AP Biology
Syllabus

Course Overview

AP Biology is a college-level course for highly motivated students who plan to further their education in a scientific field. The course is designed to be the equivalent of a two-semester college introductory biology course. The class will meet for 52 minutes every day with an additional 52 minute double period given every other day. The goal of the course is to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology. The framework of the course is designed around eight major themes establish by the College Board. The themes include: Science as a Process, Evolution, Energy Transfer, Continuity and Change, Relationships of Structure and Function, Regulation, the Interdependence in Nature, and Science, Technology, and Society. Students will conduct all twelve of the AP laboratories included the *AP Lab Manual for Students*. Throughout the course, we will establish evolution as the foundation upon which current conceptual models are built. Due to the volume and complexity of the material covered in this class, students will be encouraged to develop personal techniques for self-learning. I will attempt to foster this development by stressing the importance of reading for comprehension and proper study skills.

Textbooks

Biology 12th Edition by Neil A. Campbell and Jane B. Reece
AP Lab Manual for Students

Other Resources

Carolina Biological Computer Simulation: AP Lab #7 Genetics of Organisms
NEO/Lab Collection

All laboratory material is purchased through the kits supplied through Carolina Biological Supply Company

Course Format

I have designed the course to include the following leaning activities and evaluation methods:

Activity	Description
1. Lecture/Class discussion	Guided notes will be distributed at the beginning of each chapter. The notes will have missing words or phrases. Students will be expected to have the missing words completed prior to classroom discussion. The intent is to emphasize the importance of reading for comprehension, promote self-learning, and provide students with a conceptual and vocabulary framework upon which to build. This will allow me to maintain a brisk pace and focus more on areas of confusion.
2. Laboratories	All 12 of the laboratories listed in the *AP Lab Manual for Students* will be completed in there entirety. A computer simulation will be used for Lab #7. The other 11 labs will be "hands on" labs. Laboratory reports will be required for each. Reports will include a title, introduction, procedure, results, and discussion. We will stress the process of science throughout our laboratory experiences. Time permitting, additional labs may be added.

3. Class Assignments	Assignments will take the form of: -Reading assignments -Problem sets -Review study guides -Pre-lab assignments
4. Chapter Quizzes	10-15 questions to assess student's understanding of the chapter
5. Unit Evaluations	50-120 question evaluation of an entire unit of instruction
6. Free Response Questions	Released free response questions will be assigned at the beginning of each unit of instruction. Typed responses will be turned in on the day of the unit exam to be graded concurrently with the unit evaluation.

Units of Instruction

Unit	Chapters included
I. Summer Work	1, 2, 3
II. Chemistry & Intro to Biochemistry	4,5,6
III. Cell Physiology & Cell Transport	7,8
IV. Energy Transformations	9,10
V. Cell Reproduction & Mendelian Genetics	11,12,13,14
VI. Molecular Genetics #1	15,16,17
VII. Molecular Genetics #2	18,19,Portions of 20/21
VIII. Evolution	22,23,Portions of 24,25
IX. Biological Diversity #1	27,28
X. Biological Diversity #2	29,30,31
XI. Plant Form & Function	35,36,37,38,39
XII. Biological Diversity #3	32,33,34
XIII. Animal Form & Function #1	40,41,42,43,44
XIV. Animal Form & Function #2	45,46,47,48
XV. Ecology & Animal Behavior	50,51,52,53,54,55

Course Outline and Sequence

All dates listed in the outline are approximate. Adjustments will be made based on the student's mastery of the material. **However, adjustments must be kept to a minimum due to the volume of material to be covered.**

Unit	Time

I. Summer Work

A. Chapters 1-3
B. Focus
    1. Unifying Themes of Biology
    2. Inorganic Chemistry
    3. Water
C. Laboratory: None

II. Chemistry and Introduction to Biochemistry **3 Weeks**

A. Chapters 4, 5, 6
B. Focus
    1. Carbon's versatility
    2. Functional groups
    3. Organic molecules
    4. Free energy change
    5. Enzymes
C. Laboratory: Chemical unknowns
    AP Lab #2 Enzyme Catalysis

III. Cell Physiology and Cell Transport **4 Weeks**

A. Chapters 7, 8
B. Focus
    1. Prokaryotic and eukaryotic cells
    2. Sub-cellular organization
    3. Cell surfaces/junctions
    4. Membrane structure
    5. Transport across membranes
C. Laboratory: AP Lab #1 Diffusion and osmosis

IV. <u>Energy transformations</u> **2 Weeks**

A. Chapters 9, 10
B. Focus
    1. Cellular Respiration
    2. Fermentation
    3. Photosynthesis
    4. Alternative mechanisms of carbon fixation
C. Laboratories: AP Lab #5 Cell respiration
    AP Lab #4 Plant Pigments and Photosynthesis

V. <u>Cell Reproduction and Mendelian Genetics</u> **3 Weeks**

A. Chapters 11, 12, 13, 14
B. Focus

1. Mitosis/Cell cycle
2. Meiosis/Sexual life cycles
3. Cell communication
    a. Signal-transduction pathways
    b. Cellular responses
4. Mendelian genetics
    a. Mendel's experiments
    b. Mendelian inheritance in humans
    c. Pedigrees

C. Laboratory: AP Lab #3 Mitosis and Meiosis

VI. Molecular Genetics #1 **3 Weeks**

A. Chapters 15, 16, 17

B. Focus

1. Chromosomal basis
    a. Morgan
    b. Sex-chromosomes
    c. Errors in inheritance
2. DNA Structure and Replication
3. RNA and protein synthesis

C. Laboratory: AP Lab #7 Genetics of Organisms (Computer Simulation)
Carolina Biological AP Biology: NEO/Lab Collection D.

VII. Molecular Genetics # 2 **3 Weeks**

A. Chapters 18, 19, Portions of 20/21

B. Focus

1. Organization and control of genomes
    a. Viral
    b. Bacterial
2. Eukaryotic genome organization
    a. Organization at DNA level
    b. Gene control
3. DNA technology
4. Genetics of development

C. Laboratory: AP Lab #6 Molecular Biology

VIII. Evolution **4 Weeks**

A. Chapters 22, 23, Portions of 24/25
B. Focus
    1. Darwin's views
    2. Population evolution
    3. Species evolution
    4. Phylogeny
C. Laboratory: AP Lab #8 Population Genetics and Evolution

IX. Biological Diversity #1

A. Chapters 27, 28
B. Focus
    1. Prokaryotes
        a. Structure/Function/Reproduction
        b. Nutrition
        c. Survey
    2. Origin of Eukaryotes
    3. Protista
        a. Origins
        b. Survey

X. Biological Diversity #2

A. Chapters 29, 30, 31
B. Focus
    1. Plant evolution
        a. Bryophytes
        b. Vascular plants
    2. Gymnosperms
    3. Angiosperms
    4. Fungi

XI. Plant Form and Function **3 Weeks**

A. Chapters 35, 36, 37, 38, 39
B. Focus
    1. Plant structure
    2. Transport in plants
    3. Plant nutrition
    4. Plant reproduction
    5. Plant response to environment
C. Laboratory: AP Lab #9 Transpiration

XII. Biological Diversity #3

A. Chapters 32,33, 34
B. Focus
    1. Origins of Animal Diversity
    2. Invertebrate Diversity
    3. Vertebrate Diversity

XIII. Animal Form and Function #1 **3 Weeks**

A. Chapters 40, 41, 42, 43, 44
B. Focus
    1. Digestion system
    2. Circulatory system
    3. Immune system
    4. Excretory system
C. Laboratory: AP Lab #10 Physiology of the

Circulatory System

XIV. Animal Form and Function #2 **3 Weeks**

A. Chapters 45, 46, 47, 48
B. Focus
    1. Endocrine system
    2. Reproductive system
    3. Animal development
    4. Nervous system

C. Laboratory: Dissection

XV. <u>Ecology and Animal Behavior</u> **2 Weeks**

A. Chapters 50-55

B. Focus

1. Population dynamics
2. Communities and ecosystems
3. Global issues
4. Application of biology to environmental/social concerns

C. Laboratories: AP Lab#11 Animal Behavior
AP Lab #12 Dissolved Oxygen and Aquatic Primary Production

XVI. AP Biology Exam

XVII. <u>Comparative Vertebrate Anatomy</u> Remainder of year