SCIENCE

COURSE OFFERINGS

	Suggested Grade Levels	Credits Earned	UC/CSU	Prerequisites/Notes
Integrated Science	9	10	◉	Elective credit
Biology	11-12	10		
Advanced Biology	9-10	10	◉	Algebra 1/IMP 1 recommended
IB Biology SL/HL	11-12	10	◉	Chemistry/AP Chemistry or Adv. Bio
AP Biology	10-12	10	◉	Chemistry
Biotechnology 1/2	11	10	◉	"g" requirement
Biotechnology (ROP) 3/4	12	10	◉	"g" requirement
Honors Human Anatomy/Physiology	11-12	10	◉	Chemistry/AP Chemistry and Adv. Bio/AP Bio.
AP Environmental Science	11-12	10	◉	Chemistry/AP Chemistry and Adv. Bio/AP Bio.
Physical Science	11-12	10		
Chemistry	10	10	◉	Algebra 1/IMP 1
IB Chemistry SL/HL	11-12	10	◉	Algebra 1/IMP 1
AP Chemistry	10-12	10	◉	Algebra 1/IMP 1
Physics	11-12	10	◉	Concurrent enrollment in Math Analysis
IB Physics SL/HL*	11-12	10	◉	Concurrent enrollment in Calculus
AP Physics	11-12	10	◉	Concurrent enrollment in Calculus

*Course to be offered starting 2009-2010

Science

The following brief guide is meant to help students and their parents choose, from the broad curriculum of science courses available, those course which best meet the student's needs and plans. Students enter BHS with differing levels of academic preparation and with different academic goals. Some have had rigorous backgrounds in math and science; others have had only the most fundamental preparation. In planning which science courses to take, students and parents need to understand the following criteria and basic terminology. Please read the **Course Descriptions** carefully for specific information about each course, prerequisites and credits.

The BHS science graduation requirement is the successful completion of two years of science, one year of physical science and one year of life science. However, most four- year colleges and universities require a minimum of two years of college-preparatory (P) laboratory science from two different areas, and many recommend three years. Some of the science courses offered by the BHS science department will meet the BHS graduation requirement, but do not include labs and are not rigorous enough to count towards college admission eligibility requirement. BHS science courses designated as "D", as in Chemistry (P), are rigorous lab courses that fulfill the college science eligibility requirement as well as BHS graduation requirement.

All of the courses offered by the BHS science department will help to meet BHS graduation requirements, **but only courses designated as "D" meet the UC/CSU college science admission eligibility requirement and BHS graduation requirement.** Specifically,

- General Science Classes such as Biology 1 and Physical Science meet the BHS graduation requirement but do not meet college science admissions requirements.
- Physical Science courses such as: Chemistry (P), or Advanced Placement Chemistry (P), and Physics (P) or Advanced Placement Physics (P), are lab sciences, and do count towards college science admissions eligibility.
- Life Science courses such as: Advanced Biology (P) or Advanced Placement Biology (P) and Honors Human Anatomy/Physiology (P) are lab sciences, and count towards college science admissions eligibility.
- Advanced Placement Courses, such as AP Biology (P), AP Environmental Science (P), AP Physics (P), and AP Chemistry (P) prepare students to take an "Advanced Placement" examination which may allow for college credit for the course taken. Because of the difficulty of these courses, some colleges increase the student's grade point by 1.0. **Restrictions on Advanced Placement:** Enrollment in AP courses results in a yearlong commitment and required submission of test results for the corresponding AP test. Students must attend an informational meeting in the spring before the course, at which they will be given a sample assignment to complete and told about the expectations of the course.
- AP Environmental Science (P) is a lab based course that may be counted as either a physical or life science and does count towards college science admissions eligibility

Please read the course descriptions carefully and pay special attention to the sections within the descriptions designated Prerequisites, Restrictions, and Advice.

Integrated Science (P) Year · 10 Credits

This is an introductory science course for freshman only which combines Earth Science, cosmology, ecology, biology, physics, and chemistry. It is especially recommended for students who wish to take college preparatory Science classes but who may need skills improvement prior to beginning those courses. This course satisfies one of the two years of science required for graduation. **Prerequisite:** None. Fulfills UC/CSU Elective (g) requirement

Biological Sciences

Biology 1 Year · 10 Credits

This course is designed around a series of experiments related to Human Biology, Evolution, Genetics, and Ecology. Experimentation is used in the development of an understanding of these topics. This course does NOT satisfy the University of California laboratory science requirement. **Prerequisite:** Grade 11-12.

Advanced Biology (P) Year · 10 Credits

This course considers the basic concepts of biology from an experimental and biochemical viewpoint. Topics include the origin of life, unity and diversity of life, bio-energetics (cell respiration, photosynthesis, enzyme functions) genetics, evolution, anatomy and physiology, and ecology. Emphasis is placed on understanding science and its role in society. Experimentation is stressed.

This is a beginning course. "Advanced" refers to the degree of difficulty of the material being covered. **Advice:** Students taking this course should have a firm grasp of the basic concepts of biology and chemistry that are typically presented in middle school. **Prerequisite:** Grade 9 or 10. Ninth graders enrolling in this course should have completed Algebra 1 or IMP 1 or equivalent with a "B" or better. It's also recommended that students who take this course in the 9th grade have a GPA of 3.0 or higher. Fulfills UC/CSU (d) requirement.

IB Biology SL/HL (P) Year · 10 Credits

This course provides students with an in-depth study of biological concepts and principles. IB Biology SL includes biochemistry, cell biology, classic genetics, molecular genetics, biotechnology, and evolution. The course focuses on the structure and function of living organisms and the interactions between organisms and their environment. It includes an in-depth study of plants and animals, including revolutionary relationships, anatomy and physiology, and the principles of ecology. A required group project will be completed in conjunction with IB chemistry and physics students. There is a strong component emphasizing the process of scientific inquiry. Students will be capable of taking the SL level IB exam in the spring of their junior year, and the HL level IB exam in the spring of their senior year. **Prerequisites:** successful completion of Advanced Integrated Science, Chemistry, AP Chemistry or Advanced Biology with a C or better. Students who have no prior high school science experience or a different high school science experience must meet with the IB Biology teacher before enrolling in this class.

AP Biology (AP) Year · 10 Credits

AP biology is designed to be the equivalent of a college introductory biology course taken by biology majors. This course differs from Advanced Biology with respect to the textbook used, the range and depth of topics covered and the time and effort required by students. Molecular, cellular and evolution biology represent approximately 50% of the course material. Organismic and population biology is studied from a molecular, cellular and developmental viewpoint. Advice: Students taking this course should have a firm grasp of basic concepts of biology and chemistry that are typically presented in middle school. Additionally, skill in algebraic reasoning is required for success. Students must be able to recall basic facts and synthesize these into major concepts and themes. Time spent in reading the text is about twice that expected for Advanced Biology. **Prerequisites**: Grades 10-12. "C" or better in chemistry. Students who have taken Advanced Biology may take AP Biology as a junior or senior. Enrollment in AP Biology is a yearlong commitment and requires submission of test results for the corresponding AP test. Students must attend an informational meeting in the spring before the course, at which they will be given a sample assignment to complete and told about the expectations. This course fulfills UC/CSU Laboratory Science (d) requirement.

Biotechnology 1/2 (P) Year · 10 Credits

The course centers around the following areas: Laboratory measurement and calculation, energetics of life, growth and reproduction, structural basis of function in living systems, chemistry of living systems, quantitative problem solving and data acquisition and display. Issues of career development, ethics and technology will also be stressed. Restrictions: Admission to this class is limited to 11th graders who have been enrolled in the Biotechnology Academy. Priority will be given to students residing in south and west Berkeley. Selection criteria will include interest in biotechnology-related careers and past performance in science and math. **Prerequisites**: Grade 11. C" average in two years of college preparatory math. This course fulfills UC/CSU Elective (g) requirement.

Biotechnology (rop) 3/4 (P) Year · 10 Credits

This course covers chemistry and biochemistry concepts related to biotechnology, genetics, DNA transformations, protein purification techniques, cell growth and monitoring techniques, immunology and other aspects of biotechnology. **Prerequisites**: Grade 12. Admission to the course is restricted to students who have successfully completed Biotech 1 and 2 with a "B" or better. This course fulfills UC/CSU Elective (g) requirement.

Honors Human Anatomy and Physiology (HP)
Year · 10 Credits

An honors elective course devoted to the in-depth study of the human body with applications from histology, bacteriology, and chemistry. Major systems of the human body are stressed using requisite materials from many of the animal phyla. Extensive laboratory exercises are provided as well as collateral examinations of current studies in the human sciences. Individual student research investigations are encouraged. **Advice:** Students enrolling in this course should realize that it is a college level course and as such may require more study and preparation time than required in a normal high school course. It is highly recommended that both Chemistry and Advanced Biology or AP Biology be taken prior to this course. Students who have completed a year of chemistry, biology and physics receive priority. **Prerequisites**: Grade 11-12. Student must have a grade of "B" or better in Chemistry and Advanced Biology; one year of AP science preferred. This course fulfills UC/CSU Laboratory Science (d) requirement.

AP Environmental Science (AP) Year · 10 Credits

The equivalent of an introductory college course in environmental science, this is a comprehensive, integrated exploration of biological, chemical and physical aspects of ecological issues, principles, and methods, including field study. The interdisciplinary curriculum draws on interrelationships between the natural and social sciences, and more global considerations, such as environmental justice and ethics. Topics covered include ecosystem and biome study, managing, restoring, and protecting ecosystems, energy efficiency and renewable energy, global climate change and ozone loss, water and land resources, and sustaining human societies. **Prerequisite:** Grades 11-12. Student must have completed Chemistry/AP Chemistry and Advanced Biology or AP Biology. Enrollment in AP Environmental Science is a yearlong commitment and requires submission of test results for the corresponding AP test. This course fulfills UC/CSU Laboratory Science (d) requirement.

Physical Sciences

Physical Science Year · 10 Credits

This is a survey course of physical science disciplines, mechanics, optics, sound, chemistry, astronomy, geology, meteorology and electricity. Specific topics may vary from year to year. It does NOT satisfy the University of California laboratory science requirement. Students who have completed Algebra 1 B or the equivalent with a "B" or better should take chemistry or physics. **Prerequisite:** Grades 11-12; May be used by 12th grade students to meet BHS graduation requirements.

Chemistry (P) Year · 10 Credits

This course considers information necessary for a basic understanding of the chemical behavior of matter. Such topics as atomic-molecular theory weight relations, the mole concept, the behavior of gases, solutions, the structure of matter, equilibrium, acid-base theory, oxidation-reduction reactions and chemical bonding are covered. Experimentation is stressed and is used to allow students

to discover principles for themselves. The first and second semester must be taken in sequence. **Prerequisite:** Grades 9-12. Students should have completed Algebra 1 or IMP 1 with a grade of "B" or better in both semesters or have approval of the teacher. **Advice:** Only students with strong algebra skills should take this course. Chemistry should be taken before taking AP Biology. This course fulfills UC/CSU Laboratory Science (d) requirement.

IB Chemistry SL/HL (P)

Year · 10 Credits

This course focuses on matter and its interactions. The purpose is to develop students' understanding of the physical world around them and how chemical processes take place. This understanding will be developed through lecture and laboratory investigations that will help develop the students' analytical and problem-solving abilities. Students will learn about matter, measurement, chemical names and formulae, atomic structure, the period table, chemical reactions, phases of matter, solution and chemical bonds. They will also study reaction energy, reaction rates, chemical equilibrium, acids and bases, oxidation and reduction, organic chemistry, and two optional topics selected by the teacher. A required group project will be completed in conjunction with IB biology and physics students. Students will be capable of taking the SL level IB exam in the spring of their junior year, and the HL level IB exam in the spring of their senior year. **Prerequisites**: successful completion of geometry with a B or better or Algebra 2 with a C or better. successful completion of Advanced Integrated Science, Chemistry, or Advanced Biology with a C or better. Students who have no prior high school science experience or a different high school science experience must meet with the IB Chemistry teacher before enrolling in this class.

AP Chemistry (AP)

Year · 10 Credits

This course provides an opportunity for the more able student to pursue a college level course. Emphasis is on chemistry as an intellectual activity and on the rigorous training in fundamentals needed for future work in chemistry or related fields. Topics covered include the structure of matter, reactions, descriptive chemistry and chemical calculations. The laboratory will involve individual observations of chemical substances and reactions, the recording and interpretation of data, and the calculation of results based on the obtained data. **Advice:** Chemistry should *not* be taken prior to this course. Students enrolling in this course should realize that it is a college-level course and as such may require more study and preparation time than required in a regular high school course. **Prerequisite:** Strong interest in science, very strong preparation in Algebra 1 or IMP 1. Success in this class does not require any previous knowledge of chemistry but does require good algebra, reading and problem-solving skills. Enrollment in AP Chemistry is a yearlong commitment and requires submission of test results for the corresponding AP test. Students must attend an informational meeting in the spring before the course, at which they will be given a sample assignment to complete and told about the expectations. This course fulfills UC/CSU Laboratory Science (d) requirement.

Physics (P)

Year · 10 Credits

This is a laboratory course that covers classic mechanics (motion, forces, energy and momentum) in the fall term and waves, optics, light, electricity and magnetism in the spring term through a combination of lecture/discussion, labs, demonstration and problem solving practice. The laboratory experiments emphasize hands-on applications and problem solving that help students make sense of concepts. An "Egg Drop" project/contest near the end of the fall term provides an opportunity for students to apply the classic physics they have learned in a fun and creative way. An independent research project/presentation near the end of the spring term provides and important opportunity for students to challenge themselves to learn about a physics related topic of personal interest to them. **Prerequisites**: Grades 11-12. Completion of Algebra and Geometry or equivalents with a "B" or better is recommended. Concurrent enrollment in Math Analysis or equivalent. This course fulfills UC/CSU Laboratory Science (d) requirement.

IB Physics HL (P)

Year · 10 Credits

This course focuses on developing an understanding of the universe we live in at its most basic level – all the way from the fundamental building blocks we are made of such as quarks and electrons up to the large-scale structure of universe as a whole and the set of rules governing its operation. Topics range from Newtonian Mechanics and Electro-

magnetism to Quantum and nuclear physics. The course places a strong emphasis on understanding the historical development of these ideas as well as the role of experimental design and the scientific method in developing, testing, challenging, and refining our theories of how the universe works. A required group project will be completed in conjunction with IB biology and chemistry students. Students will be capable of taking the SL level IB exam in the spring of their junior year, and the HL level IB exam in the spring of their senior year. **Prerequisites**: Concurrent enrollment or prior success in Calculus. Successful completion of Advanced Integrated Science, Chemistry, AP Chemistry, Advanced Biology or AP Biology with a C or better. Students who have no prior high school science experience or a different high school science experience must meet with the IB Physics teacher before enrolling in this class. **Offered starting in 2009-2010.**

AP Physics (AP) Year · 10 Credits

Emphasis is on the mathematical description of physical phenomena. This course covers the same range of topics as the introductory college year for physics, science, and engineering majors. Topics include mechanics, electricity and magnetism, plus some cosmology and particle physics, special relativity and other modern topics as time permits. Laboratory work is included. **Advice:** Students enrolling in this course should realize that it is a college-level course and as such may require more study and preparation than required in a regular high school course. Physics should *not* be taken prior to this course. **Prerequisites**: Strong interest in science and concurrent enrollment in or prior completion of Calculus AB and approval of instructor. Enrollment in AP Physics is a yearlong commitment and requires submission of test results for the corresponding AP test. Students must attend an informational meeting in the spring before the course, at which they will be given a sample assignment to complete and told about the expectations. This course fulfills UC/CSU Laboratory Science (d) requirement.

Note: Physics is considered an important background science course by the UC system and most four year colleges. Knowledge of physics is essential for anyone entering the sciences, including biological sciences and medicine.

Science Teaching Assistant Semester · 5 Credits

Available to students who have completed a given science course with a grade of "B" or better and the teacher's recommendation. The student will act as Teaching Assistant in the course, helping the teacher by setting up and dismantling laboratory experiments and working with small groups of students in the laboratory. The Assistant will also work with small groups of students having difficulty with specific topics in the class. Assistantships are available in all the science courses offered at Berkeley High School. This course offers school service credit. See counselor to obtain application.