Oroville Union High School District

Science Curriculum

Science - AP Biology

AP Biology

COURSE TITLE: AP Biology

LENGTH OF COURSE: One Year

TYPE OF CREDIT: Science (10 credits)

GRADE Level: 10-12

PREREQUISITE: Grade of "B" or better in College Prep Biology or instructor approval. Students who are taking Chemistry concurrently or have had Chemistry will be given preference in case of "over enrollment".

TEXTBOOK:
Biology, 6th Edition, Benjamin-Cummings, Prentice Hall, Needham, MA, 2002, ISBN # 0-8053-009-0

SUPPLEMENTARY INSTRUCTIONAL MATERIAL:
Biology, Student Study Guide 6th Edition, Benjamin-Cummings, Prentice Hall, Needham, MA, 2002, ISBN # 0-8053-6634-2
Biology 2nd Edition, CliffsAP, IDG Books Worldwide, Inc. Foster City, CA, ISBN # 0-7645-8682
Biology Laboratory Manual for Students, The College Board, College Board Publications, Plano, TX, 2002, #991461,

COURSE DESCRIPTION:
The Advanced Placement Biology course is designed to be the equivalent of a college introductory biology course usually taken by biology majors during their first year. AP Biology is an in-depth survey of molecular, cellular, organismal, and population biology. Students who pass the AP Biology exam receive six units of credit at most colleges, including the University of California.
NOTE: This course meets the U.C. "A-G" Subject" requirement.

BOARD ADOPTION DATE: JUNE 19, 2002

Molecules and Cells

Cells are the structural and functional units of life; cellular processes are based on physical and chemical changes.

Water

The learner will be able to develop an understanding of the unique chemical and physical properties of water.

Strand	Scope	Source
Chemistry of Life	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Water & the Fitness of the Environ. Ch 3 (41-51) [Textbook].

Organic Molecules in Organisms

The learner will be able to demonstrate an understanding of the biological importance of organic molecules, their synthesis, structure, and function.

Strand	Scope	Source
Chemistry of Life	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Carbon & Molecular Diversity of Life Ch 4 (52-61) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Structure & Function of Macromolecule Ch 5 (62-68) [Textbook].

Free Energy Changes

The learner will be able to demonstrate an understanding of the laws of thermodynamics and their relationship to the biochemical processes that provide energy to living systems.

Strand	Scope	Source
Chemistry of Life	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, An Introduction to Metabolism Ch 6 (87-96) [Textbook].

Enzymes

The learner will be able to demonstrate an understanding of how enzymes regulate the rate of chemical reactions and the relationship between the shape of an enzyme and its specificity. The learner will also demonstrate an understanding of the regulation of enzymes.

Strand	Scope	Source
Chemistry of Life	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Enzymes Ch 6 (96-104) [Textbook].

Prokaryotic and Eukaryotic Cells

The learner will be able to understand the similarities and differences as well as evolutionary relationship between prokaryotic and eukaryotic cells.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, A Tour of the Cell Ch 7 (108-115) [Textbook].

Membranes

The learner will be able to understand the molecular architecture of membranes, the relationship between the structure and function of membranes and the various mechanisms by which substances cross membranes.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Membrane Structure and Function [Textbook]. Ch 8 (138-154)
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Cell Communication Ch 11 (197-214) [Textbook].

Subcellular Organization

The learner will be able to understand the structure and function of various organelles and how organelles function together in cellular processes. The learner will also be able to understand the factors that limit cell size.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Study of Cells Ch 7 (116-137) [Textbook].

Cell Cycle and its Regulation

The learner will be able to understand how the cell cycle assures genetic continuity and the mechanisms of mitosis and cytokinesis. The learner will also understand how the cell cycle is regulated and how aberrations in the cell cycle can lead to tumor formation.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Cell Cycle Ch 12 (215-231) [Textbook].

Coupled Reactions

The learner will be able to understand the role of ATP in coupling the cell's anabolic and catabolic processes. The learner will also be able to understand the function of chemiosmosis in bioenergetics.

Strand	Scope	Source
Cellular Energetics	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Metabolism Ch 6 (87-105) [Textbook].

Fermentation and Cellular Respiration

The learner will be able to understand how organic molecules are broken down by catabolic pathways. The learner will also understand the role of oxygen in energy-yielding pathways and how cells generate ATP in the absence of oxygen.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Cell Resp.:Harvesting Chem. Energy Ch 9 (153-175) [Textbook].

Photosynthesis

The learner will be able to understand how photosynthesis converts light energy into chemical energy and how the chemical products of the light-trapping reactions are coupled to the synthesis of carbohydrates. The learner will also understand the kinds of photosynthetic adaptations that have evolved in response to different environmental conditions and the interactions that exist between photosynthesis and cellular respiration.

Strand	Scope	Source
Cells	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Photosynthesis Ch 10 (176-196) [Textbook].

Heredity and Evolution

Hereditary events control the passage of structural and functional information from one generation to the next.

Meiosis and Gametogenesis

The learner will be able to understand what features of meiosis are important in sexual reproduction, why meiosis is important in heredity, how meiosis is related to gametogenesis and the similarities and differences between gametogenesis and animals and gametogenesis in plants.

Strand	Scope	Source
Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Meiosis and Sexual Life Cycles Ch 13 (234-246) [Textbook].

Eukaryotic Chromosomes

The learner will be able to understand how genetic information is organized in the eukaryotic chromosome and how this organization contributes to both the continuity and variability of genetic information.

Strand	Scope	Source

Heredity	Master	The College Bopard AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Molecular Basis of Inheritance Ch 16 (287-301) [Textbook].

Inheritance Patterns

The learner will be able to understand the principal patterns of inheritance and how Mendel's work provided the foundation for modern genetics.

Strand	Scope	Source
Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Mendel and the Gene Idea Ch 14 (247-267) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Chromosomal Basis of Inheritance Ch 15 (269-285) [Textbook].

RNA and DNA Structure and Function

The learner will be able to understand how the structures of nucleic acids relate to their functions of information storage and protein synthesis. The learner will also understand the similarities and differences between prokaryotic and eukaryotic genomes.

Strand	Scope	Source
Molecular Genetics	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Molecular Basis of Inheritance Ch 16 (290-301) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, From Gene to Protein Ch 17 (303-327) [Textbook].

Gene Regulation

The learner will be able to understand some of the mechanisms by which gene expression is regulated in prokaryotes and eukaryotes.

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Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Genetics of Bacteria Ch 18 (340-351) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Eukaryotic Genomes Ch 19 (354-372) [Textbook].

Mutation

The learner will be able to understand ways genetic information can be altered and some effects of these alterations.

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Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Eukaryotic Genomes Ch 19 (369-272) [Textbook].

Viral Structure and Replication

The learner will be able to understand the structure of viruses, the major steps in viral reproduction and how viruses transfer genetic material between cells.

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Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Genetics of Viruses Ch 18 (328-340) [Textbook].

Nucleic Acid Technology and Applications

The learner will be able to understand some current recombinant technologies and some practical applications of nucleic acid technology. The learner will also be aware of legal and ethical problems that may arise from these applications.

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Heredity	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, DNA Technology and Genomics Ch 20 (375-400) [Textbook].

Early Evolution of Life

The learner will be able to understand the current biological models for the origins of biological macromolecules as well as the current models for the origins of prokaryotic and eukaryotic cells.

Strand	Scope	Source
Evolutionary Biology	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Introduction:Ten Themes-Study of Life Ch 1 (1-23) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Early Earth and the Origin of Life Ch 26 (510-525) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Origin of Species Ch 24 (464-507) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Prokaryotes:Metabolic Diversity Ch 27 (526-544) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Origins of Eukaryotic Diversity Ch 28 (545-572) [Textbook].

Evidence for Evolution

The learner will be able to understand the types of evidence that support an evolutionary view of life.

Strand	Scope	Source
Evolutionary Biology	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Introduction: Ten Themes Study of Life Ch 1 (1-23) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Origin of Species Ch 24 (464-483) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Early Earth & the Origin of Life Ch 26 (510-525) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Prokaryotes: Metabolic Diversity Ch 27 (526-543) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Origins of Eukaryotic Diversity Ch 28 (545-574) [Textbook].

Mechanisms of Evolution

The learner will be able to understand the role of natural selection and heredity in the process of evolution, the mechanisms involved in speciation and macroevolution and the different patterns of evolution that have been identified.

Strand	Scope	Source
Evolutionary Biology	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, A Darwinian View of Life Ch 22 (428-444) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Introduction to Animals Evolution Ch 23 (445-463) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Evolution of Populations Ch 24 (464-483) [Textbook].

Organisms and Populations

The relationship of structure to function is a theme that is common to all organisms; the interactions of organisms with their environment is the major theme in ecology.

Evolutionary Patterns

The learner will be able to understand the major body plans of plants and animals.

Strand	Scope	Source
Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, A Darwinian View of Life Ch 22 (428-444) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Evolution of Populations Ch 23 (445-463) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Origin of Species Ch 24 (464-483) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Animals Evolution Ch 32-34 (633-719) [Textbook].

Survey of the Diversity of Life

The learner will be able to understand what are representative organisms from the Monera, Fungi, and Protista as well as what are representative members of the major

animal phyla and plant divisions.

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Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Eukaryotic Diversity Ch 28 (545-574) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Plant Diversity Ch 29 (575-596) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Fungi Ch 31 (616-631) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Diversity of Life Ch 32-34 (633-717) [Textbook].

Phylogenetic Classification

The learner will be able to understand the distinguishing characteristics of each group (kingdoms and the major phyla and divisions of animals and plants).

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Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Phylogeny and Systematics Ch 25 (484-509) [Textbook].

Evolutionary Relationships

The learner will be able to understand evidence that organisms are related to each other, how scientists study evolutionary relationships among organisms and how this information is used to classify organisms.

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Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Prokaryotes: Metabolic Diversity Ch 27 (526-544) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Seed Plants Ch 30 (597-625) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Diversity Ch 32-34 (633-717) [Textbook].

Reproduction, Growth and Development

The learner will be able to understand what patterns of reproduction and development are found in plants and animals and how they are regulated. The learner will also understand the adaptive significance of alternation of generations in the major groups of plants.

Strand	Scope	Source
Structure & Function of Plants &	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Genetic Basis of Development Ch 21 (402-425) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Plant Structure and Growth

Ch 35 (720-748) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Transport in Plants Ch 36 (748-766) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Plant Nutrition Ch 37 (767-782) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Plant Reproduction & Biotechnology Ch 38 (783-801) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Animal Structure and Function Ch 40 (834-849) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Animal Nutrition Ch 41 (850-870) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Circulation and Gas Exchange Ch 42 (871-899) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Animal Reproduction Ch 46 (975-997) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Animal Development Ch 47 (998-1021) [Textbook].

Organismal Adaptations

The learner will be able to understand how the organization of cells, tissues, and organs determine structure and function in plant and animal systems and how animal organ systems interact. The learner will also understand what adaptive features have contributed to the success of various plants and animals on land.

Strand	Scope	Source
Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Regulating Internal Environment Ch 44 (925-954) [Textbook].

Response to Environment

The learner will be able to understand responses of plants and animals to environmental cues, and how hormones mediate these responses.

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Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Plant Responses to Signals Ch 39 (802-831) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Body's Defenses Ch 43 (900-924) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Chemical Signals in Animals Ch 45 (955-974) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Nervous Systems Ch 48 (1022-1056) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Sensory and Motor Mechanisms Ch 49 (1057-1089) [Textbook].

Population Dynamics

The learner will be able to understand models that are useful in describing the growth of a population and how population size is regulated by biotic and abiotic factors.

Strand	Scope	Source
Ecology	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, The Evolution of Populations Ch 23 (445-463) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Population Ecology Ch 52 (1151-1173) [Textbook].

Communities and Ecosystems

The learner will be able to understand how energy flow through an ecosystem is related to trophic levels and how elements (carbon, nitrogen, phosphorus, sulfur, oxygen) cycle through ecosystems. The learner will also understand how organisms affect the cycling of elements and water through the biosphere as well as how biotic and abiotic factors affect community structure and ecosystem function.

Strand	Scope	Source
Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Ecology Ch 50 (1092-1120) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Community Ecology Ch 53 (1174-1197) [Textbook].
- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Ecosystems Ch 54 (1198-1223) [Textbook].

Global Issues

The learner will be able to understand ways in which humans are affecting biogeochemical cycles.

Strand	Scope	Source
Diversity of Organisms	Master	The College Board AP Advanced Placement Program

Instructional Resources

- Campbell Biology, Benjamin-Cummings, Prentice Hall, 6th Edition, Conservation Biology Ch 55 (1224-1227) [Textbook].