

AP[®] Biology

Fordson High School in Dearborn, Michigan

Mr. Robert Harrison

Description

Advanced Placement Biology is a college-level science course designed to be a survey of the main themes with regard to the study of the living world. As a true science, biology seeks to better understand the world using evidence from observation and empirical data gathered from sound scientific experimentation. As part of your experience in this course, you will gain an understanding of the natural world in a way that closely parallels the manner in which we have come to know about the natural world: through hands-on, first hand experiences. As such, while this course will consist primarily of oral and visual explanations of the topics at hand as I attempt to explain the findings of contemporary biologists and of those of the past, your most significant exposure to the concepts will come in the lab. It is in the lab where you will not only experience first-hand what others have witnessed, but will be allowed to use your critical thinking skills to verify the results of other scientists and pose new questions that can be answered empirically.

While this course is designed to prepare you for maximum success on the CollegeBoard's AP Biology Exam in May, our goal as a learning team is to maximize your understanding of and appreciation for the natural, living world.

The study of biology in this course encompasses a vast array of information. We will study everything from the molecules involved in making and sustaining the life of a cell to the biosphere, earth's layer of life. Throughout our study, however, it is imperative that you recognize and develop your understanding of biology within the context of the major pervasive themes that exist in the living world. We will begin our year with an overview, then proceed to discover the biological world through the lenses of these 8 major themes:

1. Science as a Process

We will spend considerable time discussing the major developments in each of the main topics within the historical context of the discoveries that have been made that have led to our understanding of each topic. In other words, we will attempt to discover *how* we know *what* we know about each topic. And within each major topic, we will address current research, research findings, and application of the research and discoveries.

2. Evolution

Each major topic we study is related to modern-day organisms and their exhibited characteristics. Since each organism consists of the sum of the change over time through which its species has come, we will look at features of living organisms from microscopic through macroscopic in terms of the adaptive advantage such a feature attains for the organism. Furthermore, with each major topic, we will attempt to explore the manner in which evolutionary pressures have moved such traits in the direction necessary for them to exist today.

3. Energy Transfer

We will discover the many pathways and cycles through which energy flows through ecosystems and through the organisms that make them up, ultimately leading back to the sun; we will discover the ways in which organisms have adapted to harness the energy they absorb or consume so as to perform all of the functions necessary for life. And we will compare the relative energy input and output of varying systems.

4. Continuity and Change

We will look at each topic and recognize the patterns that are continuous and therefore likely favorable or efficient, and those that change as a result of being acted upon by evolutionary phenomena.

5. Relationship of Structure to Function

We will pay special attention to the structures present in organisms with respect to their function, recognizing that each structure has evolved to take its present form as the most efficient form necessary to perform the function it performs.

6. Regulation

We will recognize the various ways in which living systems, unlike any other kind of system, regulate their internal and external environment so as to maintain homeostatic conditions and to thereby survive.

7. Interdependence in Nature

We will pay special attention to the fact that while we may study individuals, individual structures, or individual phenomena, that nothing in the living world exists in solitude, but rather every individual and its parts survives *only* in complex living relationships with other organisms.

8. Science, Technology, and Society

We will look at ways in which new technology has resulted in new discoveries in science, as well as how science has informed new technological development over the course of the history of biology. We will also look at ways in which this interdependent relationship between science and technology have served in the advancement, as well as at times, the degradation, of society.

Course Schedule

Our school year allows us 149 full days of instruction, with each section of the course meeting for exactly 60 minutes per day. The following breakdown shows how we will spend our time this year:

Topic	Coverage	Days
Introduction	2.0%	3
Chapter 1 Scientific Method Introduction to the 8 Major Themes (science as a process, evolution, energy transfer, continuity and change, relationship of structure to function, regulation, the interdependence in nature, and science technology and society)		
Ecology	9.0%	13
Chapters 50-55 Population Dynamics Communities & Ecosystems Global Issues Animal Response to the Environment LAB 11(AP): Animal Behavior LAB 12(AP): Dissolved Oxygen & Aquatic Primary Productivity FIELD EXPERIENCE: The Environmental Interpretive Center @ the University of Michigan-Dearborn Main Campus for DO testing and qualitative observation		2 3 1
EXAM 1*		
Biochemistry	7.0%	10
Chapters 2, 3, 4, 5, 8a Chemistry of Life Water Organic Molecules in Organisms Free Energy Changes Enzymes Introduction to Metabolism Activity/LAB: The Chemical Building Blocks of Life (Foglia) LAB 1(AP): Diffusion and Osmosis LAB: Toothpickase (Foglia) LAB 2(AP): Enzyme Catalysis		3 2 1 2
EXAM 2*		
Cells	8.0%	12
Chapters 6, 7, 11, 12, 13 Prokaryotic & Eukaryotic Cells Membranes Subcellular Organization		

Cell Cycle & Its Regulation Meiosis & Sexual Life Cycles LAB 3(AP): Mitosis & Meiosis		3
QUIZ**		
Enzymes & Metabolism (Cellular Respiration)	10.0%	15
Chapters 8b, 9 Coupled Reactions Fermentation and Cellular Respiration LAB 5(AP): Cell Respiration		3
Photosynthesis	4.0%	6
Chapter 10 Photosynthesis LAB 4(AP): Plant Pigments and Photosynthesis		2
EXAM 3*		
Heredity	8.0%	12
Chapters 14, 15 Meiosis & Gametogenesis Eukaryotic Chromosomes Inheritance Patterns LAB 7(AP): Genetics of Organisms LAB: Human Blood typing simulation (Ward's Biological) LAB: Chi-Square Simulation Analysis using M&Ms (Foglia)		5 1 1
QUIZ**		
Molecular Genetics	9.0%	13
Chapters 16-21 RNA and DNA Structure & Function Gene Regulation Mutation Viral Structure & Replication Nucleic Acid Technology & Applications LAB 6(AP): Molecular Biology		4
EXAM 4*		
Evolution	8%	12
Chapters 22-25 Early Evolution of Life Evidence for Evolution Mechanisms of Evolution		
Diversity	3.0%	4
Chapters 26, 27, 28, 31, 32, 33, 34 Evolutionary Patterns Survey of the Diversity of Life Phylogenetic Classification Evolutionary Relationships LAB: Natural Selection (Bean Lab)		2
EXAM 5*		
Animal Structure & Function	20.0%	30
Chapters 40-49 LAB 10(AP): Physiology of the Circulatory System		2
Excretory System	2%	3
Nervous System	2%	3
Digestive System / Nutrition	2%	3

Circulatory System & Gas Exchange	3%	4
Immune & Lymphatic System	2%	3
Motor & Skeletal System	2%	3
Animal Reproduction	2%	3
Hormones & Regulation	3%	4
Animal Development	2%	3
QUIZ**		
Plant Evolution, Structure & Function	8.0%	12
Chapters 29, 30, 35-39 Plant Diversity Angiosperm Reproduction LAB 9(AP): Transpiration		2
EXAM 6*		
Review for AP Exam	4.0%	6

*All exams will be composed of 50 multiple choice questions and 1 essay question in the format of the AP exam questions. The multiple choice portion of the exam will be taken during class. The essay portion will be taken the following day at the beginning of class. For the essay portion, you will be given 2.5 minutes to preview the question before answering, followed by precisely 22.5 minutes to answer the question.

**Quizzes will be comprised of 25 multiple choice questions, with no essay portion.

Resources

Textbook:

Biology (6th Edition). Campbell, Neil A. and Reece, Jane B. San Francisco, CA: Benjamin Cummings.
Copyright 2002 Pearson Education, Inc., Publishing as Benjamin Cummings.

Student Study Guide for Biology (6th Edition). Campbell, N.A. Martha R. Taylor, and Reece, J.B..
San Francisco, CA: Benjamin Cummings. Copyright 2002 Pearson Education, Inc., Publishing as Benjamin Cummings.

AP Biology Lab Manual for Students. The College Board. Copyright 2001 The College Entrance Examination Board.

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Senior Biology 2 2009. Biozone International. Australia: BIOZONE International Ltd.
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