

# AP Biology Semester I: Course Outline

## I. Unit 1: Welcome to Biology

- A. Chapter 1: What is Biology?
  - 1. Lesson 1: Biology and Biologists
    - a. Topic 1: Overview
    - b. Topic 2: What is Biology?
    - c. Topic 3: How Do Biologists Study?
    - d. Topic 4: Biology as a Human Endeavor
    - e. Topic 5: Summary
- B. Chapter 2: Chemical & Physical Properties of Solutions
  - 1. Lesson 2: The Chemical Basis of Life
    - a. Topic 1: Overview
    - b. Topic 2: Elements of Life
    - c. Topic 3: Atoms and Molecules
    - d. Topic 4: Chemical Reactions
    - e. Topic 5: Summary
  - 2. Lesson 3: Water and Life
    - a. Topic 1: Overview
    - b. Topic 2: The Nature of Water
    - c. Topic 3: Physical Properties of Water
    - d. Topic 4: Summary
  - 3. Lesson 4: Acids, Bases and Buffers
    - a. Topic 1: Acids, Bases and Buffers
- C. Chapter 3: Biomolecules
  - 1. Lesson 5: Organic Molecules
    - a. Topic 1: Overview
    - b. Topic 2: Organic Chemistry
    - c. Topic 3: Food Energy Molecules
    - d. Topic 4: Nitrogen Containing Compounds
    - e. Topic 5: Summary
  - 2. Lesson 6: Macromolecules
    - a. Topic 1: Overview
    - b. Topic 2: Structure and Function of Polysaccharides
    - c. Topic 3: Structure and Function of Fats
    - d. Topic 4: Structure and Function of Proteins
    - e. Topic 5: Summary

## II. Unit 2: Cell Structure and Function

- A. Chapter 4: Cellular Organization
  - 1. Lesson 7: Cells: The Basics
    - a. Topic 1: Overview
    - b. Topic 2: What Are Cells?
    - c. Topic 3: Prokaryotes and Eukaryotes
    - d. Topic 4: Tools for Studying Cells
    - e. Topic 5: Summary
  - 2. Lesson 8: More about Cells
    - a. Topic 1: Overview
    - b. Topic 2: Cellular Organelles
    - c. Topic 3: Cell Structure and Movement
    - d. Topic 4: Extracellular Structures
    - e. Topic 5: Summary
- B. Chapter 5: Membranes and Transport
  - 1. Lesson 9: Cell Membranes
    - a. Topic 1: Overview
    - b. Topic 2: Membrane Structure
    - c. Topic 3: Transport Mechanisms
    - d. Topic 4: Membrane Proteins
    - e. Topic 5: Summary

## III. Unit 3: The Gene

- A. Chapter 6: DNA
  - 1. Lesson 10: DNA Discovery & Structure
    - a. Topic 1: Overview
    - b. Topic 2: Discovery

- c. Topic 3: Structure
- d. Topic 4: Implications
- e. Topic 5: Summary
- 2. Lesson 11: DNA Replication
  - a. Topic 1: Overview
  - b. Topic 2: The Mechanism
  - c. Topic 3: The Accuracy of Replication
  - d. Topic 4: Summary
- B. Chapter 7: From DNA to Protein
  - 1. Lesson 12: The Transcription of DNA to RNA
    - a. Topic 1: Overview
    - b. Topic 2: Genes Encode Proteins
    - c. Topic 3: RNA Structure and Function
    - d. Topic 4: The Initiation of Transcription
    - e. Topic 5: Elongation, Termination, and Processing
    - f. Topic 6: Summary
  - 2. Lesson 13: Translation: Protein Synthesis
    - a. Topic 1: Overview
    - b. Topic 2: Decoding RNA
    - c. Topic 3: The Components of Translation
    - d. Topic 4: The Mechanism of Translation
    - e. Topic 5: Summary
- C. Chapter 8: Types of Genomes
  - 1. Lesson 14: Eukaryotic Genomes
    - a. Topic 1: Overview
    - b. Topic 2: The Organization of Genetic Material
    - c. Topic 3: Chromatin Structure
    - d. Topic 4: The Regulation of Gene Expression
    - e. Topic 5: Summary
  - 2. Lesson 15: Viral & Bacterial Genomes
    - a. Topic 1: Overview
    - b. Topic 2: Viruses
    - c. Topic 3: Bacteria
    - d. Topic 4: Summary
- D. Chapter 9: Biotechnology
  - 1. Lesson 16: Applications of Biotechnology
    - a. Topic 1: Overview
    - b. Topic 2: Agricultural Applications
    - c. Topic 3: Medical Applications
    - d. Topic 4: Legal Applications
    - e. Topic 5: Practical and Ethical Concerns
    - f. Topic 6: Summary

#### IV. Unit 4: Principles of Heredity

- A. Chapter 10: The Reproduction of Cells
  - 1. Lesson 17: The Cell Cycle & Mitosis
    - a. Topic 1: Overview
    - b. Topic 2: The Cell Cycle
    - c. Topic 3: Mitosis and Cytokinesis
    - d. Topic 4: Experiment
    - e. Topic 5: Summary
  - 2. Lesson 18: Sexual Life Cycle & Meiosis
    - a. Topic 1: Overview
    - b. Topic 2: Life Cycles
    - c. Topic 3: State of Meiosis
    - d. Topic 4: Sources of Genetic Variation
    - e. Topic 5: Summary
    - f. Topic 6: Demonstration
- B. Chapter 11: Patterns of Inheritance
  - 1. Lesson 19: The Mendelian Model of Inheritance
    - a. Topic 1: Overview
    - b. Topic 2: Mendel's Experiments
    - c. Topic 3: Mendel's Law of Segregation
    - d. Topic 4: Mendel's Law of Independent Assortment
    - e. Topic 5: Summary
  - 2. Lesson 20: Extensions of Mendel

- a. Topic 1: Extensions of Mendel
- C. Chapter 12: The Chromosomal Basis of Heredity
  - 1. Lesson 21: Genes & Chromosomes
    - a. Topic 1: Overview
    - b. Topic 2: The Chromosome Theory
    - c. Topic 3: Sex Chromosomes
    - d. Topic 4: Chromosomal Abnormalities
    - e. Topic 5: Summary

## V. Unit 5: Evolutionary Biology

- A. Chapter 13: The Theory of Evolution
  - 1. Lesson 22: Darwin in Historical Context
    - a. Topic 1: Overview
    - b. Topic 2: The Historical Setting
    - c. Topic 3: Darwin's Theory of Evolution
    - d. Topic 4: The Evidence for Evolution
    - e. Topic 5: Summary
  - 2. Lesson 23: Mechanisms of Evolution
    - a. Topic 1: Overview
    - b. Topic 2: Population Genetics
    - c. Topic 3: The Process of Genetic Change
    - d. Topic 4: Preserving the Diversity
    - e. Topic 5: Summary
- B. Chapter 14: The Origin of Species
  - 1. Lesson 24: Speciation
    - a. Topic 1: Overview
    - b. Topic 2: Geographic and Reproductive Barriers
    - c. Topic 3: Types of Speciation
    - d. Topic 4: The Hybrid Zone
    - e. Topic 5: The Rate of Speciation
    - f. Topic 6: Summary

## VI. Unit 6: Biological Diversity

- A. Chapter 15: The Family Tree of Life
  - 1. Lesson 25: Systematics: Classifying Organisms
    - a. Topic 1: Overview
    - b. Topic 2: Naming Organisms
    - c. Topic 3: Constructing Phylogenetic Trees
    - d. Topic 4: Modern Taxonomy
    - e. Topic 5: Summary
  - 2. Lesson 26: The History of Life on Earth
    - a. Topic 1: The History of Life on Earth
    - b. Topic 2: Experiment (Dating Fossils)
- B. Chapter 16: Single-Celled Organisms
  - 1. Lesson 27: Prokaryotes
    - a. Topic 1: Overview
    - b. Topic 2: Physical Characteristics of Prokaryotic Cells
    - c. Topic 3: Prokaryotic Lifestyles
    - d. Topic 4: Two Domains: Bacteria and Archaea
    - e. Topic 5: Summary
  - 2. Lesson 28: Unicellular Eukaryotes
    - a. Topic 1: Overview
    - b. Topic 2: The Kingdom Protista
    - c. Topic 3: Protozoans
    - d. Topic 4: Plantlike Protists
    - e. Topic 5: Funguslike Protists
    - f. Topic 6: Summary
- C. Chapter 17: Still Life: Plants and Fungi
  - 1. Lesson 29: Plants and Their Relatives
    - a. Topic 1: Overview
    - b. Topic 2: Colonizing the Land
    - c. Topic 3: The Rise of Vascular Plants
    - d. Topic 4: Cones, Flowers, and Seeds
    - e. Topic 5: Summary
  - 2. Lesson 30: The Fungi
    - a. Topic 1: Overview
    - b. Topic 2: Characteristics of Fungi

- c. Topic 3: Surveys of Fungal Diversity
- d. Topic 4: Summary
- D. Chapter 18: The Diversity of Animals
  - 1. Lesson 31: An Introduction to the Animals
    - a. Topic 1: Overview
    - b. Topic 2: Animal Fundamentals
    - c. Topic 3: Body Plans
    - d. Topic 4: Protostomes and Deuterostomes
    - e. Topic 5: Summary
  - 2. Lesson 32: From Invertebrates to Vertebrates
    - a. Topic 1: Overview
    - b. Topic 2: More Protostomes
    - c. Topic 3: Deuterostomes and Early Vertebrates
    - d. Topic 4: Vertebrate Diversity
    - e. Topic 5: Summary