

Colton Joint Unified School District Course Description
Course Description for **Advanced Placement Biology (SCI361/2)**

DEPARTMENT:	Science
GRADE:	11 and 12
LENGTH:	One year
CREDITS:	10 (Ten)
PREREQUISITE:	Biology and Chemistry or Physics

COURSE DESCRIPTION: This course meets college entrance science requirements, and is aligned to the Advanced Biology content standards. It prepares the students for the Advanced Placement test in Biology. Areas covered briefly in Biology will be reviewed and covered in greater depth. This includes such areas such as Biochemistry, Genetics, Molecular, Microbiology, Physiology, Botany, Evolution, Classification, and Ecology. Approximately 50 percent of the course are devoted to laboratory. This course is aligned with the California Science Content Standards.

EXIT CRITERIA: **Investigation and Experimentation**

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content the other four strands, students should develop their own questions and perform investigations. Students will:

- Select and use appropriate tools and technology (such as computer-linked probes, spread sheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
- Identify and communicate sources of unavoidable experimental error.
- Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Formulate explanations using logic and evidence.
- Solve scientific problems using quadratic equations, and simple trigonometric, exponential, and logarithmic functions.
- Distinguish between hypothesis and theory as science terms.

Course Description for **Advanced Placement Biology (SCI361/2)**

- Recognize the use and limitations of models and theories as scientific representations of reality.
- Read and interpret topographic and geologic maps.
- Analyze the locations, sequences, or time intervals of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).
- Recognize the issues of statistical variability and the need for controlled tests.
- Recognize the cumulative nature of scientific evidence.
- Analyze situations and solve problems that require combining and applying concepts from more than one area of science.
- Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.
- Know that when an observation does not agree with an accepted scientific theory, sometimes the observation is mistaken or fraudulent (e.g., Piltdown Man fossil or unidentified flying objects), and sometimes the theory is wrong (e.g., Ptolemaic model of the movement of the sun, moon and planets).

Cell Biology

Fundamental life processes of plants and animals depend on a variety of chemical reactions that are carried out in specialized areas of the organism's cells. As a basis for understanding this concept, students know:

- How chemiosmotic gradients in the mitochondria and chloroplast store energy for ATP production.
- How eukaryotic cells are given shape and internal organization by a cytoskeleton and/or cell wall.

Course Description for **Advanced Placement Biology (SCI361/2)**

Genetics

A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept, students know:

- How to predict the probable mode of inheritance from a pedigree diagram showing phenotypes.
- How to use data on frequency of recombination at meiosis to estimate genetic distances between loci, and to interpret genetic maps of chromosomes.

Genes are a set of instructions, encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. As a basis for understanding this concept, students know:

- Why proteins having different amino acid sequences typically have different shapes and chemical properties.

The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells. As a basis for understanding this concept, students know:

- How basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, ligation, and transformation) is used to construct recombinant DNA molecules.
- How exogenous DNA can be inserted into bacterial cells in order to alter their genetic makeup and support expression of new protein products.

Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students know:

- How to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change.

Evolution

The frequency of an allele in a gene pool of a population depends on

Course Description for **Advanced Placement Biology (SCI361/2)**

many factors, and may be stable or unstable over time. As a basis for understanding this concept, students know:

- The conditions for Hardy-Weinberg equilibrium in a population, and why these conditions are not met in nature.
- How to solve the Hardy-Weinberg equation to determine the predicted frequency of genotypes in a population, given the frequency of phenotypes.

Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept, students know:

- How to use comparative embryology, DNA or protein sequence comparisons, and other independent sources to create a branching diagram (cladogram) that shows probable evolutionary relationships.
- How several independent molecular clocks, calibrated against each other and using evidence from the fossil record, can help to estimate how long ago various groups of organisms diverged evolutionarily from each other.

Physiology

As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic), despite changes in the outside environment. As a basis for understanding this concept, students know:

- The individual functions and sites of secretion of digestive enzymes (amylases, proteases, nucleases, lipases), stomach acid, and bile salts.
- The homeostatic role of the kidneys in the removal of nitrogenous wastes, and of the liver in blood detoxification and glucose balance.
- The cellular and molecular basis of muscle contraction, including the roles of actin, myosin, Ca^{+2} , and ATP.
- How hormones (including digestive, reproductive, osmoregulatory) provide internal feedback mechanisms for homeostasis at the cellular level and in whole organisms.

Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response, students know:

Colton Joint Unified School District Course Description
Course Description for **Advanced Placement Biology (SCI361/2)**

- The roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system.

GRADING CRITERIA:	Activities	Percentages
	Lab Work/Notebook	30%
	Homework	20%
	Assessment	50%

TEXTBOOK: Title: **Biology Fifth Edition**
Author: Neil A. Campbell, Jane B. Reece, Lawrence G. Mitchell
Publisher: Addison Wesley
Copyright: 1999
Appropriate scientific articles

Revised: 7/12/90, 4/4/96, 4/20/00