focus on applied chemistry and physics throughout the course. A major emphasis will be placed on hands on laboratory discovery of principles and practices and data collection and interpretation. In addition to the major engineering concepts, the course will emphasize technology/ society interaction, design and ethics.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## PLTW: Introduction to Engineering Design — 2501

**Length of course:** 2 Semesters

**Grade Level Option:** 9-12

**Prerequisite:** None

Project Lead the Way (PLTW) Introduction to Engineering Design course includes the following topics: introductory design, student portfolio development, sketching and visualization, geometric relationships, modeling, assembly modeling, model analysis and verification, model documentation, presentation, production, and marketing. These units represent a comprehensive introduction to the field of engineering design using computer aided design (CAD) tools.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## PLTW: Principles of Engineering — 2632

**Length of course:** 2 Semesters

**Grade Level Option:** 9-12

**Prerequisite:** None

Project Lead the Way (PLTW) Principles of Engineering course includes the following topics: definitions and types of engineering, communication and documentation, design process, engineering systems, statics and strengths of materials, materials and strength of materials, engineering for reliability, and kinematics. These topics represent a comprehensive introduction to the field of engineering.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved



## PLTW: Digital Electronics — 2507

**Length of course:** 2 Semesters  
**Grade Level Option:** 10-12  
**Prerequisite:** None

Project Lead the Way (PLTW) Digital Electronics course includes the following topics: electronics fundamentals, number systems, logic gates, Boolean algebra, combinational circuit design, binary addition, flip-flops, shift registers and counters, logic families and microprocessors. These topics represent a comprehensive introduction to the field of digital electronics.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## PLTW: Computer Integrated Manufacturing

**Length of course:** 2 Semesters  
**Grade Level Option:** 10-12  
**Prerequisite:** PLTW Intro. to Eng. Design and PLTW Prin. of Eng.

Project Lead the Way (PLTW) Computer Integrated Manufacturing is an industry specialized course that enhances computer modeling skills by applying principles of robotics and automation to the creation of models of three-dimensional designs.

*This course will meet the "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## PLTW: Engineering Design and Development — 2509

**Length of course:** 2 Semesters  
**Grade Level Option:** 11-12  
**Prerequisite:** PLTW Intro. to Eng. Design and PLTW Prin. of Eng.

Project Lead the Way (PLTW) Engineering Design and Development is a capstone course designed to draw upon the sum of the student's knowledge and skills acquired in previous PLTW courses.

*This course will meet the "d" or "g" entrance requirement for the University of California and California State University systems.*

NCAA Approved

## INTEGRATED SCIENCE

### Directed Research in Science — 4060

**Length of Course:** 2 Semesters  
**Grade Level Options:** 11-12  
**Prerequisite:** Completion or current enrollment in a life or physical science course and/or permission of instructor

This course is designed for students seeking experiences in science-related study outside the normal confines of a regular science classroom. Students will participate in extracurricular activities outside the school day, such as National Science Bowl, National Science Olympiad, District and County Science Fairs, LACOE Environmental Science Day, etc. Students design and conduct scientific experiments with the guidance of the instructor using a variety of resources such as university libraries, interviews with working scientists and other professionals, Internet research, etc. Students also research career opportunities in the sciences and related fields. This course provides in-depth study of selected topics which may not be covered in the normal course of science study. Students engage in a college-style seminar format where they present and defend their research to their peers and have an opportunity to listen to constructive criticism and amend their projects. This course encourages long-term study and research and therefore may be repeated for up to 20 units in high school, but this will be exceptional and only with the permission of the instructor. The average student will earn approximately 2.5 per semester and the maximum per semester will be 5.

