

Advanced Placement Course

The Advanced Placement (AP) biology course is designed to be equivalent to a college introductory biology course. It is to be taken by students after successful completion of first courses in high school biology and chemistry. In the guide below, we have

indicated where the relevant material can be found: SB1 for Senior Biology 1 and SB2 for Senior Biology 2. Because of the general nature of the AP curriculum document, the detail given here is based on Biozone's interpretation of the scheme.

Topic	See workbook
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Topic I: Molecules and Cells

A Chemistry of life

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|---|---|-----|---|
| 1 | The chemical & physical properties of water. The importance of water to life. | SB1 | The Chemistry of Life |
| 2 | The role of carbon. Structure and function of carbohydrates, lipids, nucleic acids, and proteins. The synthesis and breakdown of macromolecules. | SB1 | The Chemistry of Life, Molecular Genetics, Processes in Cells |
| 3 | The laws of thermodynamics and their relationship to biochemical processes. Free energy changes. | SB1 | The Chemistry of Life |
| 4 | The action of enzymes and their role in the regulation of metabolism. Enzyme specificity. Factors affecting enzyme activity. Applications of enzymes. | SB1 | The Chemistry of Life |

● For extension on this topic also see the TRC: Industrial Microbiology

B Cells

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|---|--|-----|--|
| 1 | Comparison of prokaryotic and eukaryotic cells, including evolutionary relationships. | SB1 | Cell Structure, The Origin & Evolution of Life |
| 2 | Membrane structure: fluid mosaic model. Active and passive transport. | SB1 | Processes in Cells |
| 3 | Structure and function of organelles. Comparison of plant and animal cells. Cell size and surface area: volume ratio. Organization of cell function. | SB1 | Cell Structure, Processes in Cells |
| 4 | Mitosis and the cell cycle. Mechanisms of cytokinesis. Cancer (tumour formation) as the result of uncontrolled cell division. | SB1 | Processes in Cells |

● For extension on this topic also see the TRC: The Cell Theory

C Cellular energetics

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|---|--|-----|---------------------|
| 1 | Nature and role of ATP. Anabolic and catabolic processes. Chemiosmosis. | SB1 | Cellular Energetics |
| 2 | Structure and function of mitochondria. Biochemistry of cellular respiration, including the role of oxygen in energy yielding pathways. Anaerobic systems. | SB1 | Cellular Energetics |
| 3 | Structure and function of chloroplasts. Biochemistry of photosynthesis. Adaptations for photosynthesis in different environments. | SB1 | Cellular Energetics |

● For extension on this topic also see the TRC: Events in Biochemistry

Topic II: Heredity and Evolution

A Heredity

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|---|---|-----|-----------------------|
| 1 | The importance of meiosis in heredity. Gametogenesis. Similarities and differences between gametogenesis in animals and plants. | SB1 | Chromosomes & Meiosis |
| 2 | Structure of eukaryotic chromosomes. Heredity of genetic information. | SB1 | Processes in Cells |
| 3 | Mendel's laws. Inheritance patterns. | SB1 | Chromosomes & Meiosis |

● For extension on this topic also see the TRC: Chromosome Mapping

B Molecular genetics

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|---|---|-----|-------------------------|
| 1 | RNA and DNA structure and function. Eukaryotic and prokaryotic genomes. For extension on this topic see the TRC: The Meselsohn-Stahl Experiment | SB1 | Heredity |
| 2 | Gene expression in prokaryotes and eukaryotes. The Lac operon model. | SB1 | Molecular Genetics |
| 3 | Causes of mutations. Gene mutations (e.g. sickle cell disease). Chromosomal mutations (e.g. Down syndrome). | SB1 | Mutation |
| 4 | Viral structure and replication. | SB1 | Molecular Genetics |
| 5 | Nucleic acid technology and applications. legal and ethical issues. | SB1 | Nucleic Acid Technology |

● For extension on this topic also see the TRC: Engineering Solutions

Topic	See workbook
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C Evolutionary biology

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|---|--|-----|-----------------------------------|
| 1 | The origins of life on Earth. Prebiotic experiments. Origins of prokaryotic cells. Endosymbiotic theory. | SB1 | The Origin & Evolution of Life |
| 2 | Evidence for evolution. Dating of fossils. ● For extension on this topic also see the TRC: Dating the Past | SB1 | The Origin & Evolution of Life |
| 3 | The species concept. Mechanisms of evolution: natural selection, speciation, macroevolution. ● For extension on this topic also see the TRC: A Case Study in Evolution | SB1 | Speciation, Patterns of Evolution |

Topic III: Organisms and Populations

A Diversity of organisms

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|---|--|-----|----------------|
| 1 | Evolutionary patterns: major body plans of plants and animals. | SB2 | Classification |
| 2 | Diversity of life: representative members from the five kingdoms Monera (=Prokaryotae), Fungi, Protista (=Protoctista), Animalia and Plantae. | SB2 | Classification |
| 3 | Phylogenetic classification. Binomial nomenclature. Five kingdom classification. Use of dichotomous keys. | SB2 | Classification |
| 4 | Evolutionary relationships: genetic and morphological characters. Phylogenies. ● For extension on this topic also see the TRC: Classification Exercise | SB2 | Classification |

B Structure and function of plants and animals

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|---|---|-----|---|
| 1 | Plant and animal reproduction and development (includes humans). Adaptive significance of reproductive features and their regulation. ● For extension on this topic see the TRC: Human Reproductive Technology | SB2 | The Next Generation, Plant Reproduction |
| 2 | Organization of cells, tissues & organs. The structure and function of animal and plant organ systems. Adaptive features that have contributed to the success of plants and animals in occupying particular terrestrial niches. | SB2 | PART 2 (Animals), chapters as required. PART 3 (Plants), chapters as required |
| 3 | Plant and animal responses to environmental cues. The role of hormones in these responses. | SB2 | Responding to the Environment, Plant Structure and Growth Responses |

C Ecology

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| 1 | Factors influencing population size. Population growth curves. | SB2 | Population Ecology |
| 2 | Abiotic and biotic factors: effects on community structure and ecosystem function. Trophic levels: energy flows through ecosystems and relationship to trophic structure. Nutrient cycles. | SB2 | Habitat and Distribution, Community Ecology, Ecosystem Ecology and Human Impact |
| 3 | Human influence on biogeochemical cycles: (e.g. use of fertilizers). | SB2 | Ecosystem Ecology and Human Impact |

Practical Work

Integrated practicals as appropriate

"Guide to Practical Work" in this introductory section.

Senior Biology 1: Skills in Biology (for reference throughout the course).

● TRC: Spreadsheets and Statistics