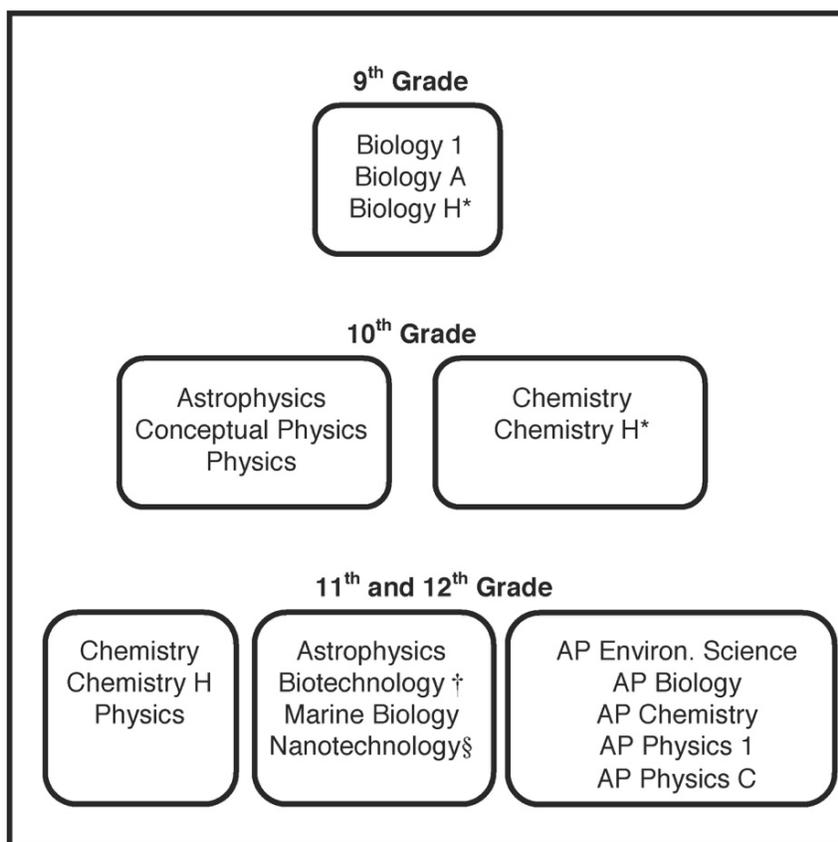


# SCIENCE

To graduate from high school, students are required to have one year of physical science and one year of life science, both of which fulfill the University of California (UC) laboratory science requirement (known as UC 'd'). Since the University of California recommends three years of lab science, students are strongly encouraged to take yearlong courses in the core sciences – biology, chemistry, and physics. All Gunn science course offerings fulfill the UC 'd' requirement.

While we encourage students to take on healthy challenges in their science course selection, strict policies regarding adding or dropping courses once the semester has begun are enforced. (See page 6 for lane change information.) For this reason, students should carefully consider their course choices. To assist with this process, in each course description, the Science Department has listed course prerequisites and homework time commitment expectations.

## Course Offerings



† The course description can be found in the CTE section of the catalog (page 16)

§ Nanotechnology is only offered second semester during H period (after school)

\* Neither Bio H nor Chem H earn weighted credit with The University of California

## Science Prerequisites

CHEMISTRY PREREQUISITES		
Chemistry	Chemistry H	AP Chemistry
<p>Successful completion of a biology course</p> <p>A <i>strong</i> understanding of introductory algebra</p> <p>Concurrent enrollment in or successful completion of a geometry course strongly recommended</p>	<p>Successful completion of a biology course</p> <p>A <i>very strong</i> understanding of introductory algebra, logarithms, and scientific notation Concurrent enrollment in or successful completion of a geometry course strongly recommended</p>	<p>Successful completion of Chemistry H or Chemistry</p> <p>A very strong understanding of first year Chemistry (see course description)</p> <p>A very strong knowledge of algebra and a high confidence in problem solving skills</p> <p>Successful completion of a second-year algebra course (Alg 2 or higher)</p>

PHYSICS PREREQUISITES			
Conceptual Physics	Physics	AP Physics 1	APC Physics
<p>Successful completion of a biology course</p> <p>Completion of 1 year of algebra (not necessarily C or above)</p> <p>May be concurrently enrolled in an algebra course</p>	<p>Successful completion of a biology course</p> <p>A very strong understanding of introductory algebra</p> <p>Concurrent enrollment in Geometry or higher level math</p>	<p>Concurrent enrollment or successful completion of IAC, Analysis Honors, or Calculus</p> <p>Successful completion of any Biology course</p> <p>Chemistry course recommended</p>	<p>Concurrent enrollment or successful completion of a calculus course</p> <p>Successful completion of any Biology course</p> <p>Chemistry course recommended</p> <p>Physics course recommended</p>

OTHER PREREQUISITES					
AP Bio	APES	Biotech <sup>†</sup>	Marine Biology	Nanotechnology <sup>§</sup>	Astrophysics
<p>Successful completion of a biology course</p> <p>Successful completion of a first-year chemistry course at Gunn High School</p>	<p>Successful completion of a biology course</p> <p>Successful completion of a first-year chemistry course at Gunn High School</p>	<p>Successful completion of a biology and a chemistry course (or department approval)</p> <p><i>† Please see CTE section for course description</i></p>	<p>Successful completion of biology <u>and</u> physical science course (chemistry or physics) or permission of instructor</p>	<p>Successful completion of a biology and chemistry course (or permission of instructor)</p> <p><i>§ Offered second semester H period only (after school)</i></p>	<p>Successful completion of a biology course</p> <p>Successful completion of one year of algebra</p>

## First-Year Biology Courses

Freshmen at Gunn High School take a biology course. First-year biology courses will vary in depth of coverage of each topic, degree of independent learning, and amount of homework required. The following table shows predictors for success:

<b>PREDICTORS FOR SUCCESS IN EACH FIRST-YEAR BIOLOGY COURSE</b>			
<b>Predictor</b>	<b>Biology 1</b>	<b>Biology 1A</b>	<b>Biology H</b>
<b>Average # of homework hours per week reported by students</b>	2 Hours	2-3 Hours	3-5 Hours
<b>Degree of independent learning and academic responsibility</b>	Significant structure provided by the teacher	Independence; moderate structure provided by the teacher	High level of independence and organization required of the student
<b>Homework structure</b>	Homework based on material learned in class	Homework based on material learned in class	Homework is pre-learning for next lesson in order to delve more deeply into the topic of study
<b>Intended preparation for future courses.</b>	College preparatory biology course and is paced at grade level	Advanced college preparatory biology course; paced at high grade level	Accelerated college preparatory course; paced far above grade level

## Advanced Biology Courses

Each advanced biology course is an upperclassman course (grades 11-12) that requires students to have successfully completed a biology course and a chemistry or other physical science course. The following table shows both prerequisites and predictors of success.

<b>PREREQUISITES &amp; PREDICTORS OF SUCCESS FOR ADVANCED BIOLOGY COURSES</b>			
<b>Predictor</b>	<b>AP Biology</b>	<b>Marine Biology</b>	<b>Biotechnology</b>
<b>Prerequisites</b>	Successful completion of a biology course and a chemistry course	Successful completion of a biology and a physical science course (chemistry recommended, but not required)	Successful completion of a biology and a chemistry course (or department approval)
<b>Commitment to hours of required homework per week</b>	5-8 hours	1 hour	No assigned homework
<b>Degree of independent learning and academic responsibility</b>	College-level expectation of independence and collaboration with peers	Independence; moderate structure provided by the teacher	Independence; moderate structure provided by the teacher
<b>Intended preparation for future courses</b>	College-level course	College preparatory course; paced at grade level	College preparatory course; paced at grade level

## Chemistry Courses

Both first-year chemistry courses cover the same fundamental concepts but differ in the degree of analysis, quantitative understanding and independent thinking required of students.

PREREQUISITES & PREDICTORS OF SUCCESS FOR CHEMISTRY COURSES			
Predictor	Chemistry	Chemistry Honors	AP Chemistry
<b>Prerequisite courses and description of math skills required</b>	Successful completion of a biology course  A <i>strong</i> understanding of introductory algebra  Concurrent enrollment in or successful completion of a geometry course strongly recommended	Successful completion of a biology course  A <i>very strong</i> understanding of introductory algebra, logarithms, and scientific notation  Concurrent enrollment in or successful completion of a geometry course strongly recommended	Successful completion of Chemistry H or Chemistry  A <i>very strong</i> understanding of first year Chemistry. (See course description)  A <i>very strong</i> knowledge of algebra and a high confidence in problem solving skills  Successful completion of a second-year algebra course (Alg 2 or higher)
<b>Degree of independent learning and academic responsibility</b>	Limited Guidance Needed	Self- Motivated; high degree of independence	Independent Learner
<b>Commitment to hours of required homework per week (discretionary out of class study time is not included)</b>	2-3 hours per week Assigned HW: 1-2 h Lab reports: 1 h	3-4 hours per week Assigned HW: 2 h Lab reports: 1-2 h	3-6 hours per week

## Physics Courses

All physics courses cover mechanics and electromagnetism. With the exception of AP Physics C, physics courses may also include other topics, such as optics, waves, and modern physics. Additional emphasis may be placed on thermodynamics, astronomy, and other physics-related or interdisciplinary topics at the discretion of the instructor. Each course develops basic physics concepts and explores applications to daily life.

PREREQUISITES & PREDICTORS OF SUCCESS FOR PHYSICS COURSES				
Predictor	Conceptual Physics	Physics	AP Physics 1	AP Physics C
<b>Math Prerequisites</b>	Concurrent enrollment in an introductory algebra course or above	A very strong understanding of introductory algebra  Concurrent enrollment in Geometry or higher level math	Concurrent enrollment or successful completion of IAC, Analysis Honors, or Calculus	Concurrent enrollment or successful completion of a calculus course
<b>Science Prerequisites</b>	Successful completion of any Biology course	Successful completion of any Biology course	Successful completion of any Biology course  Chemistry course recommended	Successful completion of any Biology course  Chemistry course recommended  Physics course recommended

Predictor	Conceptual Physics	Physics	AP Physics 1	AP Physics C
Degree of independent learning and academic responsibility	Limited Guidance Needed	Limited Guidance Needed	Self-Motivated	Independent Learner
Commitment to hours of required homework per week	1 hour per week	1-2 hours per week	3-5 hours per week	4-7 hours per week

## Science Elective Courses

PREREQUISITES & PREDICTORS OF SUCCESS FOR SCIENCE ELECTIVE COURSES			
Predictor	Astrophysics	APES	Nanotech
Prerequisites	Successful completion of a biology course; successful completion of one year of algebra	Successful completion of a biology course  Successful completion of a first-year chemistry course at Gunn High School	Successful completion of a biology and chemistry course
Commitment to hours of required homework per week	1 hour	3-5 hours	3 hours
Degree of independent learning and academic responsibility	Limited Guidance Needed	College-level expectation of independence and collaboration with peers	College-level expectation of independence and collaboration with peers

## BIOLOGY

All biology courses at Gunn High School meet the graduation and university lab science requirements for life science.

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### **BIOLOGY I (3108)**

(UC Approved "d")

Year

### **BIOLOGY IA (3115)**

### **BIOLOGY IA SLC (3215)**

### **BIOLOGY H (3131)**

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In all three biology courses topics include cell biology, genetics, evolution, biodiversity ecology, life processes, reproduction and contemporary advances and issues in cellular biology and biotechnology. Topics will be developed through laboratory exercises, discussions, lectures, demonstrations, informational research projects, and field trips. Scientific skills and methods will be emphasized.

Biology 1A SLC is the section of Biology 1A that is integrated in the "Small Learning Community" Program. See page 67 for a description of the "Small Learning Community" Program.

- *Prerequisites:* Open to grade 9
- *Homework Expectation:* Ranging from 2 to 5 hours per week depending on level. See "Predictors for Success in Each First-Year Biology Course" chart on page 39.
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7
- This class is a college prep course

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**AP BIOLOGY (3139)***(UC Approved "d")*Year

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This course is designed to provide a survey of biological knowledge at an introductory college level. Because successful completion of the curriculum will enable students to take the College Board Advanced Placement Examination, the course follows the outline recommended by the College Board, covering the general content areas of: (1) Molecular and Cellular Biology; (2) Genetics and Evolution; and (3) Organisms and Populations.

Heavy emphasis is placed on understanding the connection between experimentation and scientific discovery. Both hands-on laboratory activities and scientific readings are used to show how biological information is gained, interpreted, and applied. Required homework includes extensive reading, activities, regular written lab reports, and occasional group projects.

- *Prerequisites:* Open to grades 11 and 12. Successful completion of a biology course. Successful completion of a first-year chemistry course at Gunn High School. (Exceptions must be approved by both the Science Department Instructional Supervisor and the Guidance Department.)
- *Homework Expectation:* 5-8 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

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**MARINE BIOLOGY (3168)***(UC Approved "d")*Year

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Marine Biology is a second-year biology course that builds upon and extends biological concepts developed during the first year. Students will take an in-depth look at the features of the ocean and the variety of plant and animal life that lives within. They will investigate how life in the ocean is interconnected and the impact that humans have on that system. Topics will be developed through laboratory exercises, discussions, lectures, demonstrations, informational research projects, and field trips. Please note, this is a laboratory science class where scientific skills and methods (including data analysis and laboratory write-ups) will be emphasized.

- *Prerequisites:* Successful completion of Biology and a physical science course (Conceptual Physics, Astrophysics, Chemistry, Chemistry H, Physics, Physics H)
- *Homework Expectation:* 1 hour per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

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**BIOTECHNOLOGY: THEORY & PRACTICES (3955)***(UC Approved "d")*Year

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Course description in the CTE section of this catalog. See page 16.

## CHEMISTRY

All chemistry courses meet the physical science graduation requirement, and all university lab science admission criteria.

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**CHEMISTRY (3624)***(UC Approved "d")*Year

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This course meets all graduation and university admission criteria for physical science.

Topics covered generally include atomic structure, nuclear chemistry, chemical nomenclature, periodic properties of elements, bonding, states of matter, gas laws, solutions chemistry, chemical reactions, thermodynamics and kinetics of reactions, chemical equilibrium and acid-base reaction. (Note: same topics as Chemistry Honors).

The course includes many laboratory experiments and demonstrations. Students learn how to work safely in the laboratory, how to perform basic laboratory operations, how to organize and interpret data, and how to draw conclusions from experimental results.

Chemistry is sufficient preparation for students wanting to take AP science courses. Chemistry Honors is not required.

- *Prerequisites:* Successful completion of a Biology course. Successful completion of an introductory algebra course, leading to a strong understanding of introductory algebra. Concurrent enrollment in or completion of a geometry course highly recommended. Consent of department required for exceptions.
- *Homework Expectation:* 2-3 hours per week (assigned homework: 1-2 hours; lab reports: 1 hour)
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

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**CHEMISTRY HONORS (3625)***(UC Approved "d")*Year

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This course meets all graduation and university admission criteria for physical science.

Chemistry H does not earn a weighted grade from the University of California.

Chemistry Honors is not required for students wanting to take AP science courses; Chemistry is sufficient for this purpose.

Chemistry Honors covers all material that is covered in Chemistry, but with more depth and breadth. Topics like quantum mechanics, molecular geometry, thermodynamics, kinetics, dynamic equilibrium and electrochemistry are covered in further detail at a level that prepares students for the SAT-2 Chemistry exam.

Students should take Chemistry Honors if they have a strong interest in the sciences, prefer a high level of rigor in their studies, and are able to accommodate their schedules for a much more significant time commitment than Chemistry would entail.

- *Prerequisites:* Successful completion of a biology course. Successful completion of an introductory algebra course, leading to a very strong understanding of introductory algebra, including logarithms and scientific notation. Concurrent enrollment in a geometry class or completion of geometry highly recommended.
- *Homework Expectation:* 3-4 hours per week (assigned homework: 2 hours; lab reports: 1-2 hours)
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

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**AP CHEMISTRY (3609)***(UC Approved "d")*Year

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This course meets all graduation and university admission criteria for physical science and will prepare students to take the AP Chemistry examination

Life is Chemistry! In general chemistry, much of what we learn is foundational, but this will not be your typical lecture based chemistry course. The educational philosophy behind the course lies in hands-on learning, and inquiry, which will challenge all types of learners. Therefore students will be spending at least 40% of their time on laboratory work, some of which may need to be completed outside of class. The expectation for this class is to have second year chemistry students who are excited about learning chemistry, love being in lab, and are willing to work through challenges.

**IMPORTANT NOTE:** *The AP Chemistry course is taught through lab performance and analysis. Students are required to utilize the knowledge taught in their first-year chemistry course, as that material will not be retaught.*

- *Prerequisites:* Successful completion of Chemistry OR Chemistry H and a very strong understanding of first-year chemistry. Successful completion of a second-year algebra course (Alg 2 or higher). Students need a strong knowledge of algebra and a high confidence in problem-solving skills.
- *Homework Expectation:* 3 to 6 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

## PHYSICS

All physics courses meet the physical science graduation requirement, and all university lab science admission criteria.

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**CONCEPTUAL PHYSICS (3254)***(UC Approved "d")*Year

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This course meets all graduation and university admission criteria for physical science.

Conceptual Physics is intended to meet the needs of those students who are still developing their basic algebraic skills in a first-year algebra course. It provides a rudimentary introduction to the fundamental principles of physics and how they apply to our daily lives. Topics covered include motion, forces, energy, waves, optics, electricity, and magnetism. Primary emphasis is placed on developing a conceptual understanding of topics, though simple mathematical formulas will be introduced and used to augment their understanding of how nature works. In such cases, use of these formulas will support the development of algebraic skills and provide reinforcement for material covered in introductory algebra courses.

- *Prerequisites:* Successful completion of a biology course. Completion of 1 year of algebra. Consent of department required for exceptions. Concurrent enrollment in a geometry or higher math course recommended. Consent of department required for exceptions.
- *Homework Expectation:* 1 hour per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

### **PHYSICS (3820)**

(UC Approved “d”)

Year

This course meets all graduation and university admission criteria for physical science.

The goal of Physics is to develop a conceptual understanding of the fundamental principles of physics. Students will explore these concepts in the laboratory and will apply them in problem-solving situations and in explaining physical phenomena in their daily lives. Students should be confident with the knowledge and application of introductory algebra.

- *Prerequisites:* Successful completion of Biology. A very strong understanding of introductory algebra. Concurrent enrollment in geometry or higher level math.
- *Homework Expectation:* 1 to 2 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

### **AP PHYSICS I (3824)**

(UC Approved “d”)

Year

This course meets all graduation and university admission criteria for physical science.

The course is designed to foster deeper conceptual understanding of physics topics through inquiry, quantitative data analysis, and problem solving. The course will teach students to relate conceptual and pictorial understanding to mathematical descriptions used in the practice of physics. Students will engage in scientific questioning and evidence-based reasoning to guide their understanding of the content.

This course will also prepare students to take the AP Physics 1 exam.

- *Prerequisites:* Successful completion of any Biology course. Chemistry course recommended. Concurrent enrollment or successful completion of IAC, Analysis Honors, or Calculus.
- *Homework Expectation:* 3 to 5 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

### **AP PHYSICS C (3879)**

(UC Approved “d”)

Year

This course meets all graduation and university admission criteria for physical science.

AP Physics C is an advanced physics course, taught with calculus, equivalent to a course taken by physics majors and engineers at most universities. It concentrates on Mechanics and Electricity and Magnetism, two semesters of the usual college curriculum. Students with particular strengths in math and science, and students with a serious intent to major in science or engineering should consider this course. The course prepares students to take the Advanced Placement physics examinations in Mechanics and/or Electricity and Magnetism.

- *Prerequisites:* Concurrent enrollment or completion of a calculus course. Successful completion of any biology course. Chemistry course recommended. Physics course recommended.
- *Homework Expectation:* 4 to 7 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

## **OTHER SCIENCE ELECTIVES**

### **ASTROPHYSICS (6409)**

(UC Approved “d”)

Year

This course meets all graduation and university admission criteria for physical science.

This course is a hands-on, inquiry based laboratory course that will introduce students to concepts in Astronomy while exploring the fundamental principles that govern the physical universe. The course will emphasize the processes of science including observation and experimentation, gathering and evaluating data, interpreting scientific data,

searching for patterns, developing and interpreting models, making conclusions based on evidence, and communication of scientific process, ideas and conclusions. The course will highlight the historical development of scientific thinking, cumulative nature of scientific evidence and the evolution of our current understanding of the physical universe. The topics covered in this course include, the scientific process, celestial motions, history of Astronomy, planetary mechanics, the nature of light, telescopes, survey of the solar system, detail study of our Moon and Mars, our Sun as a star, properties of stars, stellar evolution, galaxies and cosmology.

- *Prerequisites:* Successful completion of a biology course; successful completion of one year of algebra
- *Homework Expectation:* 1 hour per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

**AP ENVIRONMENTAL SCIENCE (3279)**  
**AP ENVIRONMENTAL SCIENCE (3279B)\***

(UC Approved “d”)  
 (UC Approved “d”)

Year  
 Year

AP Environmental Science is structured to provide a survey of earth’s geology and history, its environmental processes, disturbances to these processes, impact of human population on the environment and governmental regulation of local and international environmental issues.

The course follows the outline recommended by the College Board and is designed to enable students to successfully take the College Board Advanced Placement Examination.

Course content, laboratory activities, textbook assignments, activities and projects will all be carried through with the skill and content required to be successful on the AP exam.

*\*This is the Blended Learning version of this course. As a Blended Learning course, class will meet 1-3/week during the regular school day. For more information regarding Blended Learning, please see page 68.*

- *Prerequisites:* Successful completion of a biology course. Successful completion of a first-year chemistry course at Gunn High School. (Exceptions must be approved by both the Science Department Instructional Supervisor and the Guidance Department.)
- *Homework Expectation:* 3 to 5 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7

**NANOTECHNOLOGY 10 (3835)**

(UC Approved “g”)

Semester

Since this is a college-level course, this course will introduce upper-division high school students to the key ideas of nanoscale science with an emphasis on applications of topics from physics, biology, chemistry, mathematics, and environmental science. Key concepts will be explored in an integrated discussion-lab setting as opposed to a strict lecture-based format. These concepts will include exploring the myths and realities of nanotechnology, self-assembly, nanomagnets, scanning probe microscopy, nano-engineered fabrics and memory wires, biomimicry, and nano-medicine. This is a dual enrollment course offered by Foothill College and gives students 10 high school credits. Students will also receive college credit through Foothill College which is UC/CSU transferrable.

This course will be offered “H” period.

- *Prerequisites:* Successful completion of Biology and Chemistry or Physics
- *Homework Expectation:* 3 hours per week
- *District SLOs Addressed in this Course:* 1, 2, 3, 4, 5, 6, 7