All students in the district will benefit from a relevant and coherent science education that promotes twenty-first-century skills, scientific literacy, and an appreciation and wonder for science.

Students must have the opportunity to do science through the use of the Science and Engineering Practices. They are expected to grow their skills in the investigative practices (asking questions, planning and carrying out investigations, and using mathematics and computational thinking) from the simple tasks of making observations to the complex tasks of creating simulations to test their predictions. Students need to make sense of their science learning through modeling, constructing explanations, and analyzing and interpreting data. Finally, students should learn to critique their work, the work of others, public resources, and other relevant materials, using the practices of engaging in argument from evidence and critically evaluating resources.

Science instruction from transitional kindergarten through grade 12 should reflect the conceptual shifts of the Next Generation Science Standards (NGSS). These include science education that reflects the interconnected nature of science, the use of NGSS standards as performance expectations, coherent science content from grade to grade with a focus on depth and the application of acquired science knowledge, integration of engineering practices into science instruction, alignment with the Common Core State Standards, and a focus on preparing students for college, career, and citizenship.

STANDARDS

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for students in grades TK–12. The board adopted the New Generation Science Standards in 2013. These performance expectations outline how students should practice and think about science concepts. The California NGSS, a conceptual framework, and other resources are available at: www.cde.ca.gov/pd/ca/sc/ngssintrod.asp

CONTENTS

This section is divided into the following subsections:

- Elementary courses (grades TK–6), arranged by grade level, p. SCI-2
- Middle-level courses (grades 5–8), arranged alphabetically, p. SCI-5
- Senior high courses (grades 9–12), arranged alphabetically, p. SCI-10
Elementary Science Courses (Grades TK–6)

Strands (Themes) Emphasized

<table>
<thead>
<tr>
<th>Grade Required</th>
<th>TK</th>
<th>K</th>
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<th>3</th>
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<tr>
<td>Engineering</td>
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<tr>
<td>Grade 6 elementary curriculum should follow the recommendations for grade 6 middle school.</td>
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Strands (Themes) Emphasized

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<td>Life science</td>
<td>Life science</td>
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<tr>
<td>Engineering</td>
<td>Engineering</td>
</tr>
</tbody>
</table>

COURSE DESCRIPTION

Using the same curriculum materials provided to kindergarten classes, the TK science program focuses more narrowly on the foundational big ideas of the content and on the science skills of asking questions, making observations, and sharing ideas.

BASIC TEXTS AND TEACHING GUIDES


BASIC TEXTS AND TEACHING GUIDES

GRADE 1
STRANDS EMPHASIZED
Physical science
Earth science
Life science
Engineering

COURSE DESCRIPTION
By the end of first grade, students understand materials come in different forms (solids, liquids, and gases); plants and animals meet their needs in different ways; and weather can be observed, measured, and described. They record observations, collect data, and explain their thinking using pictures, numbers, bar graphs, and written statements. They describe two positions of an object (e.g., above and next to), refine their observations when discrepancies exist, and draw pictures that portray some features of the object.

BASIC TEXTS AND TEACHING GUIDES

GRADE 2
STRANDS EMPHASIZED
Physical science
Earth science
Life science
Engineering

COURSE DESCRIPTION
By the end of second grade, students understand the motion of objects can be observed and measured; plants and animals have predictable life cycles; and Earth is made of materials that have distinct properties and provide resources for human activities. They observe, diagram, and record data using magnifiers and metric measurement tools. They compare and sort common objects by two attributes (e.g., color, shape, texture, size, or weight), identify patterns, and make predictions. They record data using bar graphs with appropriately labeled axes and follow oral instructions for a scientific investigation.

BASIC TEXTS AND TEACHING GUIDES

GRADE 3
STRANDS EMPHASIZED
Physical science
Earth science
Life science
Engineering

COURSE DESCRIPTION
By the end of third grade, students understand that energy and matter have multiple forms and can be changed from one form to another; light has a source and travels in a direction; adaptations in physical structure or behavior may improve an organism’s chance for survival; living organisms depend on one another and on their environment for survival; and objects in the sky move in regular and predictable patterns. Students repeat observations to collect accurate data, make predictions, analyze the data, compare results, and develop logical conclusions. They understand that scientific investigation is based on evidence, not opinion.

BASIC TEXTS AND TEACHING GUIDES

GRADE 4
STRANDS EMPHASIZED
Physical science
Earth science
Life science
Engineering

COURSE DESCRIPTION
By the end of fourth grade, students understand that electricity and magnetism are related effects that have many useful applications in everyday life; all organisms need energy and matter to live and grow; living organisms depend on one another and on their environment for survival; the properties of rocks and minerals reflect the processes that formed them; and waves, wind, water, and ice shape and reshape Earth’s surface. Students follow written instructions for a scientific investigation. They collect data using
measurement and estimation and use graphs to interpret the data. They form and test predictions (in multiple trials) and draw conclusions about their evidence.

BASIC TEXTS AND TEACHING GUIDES

GRADE 5
STRANDS EMPHASIZED
Physical science
Earth science
Life science
Engineering

COURSE DESCRIPTION
By the end of fifth grade, students understand that elements and their combinations account for all the varied types of matter in the world; plants and animals have structures for respiration, digestion, waste disposal, and transport of materials; water on Earth moves between the oceans and land through the processes of evaporation and condensation; energy from the sun heats earth unevenly, causing air movements that result in changing weather patterns; and the solar system consists of planets and other bodies that orbit the sun in predictable paths. Students plan, conduct, and write reports of simple investigations using independent and controlled variables, appropriate measurement tools, and graphs. They support their conclusions with evidence from qualitative and quantitative data.

BASIC TEXTS AND TEACHING GUIDES

GRADE 6
STRANDS EMPHASIZED
Earth science
Life science
Physical science
Engineering

COURSE DESCRIPTION
In this general science course students learn concepts in physical, life, and earth sciences. Students conduct experiments utilizing appropriate tools, technology, and graphs and communicate their conclusions orally and in writing. Students continue to develop their abilities to conduct inquiry, create explanations based on evidence, and understand the nature of science. Students use the concepts of patterns, structure and function, and systems to explore and build their understanding of science.

BASIC TEXTS AND TEACHING GUIDES

SUPPLEMENTAL RESOURCES
Middle-level Science Courses (Grades 5–8)
Sequence of Districtwide Courses*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>5†</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td>Science 5th (6210)</td>
<td>Science 6th (6006)</td>
<td>Science 7th (6003)</td>
<td>Science 8th (6005)</td>
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<tr>
<td>Science 7th — Computers and Technology 1.2 (6008, 6009)</td>
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<td></td>
<td>Science 8th Advanced (6041)</td>
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</tbody>
</table>

* Pilot courses and courses approved by the Board of Education to be offered at specific sites only are also described below. Please note that other schools may not offer these courses without prior approval from the Interdivisional Curriculum Committee.
† For students in grade 5 at schools that use a secondary-type master schedule.

The following course descriptions are arranged alphabetically. Refer to the chart above for guidance.

CONSERVATION SCIENCE I (6033)
Grade level: 7
Prerequisites: None
Course duration: Two semesters

COURSE DESCRIPTION

Site-adopted Course. Approved for Millennial Tech Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

Conservation Science I is a full-year science elective that supports and augments students’ understanding of physical and chemical properties. The course is intended to expand course offerings and bolster the pilot site’s STEM magnet theme. The focus of the Conservation Science I course is on wastewater, groundwater contamination, and water pollution. Students will participate in the San Diego City Water Department’s “Sewer Science Program.” Students will also spend hands-on time at Groundwork San Diego’s Chollas Creek outdoor learning lab helping out with the Cactus Wren Conservation Project.

CONSERVATION SCIENCE II (6036)
Grade level: 8
Prerequisites: Conservation Science I
Course duration: Two semesters

COURSE DESCRIPTION

Site-adopted Course. Approved for Millennial Tech Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This full-year science elective builds on concepts introduced in Conservation Science I, using the theme of materials and the environment as its jumping-off point. Students in this course will examine toxic and non-toxic waste issues associated with electronics manufacturing, including the handling and disposal of electronic waste, environmental impacts and health risks, as well as food safety, solar energy and conservation of matter. Students will explore the city’s Miramar landfill and participate in an ongoing solar project being conducted by Groundwork San Diego at its Chollas Creek outdoor learning lab.

DISCOVERY SCIENCE (6460)
Grade level: 5–6
Prerequisites: None
Course duration: Two semesters
Science 2016–2017

COURSE DESCRIPTION

**Site-adopted Course.** Approved for Dana Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

Discovery Science is an elective course designed to provide students with additional time to explore key scientific concepts in more depth than is possible in their regular, grade-level science courses. This enrichment course, which is taught concurrently with a student's fifth- or sixth-grade science course, also allows students to engage in hands-on activities that support the processes of scientific inquiry. This site-adopted course is funded by the Point Loma Cluster Foundation.

**ENVIRONMENTAL SCIENCE 7TH–8TH (6437)**

**Grade level:** 7–8  
**Prerequisites:** None  
**Course duration:** Two semesters

COURSE DESCRIPTION

**Pilot Course.** Approved for Correia Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This elective science course introduces students to the Earth’s systems and resources and the various ways they change over time. The overarching themes of conservation and sustainability connect the units of study, while local environmental issues form the framework, since hands-on projects and activities are an important part of the course’s instructional strategy. An ongoing project over the length of the course will be the school garden, which students will work in every Friday. Students will also participate in various course-related extracurricular activities, such as beach clean ups and campus beautification, and will be required to complete at least one such activity to earn a passing grade. The goal of the course is to encourage students to become “environmentally literate” citizens; ones who routinely take the environment into account as they go about their everyday lives.

**INTRODUCTION TO ASTRONOMY (6483X)**

**Grade level:** 6  
**Prerequisites:** None  
**Course duration:** Six weeks

COURSE DESCRIPTION

**Site-adopted Course.** Approved for Millennial Tech Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This six-week course is one of three courses that make up a sixth-grade wheel supporting the school’s STEM magnet focus. The curriculum for this course is designed to aid student learning in Earth science, and includes a unit that examines how technology is used in space exploration. The course is offered in conjunction with Intro to Meteorology (6484X) and Intro to Web Design (3650X).

**INTRODUCTION TO METEOROLOGY (6484X)**

**Grade level:** 6  
**Prerequisites:** None  
**Course duration:** Six weeks

COURSE DESCRIPTION

**Site-adopted Course.** Approved for Millennial Tech Middle School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This six-week course is one of three courses making up a sixth-grade wheel that supports the approved site’s STEM magnet focus. This course utilizes the hands-on, inquiry based Jason curriculum to teach students about the effects of weather. This wheel course is offered in conjunction with Intro to Astrology (6483X), and Intro to Web Design (3650X).

**PROJECTS—MESA (8059)**

**Grade level:** 6–8  
**Prerequisites:** None  
**Course duration:** Two semesters

COURSE DESCRIPTION

**Site-adopted Course.** Approved for Challenger, Knox, Millennial Tech, and Montgomery Middle Schools. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This two-semester course is part of the statewide Math, Engineering, and Scientific Achievement (MESA) program, which seeks to increase the number
of middle and high school students who excel in math and science. The program is administered through an agreement with San Diego State University, and all associated costs are borne by the pilot sites. During the first semester of the course, students focus on designing, implementing, and analyzing an experiment to enter in the Greater San Diego Science Fair. In the second semester, they follow MESA-developed curriculum that reinforces California state mathematics and science standards through hands-on projects. The course culminates in a local MESA Days competition, in which these grade-specific projects vie for awards with those from other local MESA-program schools.

SCIENCE 5TH (6210)
Grade level: 5
Prerequisites: None
Course duration: One or two semesters

COURSE DESCRIPTION
This course is for fifth-grade students in a middle school scheduling environment. By the end of fifth grade, students understand elements and their combinations account for all the varied types of matter in the world; plants and animals have structures for respiration, digestion, waste disposal, and transport of materials; water on Earth moves between the oceans and land through the processes of evaporation and condensation; energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns; and the solar system consists of planets and other bodies that orbit the sun in predictable paths. Students plan, conduct, and write reports of simple investigations using independent and controlled variables, appropriate measurement tools, and graphs. They support their conclusions with evidence from qualitative and quantitative data.

BASIC TEXTS AND TEACHING GUIDES

SCIENCE 6TH (6006)
Grade level: 6
Prerequisites: None

SCIENCE 7TH (6003)
Grade level: 7
Prerequisites: None
Course duration: Two semesters

COURSE DESCRIPTION
This general science course allows grade 7 students to meet the requirement for completion of one year of science. Students extend their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They learn concepts in physical, life, and earth sciences. Students are given the opportunity to explain the relationships of these topics to their daily lives. A variety of inquiry-based technology experiences are used to promote learning for all students. Students use the concepts of energy and matter and cause and effect to explore and build their understanding of science.

BASIC TEXTS AND TEACHING GUIDES

SUPPLEMENTAL RESOURCES
SCIENCE 7TH—COMPUTERS AND TECHNOLOGY 1,2 (6008, 6009)
Grade level: 7
Prerequisites: None
Course duration: Two semesters

COURSE DESCRIPTION
Science 7th—Computers and Technology is a two-semester, technology-oriented course in general science. Students extend their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They are given the opportunity to explain the relationships of these topics to their daily lives. The course integrates computers into the science curriculum using a technology-rich approach that increases students’ scientific and technological literacy while preparing them for success in the increasingly technology-driven world of the 21st century.

BASIC TEXTS AND TEACHING GUIDES

SUPPLEMENTAL RESOURCES

SCIENCE 8TH (6005)
Grade level: 8
Prerequisites: None
Course duration: Two semesters

COURSE DESCRIPTION
This general science course allows grade 8 students to meet the requirement for completion of one year of science. Students extend their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They learn concepts in physical, life, and earth sciences. Students are given the opportunity to explore the relationships of these topics to their daily lives. A variety of strategies and experiences will be used that promote learning for all students. Students use the concepts of stability and change and scale, proportion, and quantity to explore and build their understanding of science.

BASIC TEXTS AND TEACHING GUIDES
InterActions in Physical Science, It’s About Time, 2009.

SUPPLEMENTAL RESOURCES

SCIENCE 8TH ADVANCED (6041)
Grade level: 8
Prerequisites: Interest in science and successful achievement in previous courses
Course duration: Two semesters

COURSE DESCRIPTION
This general science course allows grade 8 students to meet the requirement for two semesters of science. It is an accelerated course offered to interested and high achieving science students. Students extend their abilities in investigation, inquiry, and the nature of science, emphasizing in particular the quality of explanations and citing of evidence for these explanations. Concepts in physical, life, and earth sciences are explored in depth. Students use the concepts of stability and change and scale, proportion, and quantity to explore and build their understanding of science.

BASIC TEXTS AND TEACHING GUIDES
InterActions in Physical Science, It’s About Time, 2009.

SUPPLEMENTAL RESOURCES

SCIENCE AND TECHNOLOGY 6TH IB (6086)
Grade level: 6
Prerequisites: None
Course duration: Two semesters

COURSE DESCRIPTION
Site-adopted Course. Approved for Pacific Beach Middle School. This course is part of the International Baccalaureate magnet program at this site and is not available to other schools.

This course is required for all grade 6 students at the approved site.

This course is the first in a three-year series of integrated courses designed to meet the science and technology requirements of the International Baccalaureate (IB) Middle Years Programme (MYP). Concepts in earth, life, and physical sciences are explored. In this foundational course, students acquire basic computer proficiency skills by using
computer technology to extend their ability to conduct scientific experiments and develop explanations based on evidence. In order to satisfy the IB MYP 50-hour technology requirement, this course is taught during a 70-minute extended period every day for the entire year.

**BASIC TEXTS AND TEACHING GUIDES**


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### SCIENCE AND TECHNOLOGY 7TH IB (6087)

**Grade level:** 7  
**Prerequisites:** None  
**Course duration:** Two semesters

**COURSE DESCRIPTION**

**Site-adopted Course.** Approved for Pacific Beach Middle School. This course is part of the International Baccalaureate magnet program at this site and is not available to other schools.

This course is required for all grade 7 students at the approved site.

This course is the second in a three-year series of integrated courses designed to meet the science and technology requirements of the IB Middle Years Programme. Students explore concepts in life, earth, and physical science. This course builds on skills developed in the first-year course, with course content taught through the means of guided scientific inquiry. Technology use and design are embedded into the curriculum. In order to satisfy IB MYP time requirements, this course is taught during a 70-minute extended period every day for the entire year.

**BASIC TEXTS AND TEACHING GUIDES**


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### SCIENCE AND TECHNOLOGY 8TH IB (6088)

**Grade level:** 8  
**Prerequisites:** None  
**Course duration:** Two semesters

**COURSE DESCRIPTION**

This course is required for all grade 8 students at the approved site.

This course is the last in a three-year series of integrated courses designed to meet the science and technology requirements of the IB Middle Years Programme. Students explore concepts of physical, earth, and life sciences. While this course continues to build on the technology competencies mastered by students in the second-year course, the emphasis is on scientific inquiry. Students in this course participate in hands-on explorations and experiments, manipulate models and simulations, research and read about the work of other scientists, and create graphic organizers in preparation for taking advanced physics in ninth grade. In order to satisfy IB MYP time requirements, this course is taught during a 70-minute extended period every day for the entire year.

**BASIC TEXTS AND TEACHING GUIDES**

High School Science Courses (Grades 9–12)

Sequence of Districtwide Courses*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>9</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>Biology 1,2</td>
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<td>Biology 1,2 Advanced</td>
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<td>Earth Science 1,2</td>
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<tr>
<td>Physics 1,2</td>
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<tr>
<td>Science Research Techniques 1,2</td>
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</tbody>
</table>

| Science Research Techniques 1,2 |   |    |    |    |
| AP Physics I A,B (6349, 6350) |   |    |    |    |
| AP Physics II A,B (6359, 6360) |   |    |    |    |
| Biology 1,2 AP (6191, 6192) |   |    |    |    |
| Chemistry 1,2 AP (6291, 6292) |   |    |    |    |
| Environmental Science 1,2 AP (6455, 6456) |   |    |    |    |
| Marine Science 1,2 (6441, 6442) |   |    |    |    |
| Physics C 1,2 AP (6393, 6394) |   |    |    |    |
| Physiology 1,2 (6151, 6152) |   |    |    |    |

* Pilot courses and courses approved by the Board of Education to be offered at specific sites only are also described below. Please note that other schools may not offer these courses without prior approval from the Interdivisional Curriculum Committee.

† This course is currently accepted by the University of California as meeting its d (laboratory science) entrance requirement. However, each district high school seeking recognition by the university of this course for its students must include the course on its individual UC-approved list.

§ This course is currently accepted by the University of California as meeting its g (electives) entrance requirement. However, each district high school seeking recognition by the university of this course for its students must include the course on its individual UC-approved list.

** Students who are sufficiently advanced in their mathematics and science preparation may, with the permission of the instructor and their parents, take AP Physics I A,B or Chemistry 1,2 AP in grade 10 as their first course in these subjects.

Districtwide Courses in Grades 9–12 that Meet SDUSD High School Graduation Requirements for Science

Six semester credits (3 years) required: one year of life science (biology or other University of California [UC]-approved laboratory science course in the ‘d’ subject area); one year of physical science (physics, chemistry, or other UC-approved laboratory science course in the ‘d’ subject area); and one additional year of UC-approved science coursework in the ‘d’ (laboratory science) or ‘g’ (elective) subject areas.

<table>
<thead>
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<th>Additional Science Courses</th>
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<td>AP Physics II A,B</td>
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<td>Chemistry 1,2</td>
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<td>Chemistry 1,2 AP</td>
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<td>Physics 1,2</td>
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<tr>
<td></td>
<td>Physics C 1,2 AP</td>
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</tbody>
</table>

* UC and California State University consider this course to be “interdisciplinary” rather than a life science or a physical science. Because of prerequisites, students will meet the district’s life science and physical science requirements before they take this course.
The following course descriptions are arranged **alphabetically**. Refer to the chart on page SCI-10 for guidance.

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**AP PHYSICS I A,B (6349, 6350)**

| Grade level: | 11–12 |
| Prerequisites: | Integrated Math II or equivalent; concurrent enrollment in Integrated Math III; no prior coursework in physics is required |
| Course duration: | Two semesters |
| Type of graduation credit earned: | Science; weighted |

**COURSE DESCRIPTION**

**Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject area requirement.

AP Physics I is equivalent to the first semester of a typical introductory, algebra-based college physics course. The course gives teachers the time to foster greater depth of conceptual understanding through the use of student-centered, inquiry-based instruction. Twenty-five percent of instructional time is spent in laboratory work. The course explores such topics as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; and quantum, atomic, and nuclear physics.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**AP PHYSICS II A,B (6359, 6360)**

| Grade level: | 11–12 |
| Prerequisites: | AP Physics I A,B (6349, 6450) |
| Course duration: | Two semesters |
| Type of graduation credit earned: | Science; weighted |

**COURSE DESCRIPTION**

**Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject area requirement.

AP Physics II is equivalent the second semester of an introductory, algebra-based college physics course. This course provides teachers with time to foster deep conceptual understanding through student-centered, inquiry-based instruction. Twenty-five percent of instructional time is spend in laboratory work. The course explores such topics as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; and quantum, atomic, and nuclear physics.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**BIOLOGY 1,2 (6111, 6112)**

| Grade level: | 9–12 |
| Prerequisites: | None |
| Course duration: | Two semesters |
| Type of graduation credit earned: | Science |

**COURSE DESCRIPTION**

**College Preparatory Course (P).** This course meets the University of California’s d (laboratory science) subject area requirement.

This introductory course is designed to meet college entrance requirements and prepare students for the worlds of school, work, and citizenship. It builds on physical science concepts, and emphasizes mechanisms for the functioning and continuity of organisms. Unifying themes of biology are stressed (evolution, homeostasis, energy, matter and organization, continuity, development, and ecology) and the application and relevance of biology to students’ lives and to society. Inquiry and the nature of science are important content elements.

Students study human impacts on the environment and the co-evolution of life and the Earth. Class organization is student centered. Learning begins with questions and includes students interacting with science using the science and engineering practices. All student activities have clearly defined goals for both the content material and thinking skills involved. Multiple forms of assessment, including authentic assessment, are used. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures.

**BASIC TEXTS AND TEACHING GUIDES**

SUPPLEMENTAL RESOURCES
Science Safety Handbook for California High Schools,

BIOLOGY 1,2 ADVANCED (6121, 6122)
Grade level: 9–12
Prerequisites: None
Course duration: Two semesters
Type of graduation credit earned: Science

COURSE DESCRIPTION
College Preparatory Course (P). This course meets the University of California’s d (laboratory science) subject area requirement.

This is a first-year course intended for students with the interest and ability to extend their study of biology beyond the basic course, and/or who are contemplating a science-related career but are not prepared to take Advanced Placement Biology as their first biology course. It covers all the elements of the regular course, including the same inquiry and cooperative strategies, but its pace will be faster, it will go into greater depth in selected areas, and it will be more quantitative. The course addresses state science standards.

BASIC TEXTS AND TEACHING GUIDES

SUPPLEMENTAL RESOURCES
Science Safety Handbook for California High Schools,

BIOLOGY 1,2 AP (6191, 6192)
Grade level: 11–12
Prerequisites: Chemistry 1,2 and Biology 1,2, or equivalents; the commitment to succeed in rigorous AP content. Some students with high achievement in Chemistry 1,2 may qualify to take this as their first course in biology.
Course duration: Two semesters
Type of graduation credit earned: Science; weighted

COURSE DESCRIPTION
Honors Preparatory Course (HP). This course meets the University of California’s d (laboratory science) subject area requirement.

The AP Biology course is equivalent to a two-semester college introductory biology course. Students successful in this course attain a deep grasp of fundamental biological concepts that focuses on enduring, conceptual understanding and the content that supports it. This approach enables students to spend less time on factual recall and more time on inquiry-based learning of essential concepts, and helps them develop the reasoning skills necessary to engage in the science practices used throughout their study of AP Biology.

Materials used for this course differ qualitatively from those used in other biology courses in both rigor and content and in the complexity of laboratory experiences. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures.

BASIC TEXTS AND TEACHING GUIDES

SUPPLEMENTAL RESOURCES
Science Safety Handbook for California High Schools,

BIOLOGY HL1 IB 1,2 (6197, 6198)
Grade level: 10–12
Prerequisites: None
Course duration: Two semesters
Type of graduation credit earned: Science

COURSE DESCRIPTION

Site-adopted Course. Approved for San Diego International Studies and Mission Bay High Schools. This course is specific to these schools’ International Baccalaureate magnet program and is not available to other sites.

College Preparatory Course (P). This course meets the University of California’s d (laboratory science) subject-area requirement.

This course is the first year of a two-year sequence of courses that prepares students to take the IB Biology HL (Higher Level) exam, and satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma. In this first year of study, students gain insight into the scientific concepts and principles that govern living organisms, using the techniques and approach of the scientific method.

BIOLOGY HL2 IB 1,2 (6199, 6196)
Grade level: 11–12
Prerequisites: Biology HL1 IB 1,2
Course duration: Two semesters
Type of graduation credit earned: Science; weighted
BIOTECHNOLOGY 1,2 (6458, 6459)
Grade level: 11–12
Prerequisites: Biology 1,2 and Chemistry 1,2
Course duration: Two semesters
Type of graduation credit earned: Science

COURSE DESCRIPTION

Pilot Course. Approved for Mira Mesa and Serra High Schools. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

Honors Preparatory Course (HP). This course meets the University of California’s d (laboratory science) subject-area requirement.

This is the second year of a two-year sequence of courses that prepares students to take the IB Biology HL (Higher Level) exam, and satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma. In the second year of study, students use the scientific method to explore real-life applications of the concepts and principles introduced in Biology HL1. They perform laboratory experiments, complete group projects, and demonstrate their understanding of the fundamental concepts of biology, both orally and in writing.

CHEMISTRY 1,2 (6211, 6212)
Grade level: 9–12
Prerequisites: Integrated Math I or equivalent
Course duration: Two semesters
Type of graduation credit earned: Science

COURSE DESCRIPTION

College Preparatory Course (P). This course meets the University of California’s d (laboratory science) subject-area requirement.

This introductory course is designed to meet college entrance requirements and prepare students for the worlds of school, work and citizenship. Students learn the fundamental concepts and knowledge of chemistry through thematic units that develop thinking and analytical skills as well as traditional chemistry subject matter and problem solving. Students study the relationship of chemistry to plate tectonics and ocean acidification. They use the science and engineering practices to deepen their understanding of science. Inquiry and the nature of science are emphasized, and all student activities have clearly defined goals for both the content material and thinking skills involved. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures.

CHEMISTRY 1,2 AP (6291, 6292)
Grade level: 11–12
Prerequisites: Chemistry 1,2, Physics 1,2, Integrated Math I and II or equivalents; commitment to succeed in rigorous AP content; concurrent enrollment in college-preparatory mathematics
Course duration: Two semesters
Type of graduation credit earned: Science; weighted
**COURSE DESCRIPTION**

**Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject area requirement.

In this second-year chemistry course, students are challenged with learning activities equivalent to those of a general chemistry course they would usually take during their first year of college. The AP Chemistry course promotes enduring, conceptual understanding and the content that supports it. This approach enables students to spend less time on factual recall and more time on inquiry-based learning of essential concepts, and helps them develop the reasoning skills necessary to engage in the science practices used throughout their study of AP Chemistry. Those successfully completing this course will attain a depth of understanding of chemical concepts, significant laboratory experiences, and knowledge of current directions that will prepare them for the Advanced Placement Test in General Chemistry.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**CHEMISTRY HL1 IB 1,2 (6295, 6296)**

**Grade level:** 11–12  
**Prerequisites:** Integrated Math I and concurrent enrollment in Integrated Math III or equivalent  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**

*Site-adopted Course.* Approved for San Diego International Studies and Mission Bay High Schools. This course is specific to these schools’ International Baccalaureate magnet program and is not available to other sites.

- **College Preparatory Course (P).** This course meets the University of California’s d (laboratory science) subject-area requirement.
- This course forms the first year of a two-year sequence of courses that prepares students to take the IB Chemistry HL (Higher Level) exam. In this first year of study, students gain insight into the principles and concepts of chemistry and organic chemistry—the chemical and physical properties of materials in our environment and how they interact. This course satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma.

**CHEMISTRY HL2 IB 1,2 (6297, 6298)**

**Grade level:** 11–12  
**Prerequisites:** Chemistry HL1 IB 1,2  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science; weighted

**COURSE DESCRIPTION**

- **Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject-area requirement.

This honors-level course represents the second year of a two-year (mandatory) sequence of courses that prepares students to take the IB Chemistry HL (Higher Level) exam. This second year of study provides more in-depth instruction in the principles of chemistry, with a particular focus on organic chemistry. Students in this course will perform laboratory experiments, create group projects, and demonstrate their knowledge of fundamental chemistry concepts, both orally and in writing. This course satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma.

**CHEMISTRY 1,2 HONORS (6221, 6222)**

**Grade level:** 9–12  
**Prerequisites:** Above-average achievement in previous science course(s) and in Integrated Math I or equivalent; Physics 1,2 and Chemistry 1,2 recommended; concurrent enrollment in Integrated Math II or equivalent recommended; a desire to succeed in a rigorous college-level course environment  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science; weighted

**COURSE DESCRIPTION**

- **Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject area requirement.
Successful completion of this course earns recognition of honors (i.e., weighted) credit by the University of California. Courses meeting UC criteria for honors designation must be comparable in workload and emphasis to Advanced Placement, International Baccalaureate, or introductory college courses. A course syllabus, with laboratory activities, and a district-prepared, comprehensive end-of-course examination are required.

Students who complete this course successfully will gain a depth of understanding of chemical concepts and processes. They will also develop their critical thinking and analytical skills. The class includes experimental laboratory activities, class discussions, reading, and critical analysis leading to deeper understanding, and it emphasizes human inquiry and the nature of science.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**EARTH SCIENCE 1,2 (6023, 6024)**

*Grade level: 9–12*

*Prerequisites: None*

*Course duration: Two semesters*

**Type of graduation credit earned: Science**

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**COURSE DESCRIPTION**

College Preparatory Course (P). This course meets the University of California’s g (elective) subject area requirement.

Earth Science provides an overview of the areas of astronomy, chemistry, geology, oceanography, meteorology, and paleontology, and provides a foundation for further study in physics, chemistry, biology, and environmental science. Students in this course will investigate and supplement their understanding by conducting and analyzing experiments and using technology to collect data and communicate ideas.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**EARTH SCIENCE 1,2 ADVANCED (6026, 6027)**

*Grade level: 9–12*

*Prerequisites: Successful completion of Integrated Math I and completion of or concurrent enrollment in Integrated Math II.*

*Course duration: Two semesters*

**Type of graduation credit earned: Science**

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**COURSE DESCRIPTION**

Site-adopted Course. Approved for Mira Mesa and Kearny DMD High Schools. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

College Preparatory Course (P). This course meets the University of California’s g (elective) subject area requirement.

This two-semester, standards-based laboratory science course is a more rigorous version of the regular Earth Science course currently offered. Topics covered include astronomy, dynamic Earth processes, energy in the earth’s systems, biogeochemical cycles, structure and composition of the atmosphere, and California geology. Emphasis will be placed on the use of mathematics and graphical analysis in each of these major content areas.

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**ENVIRONMENTAL SCIENCE 1,2 AP (6455, 6456)**

*Grade level: 11–12*

*Prerequisites: Successful completion of Chemistry 1,2 and Biology 1,2, or equivalents*

*Course duration: Two semesters*

**Type of graduation credit earned: Science; weighted**

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**COURSE DESCRIPTION**

Honors Preparatory Course (HP). This course meets the University of California’s d (laboratory science) subject area requirement.

This advanced-level course is designed as the equivalent of a one-semester college-level course in environmental science. It provides students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems, to evaluate the relative risks associated
with these problems, and to examine solutions for resolving or preventing them.

Environmental Science 1,2 Advanced Placement will provide students with an additional laboratory science option at the advanced-placement level, as well as an opportunity to explore their local environments and global environmental issues. Students who normally do not enroll in Advanced Placement courses may select this course as a result of their interest in environmental issues.

Note: The Career Technical Education department is currently offering a version of this AP course under course numbers 8448, 8449.

**BASIC TEXTS AND TEACHING GUIDES**


**ENVIRONMENTAL SYSTEMS AND SOCIETIES SL 1,2 IB (6427, 6428)**

**Grade level:** 11–12  
**Prerequisites:** Integrated Math I; Biology 1,2; and either Physics 1,2 or Chemistry 1,2  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**

Pilot Course. Approved for Mission Bay High School. This course is specific to the school’s International Baccalaureate magnet program and is not available to other sites.

College Preparatory Course (P). This course meets the University of California’s d (laboratory science) subject-area requirement.

This International Baccalaureate (IB) course provides students with a comprehensive overview of the global environment and the impact humans have had on it. Interdisciplinary by nature, it allows students to satisfy two of the three Standard Level (SL) subject requirements for the IB diploma: Group 3 (Individuals and Society) and Group 4 (Experimental Sciences).

Basic Texts and Teaching Guides


**GIS AND OCEANOGRAPHY 1,2 (6331, 6332)**

**Grade level:** 11–12  
**Prerequisites:** Completion of, or concurrent enrollment in, GIS and Global Technologies (8291, 8292)  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Elective

**COURSE DESCRIPTION**

Site-adopted Course. Approved for Kearny SCT High School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

Global Information Systems and Oceanography is intended for students who have already completed their high school graduation requirements in science and are interested in pursuing an interdisciplinary course that builds on their previous GIS course training. This course allows students to put GIS data collection to use in high-level scientific research in Earth and environmental sciences. Students enrolled in this course will engage in ongoing oceanographic research at the Applied Ocean Science Lab of the Scripps Institution of Oceanography (SIO) and will use current and historical oceanographic data sets from the SIO and government agencies to answer questions about weather patterns, climate, and changes in organic and inorganic marine resources.

**MARINE SCIENCE 1,2 (6441, 6442)**

**Grade level:** 11–12  
**Prerequisites:** Successful completion of Biology 1,2 or equivalent and either physics or chemistry; interest in marine science  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**

College Preparatory Course (P). This course meets the University of California’s d (laboratory science) subject area requirement.

This course builds on the physical science and life science concepts learned in previous science courses and applies that knowledge to the exploration of the living and nonliving environments of our bays and...
oceans. Students will participate in a variety of learning experiences, including laboratory experiments, discussions, field trips, projects, independent research, and appropriate use of community resources. Ethical and social issues related to the marine environment may be addressed.

**BASIC TEXTS AND TEACHING GUIDES**

**SUPPLEMENTAL RESOURCES**

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**MARINE SCIENCE 3,4 (6443, 6444)**
Grade level: 11–12
**Prerequisites:** Marine Science 1,2; Chemistry 1,2; and Physics 1,2
**Course duration:** Two semesters
**Type of graduation credit earned:** Elective

**COURSE DESCRIPTION**
This two-semester elective course takes an in-depth look at living and nonliving things that affect the marine environment. The course focuses on the origin of the earth and the oceans, marine geology, sea-floor spreading and plate tectonics, as well as chemical, physical, botanical, and biological oceanography. It also provides an opportunity for yearlong investigations of plankton populations and earthquake epicenters by students. The curriculum includes science-fair projects and field trips.

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**PHYSICS 1,2 (6311, 6312)**
Grade level: 9–12
**Prerequisites:** Integrated Math I or equivalent
**Course duration:** Two semesters
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**
This two-semester laboratory science course is more rigorous and mathematically demanding than the basic physics course. It is designed to provide an introductory experience to the processes of investigating the physical world and the understandings derived from those processes. The emphasis is on developing a qualitative conceptual understanding of general principals and models and of the nature of scientific inquiry. The core content addresses the topics of motion and forces, the conservation of energy and momentum, heat and thermodynamics, waves and electric and magnetic phenomena. Students also engage in studying the physics of space while using the science and engineering practices.
conservation of energy and momentum, heat and thermodynamics, waves and electric and magnetic phenomena. Students also study the physics of space while using the science and engineering practices.

**BASIC TEXTS AND TEACHING GUIDES**

**SUPPLEMENTAL RESOURCES**

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**PHYSICS C 1,2 AP (6393, 6394)**

**Grade level:** 11–12  
**Prerequisites:** Successful completion of Precalculus 1-2, Precalculus 1-2 Honors, or concurrent enrollment in calculus or another higher-level mathematics course  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science; weighted

**COURSE DESCRIPTION**

**Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject area requirement. This course is the equivalent of a college-level physics course that provides a foundation for college students who will major in the physical sciences or engineering. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. The course is more intensive and analytic than AP Physics I. The subject matter of the Physics C course is mechanics and electricity and magnetism, with approximately equal emphasis in the two areas.

**BASIC TEXTS AND TEACHING GUIDES**

**SUPPLEMENTAL RESOURCES**

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**PHYSICS HL1 IB 1,2 (6395, 6396)**

**Grade level:** 11–12  
**Prerequisites:** None  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**

**Site-adopted Course.** Approved for San Diego International Studies and Mission Bay High Schools. This course is specific to these schools’ International Baccalaureate magnet program and is not available to other sites.

**College Preparatory Course (P).** This course meets the University of California’s d (laboratory science) subject-area requirement.  
This college prep course is the first year of a two-year sequence of courses that prepares students to take the IB Physics HL (Higher Level) exam. In this first-year of study, students focus on the concepts of matter; forces and motion; waves; electricity; and thermal and nuclear physics. The course emphasizes problem solving through familiarity with classical applications in the lab. This course satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma.

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**PHYSICS HL2 IB 1,2 (6397, 6398)**

**Grade level:** 11–12  
**Prerequisites:** Physics HL1 IB 1,2  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science; weighted

**COURSE DESCRIPTION**

**Site-adopted Course.** Approved for San Diego International Studies and Mission Bay High Schools. This course is specific to these schools’ International Baccalaureate magnet program and is not available to other sites.

**Honors Preparatory Course (HP).** This course meets the University of California’s d (laboratory science) subject-area requirement.  
This two-semester course represents the second year of a two-year sequence of courses that prepares students to take the IB Physics HL (Higher Level) exam. It provides more in-depth instruction in the physics concepts and applications introduced in Physics HL1 IB 1,2, and introduces the additional topics of optics and Einstein’s theories of relativity. Lab work continues, with an increasing emphasis on student experimental designs. The course satisfies the Group 4 (Experimental Sciences) requirement for the International Baccalaureate diploma.
**PHYSIOLOGY 1,2 (6151, 6152)**

**Grade level:** 11–12  
**Prerequisites:** Physics 1,2 or Chemistry 1,2, and Biology 1,2, or equivalents  
**Course duration:** Two-semester course  
**Type of graduation credit earned:** Science

**COURSE DESCRIPTION**

**College Preparatory Course (P).** This course meets the University of California’s (laboratory science) subject area requirement.

The body systems of humans and animals are used as examples of systems necessary for the growth and maintenance of life. These systems are studied in terms of their general structures and functions in living things. Emphasis is placed on the evolutionary sequence of particular organs, tissues and functions so the student can grasp the concept of homology and the evidence by which scientists unite organisms into evolutionary groups. The biochemical functions of human systems are covered in relation to human pathologies and wellness.

**BASIC TEXTS AND TEACHING GUIDES**


**SUPPLEMENTAL RESOURCES**


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**PHYSIOLOGY 1,2 HONORS (6153, 6154)**

**Grade level:** 11–12  
**Prerequisites:** Biology 1,2 (6111, 6112) with a grade of C or better; Chemistry 1,2 (6211, 6212) with a grade of C or better  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science; weighted

**COURSE DESCRIPTION**

**Site-adopted Course.** Approved for all schools in the Kearny High Educational Complex. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

Principles of Technology is a laboratory-based course in physics and electronics taught through hands-on experience. Instruction focuses on the application of physical principles to four energy systems—mechanical, fluid, thermal, and electrical—and uses both simple and complex technological devices to develop an understanding of these principles. The curriculum also covers the math skills that are needed in order to understand and apply these physics principles.

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**SCIENCE RESEARCH TECHNIQUES 1,2 (BIOLOGY, CHEMISTRY, OR PHYSICS) (6431, 6432)**

**Grade level:** 10–12  
**Prerequisites:** Satisfactory completion of a one-year course in the subject area involved; recommendation of teacher  
**Course duration:** Two semesters  
**Type of graduation credit earned:** Science
COURSE DESCRIPTION

College Preparatory Course (P). This course meets the University of California’s g (elective) subject area requirement.

Highly recommended students will work on a one-to-one basis with a science teacher to acquire knowledge, skills, and attitudes necessary for careers in science. The teacher and student will develop an individualized syllabus showing the course content, state science standards to be addressed, and the research plan. Students will prepare equipment and materials for their own laboratory investigations. Students should enter their projects to be judged for the Greater San Diego Science and Engineering Fair.

BASIC TEXTS AND TEACHING GUIDES


SCI-TECH 1,2 (6305, 6306)

Grade level: 11–12
Prerequisites: Completion of, or concurrent enrollment in, Integrated Math III or equivalent
Course duration: Two semesters
Type of graduation credit earned: Elective

COURSE DESCRIPTION

Site-adopted Course. Approved for San Diego SciTech High School. Other schools may not offer this course without prior approval from the Interdivisional Curriculum Committee.

This course explores topics in biology, chemistry and physics by challenging students to solve real-world problems rather than engaging in lab-based learning exercises. The course starts with a measurement unit in which students learn how to estimate quantities through their senses, recognize volume by sight, isolate mass by lifting and shaking, and feel forces through pushing and pulling. Subsequent units use equally novel approaches to teach concepts in biophysics, chemistry and biology.