

## ADVANCED PLACEMENT BIOLOGY SYLLABUS

**DATE:** Fall Semester 2010 and Spring Semester 2011

**LECTURE AND LAB TIME:** TBA

**INSTRUCTOR'S NAME:**

**INSTRUCTOR'S OFFICE:** Room 221

**OFFICE HOURS:** Period (TBA) Conference, 3:00-3:30 p.m. Monday – Thursday

**PHILOSOPHY:** It is my belief that an understanding of biology is essential for all people in today's society. One cannot make sense of the world around them without at least a basic understanding of the fundamental biological principles. A firm grasp of these principles will allow students to make informed decisions that affect them directly (health), that affect society (evolution of antibiotic resistant diseases), and that affect the planet as a whole (climate change). Woven throughout the course is the interconnectedness of the 8 major biological themes and also of the anthropocentric element. Knowledge is power, the more you have the more powerful you are.

**COURSE DESCRIPTION:** This course is designed for students with an intense interest in the life sciences and is part of the required coursework for majors such as environmental science, animal sciences, agriculture and wildlife management, pre-med tracks including nursing etc. It is the equivalent of an introductory college biology course taken in the first year by biology majors. Students enrolled in this course are expected to sit for the AP Exam in Biology given in May. My primary objective for my students is that they attain a solid grasp on the basic biological principles and comprehend its relevance to themselves and society.

**MAJOR AREAS OF STUDY:** Molecules and Cells (25% of course)  
Heredity and Evolution (25% of course)  
Organisms and Populations (50% of course)

**THE 8 MAJOR THEMES:** The study of biology is far too broad in scope to simply memorize terms and concepts. We will therefore be examining the eight major unifying themes of biology throughout the course. These are the 8 themes found in the official curricular requirements put forth by College Board and correlate with the "Ten Themes in the Study of Life" from the Campbell/Reese text used for this course.

### 8 Major Themes

- Science as a Process
- Evolution
- Energy Transfer
- Continuity and Change
- Relationship of Structure and Function
- Regulation
- Interdependence in Nature
- Science, Technology and Society

**PRE-REQUISITES:** Biology Honors **and** Chemistry I

**METHODOLOGY:** Lecture, discussion, reading guides, and interactive computer simulations will be utilized to explain the biological concepts. Numerous labs, including twelve required AP Biology labs (called the "Dirty Dozen") will reinforce key concepts and provide the skill development necessary to continue advanced study in lab-based courses.

## LABORATORY

Hands on laboratory time is an important part of any science course. I cover all **twelve** of the labs in the *AP Laboratory Manual for Students* as well as integrating supplemental labs throughout the course. Labs make up 25% of this course so it is extremely important to attend every class.

**EVALUATION CRITERIA:** Grades will be based on exams and quizzes, homework, lab reports and classwork. A weighted grading scale will be employed with the following break-down:

Exams and quizzes	=	40%
Lab reports	=	20%
Classwork	=	15%
Homework	=	15%
Participation	=	10%

Grades will be assigned according to the following scale:

100% - 90%	=	A
89% - 80%	=	B
79% - 70%	=	C
69% - 60%	=	D

\*Exam grades **may** be curved at the instructor's discretion.

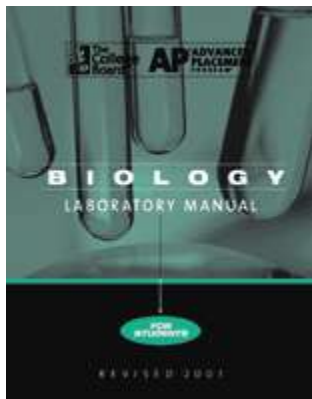
**ABSENCE POLICY:** This is a fast-paced course covering a great deal of material within a short time. To be successful on the AP exam and provide an experience commensurate with a college course, it will be necessary to maintain a rigorous schedule. Work done on the day of an absence results in a grade of **zero** until the work is made up. The student has **3 days** to clear an absence and make-up the work. It is the student's responsibility to:

1. Obtain missed lecture notes from another student.
2. Make-up missed labs and exams.
3. Obtain details about reading assignments and homework.

**TEXT:** *Biology*, Campbell and Reece, 8th Edition  
Published by: Prentice-Hall

**Highly recommended but not mandatory:** Purchase an AP review guide such as Cliff's, from your local bookstore. Border's on Providence Road has a wide variety of guides. In the past many students have regretted that they didn't purchase a review book sooner.

## REQUIRED MATERIALS:



- **Biology Lab Manual for Students (2001)**
  - \$18.00 at <http://store.collegeboard.com/sto/productdetail.do?Itemkey=991461>
- **Laboratory research notebook book (~\$20.00) (ISBN 0-7167-3900-3)**
  - USF Book Store or Grey's Bookstore
  - <http://www.whfreeman.com/newcatalog.aspx?disc=Chemistry&course=Lab+Notebooks&isbn=0716739003>
  - <http://www.amazon.com/Laboratory-Notebook-W-H-Freeman-Company/dp/0716739003>
- scientific calculator
- 3-ring binder

- 5 tab dividers
- Highlighter
- planner

## AP BIOLOGY FALL 2008 SCHEDULE WITH COURSE CONTENT:

### ➤ Unit 1: Overview/Introductory Information

- Characteristics of Life
- Unifying Themes of Biology
- Classification of Organisms

Reading assignments: Chapter 1, Chapter 25 pgs 496 – 501

Activities/Labs:

- Experimental Design Analysis:

- (1) analyze one of several experiments for the required elements of appropriate experimental design
- (2) Discuss your findings with the class

### ➤ Unit 2: Chemistry

- Atomic structure and bonding
- Properties of water
- In-organic compounds
- Properties of carbon
- Functional groups and organic compounds
- Enzyme properties and dynamics

Reading assignments: Chapters 2 – 5

Activities/Labs:

- Properties of Water
- Buffer Lab
- Carbohydrate Identification

### ➤ Unit 3: Cellular Biology

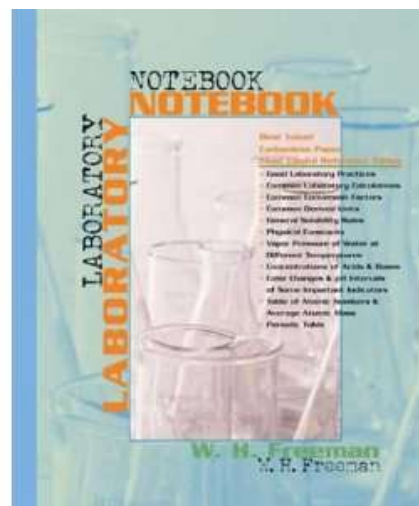
- Developments in cell biology
- Microscopy techniques
- Organelles and structures
- Cell transport mechanisms
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Reading assignments: Chapters 6 and 7

Articles: My Cells are Your Cells  
Stem Cells

Labs/Activities:

- Sketches of various cell types : bacteria, plants, fungi, protists, muscle cells, white blood cells (identify structures visible)
- Identifying Cells
- **AP Lab 1: Diffusion and Osmosis**



➤ Unit 4: Metabolism

- Bioenergetics
- Photosynthesis: Light dependent reaction
- Photosynthesis: Calvin Cycle
- Respiration: Glycolysis
- Respiration: Krebs's Cycle
- Respiration: Oxidative Phosphorylation

Reading assignments: Chapters 8 – 10

Labs/Activities:

- **AP Lab 2: Enzyme Catalysis**
- **AP Lab 4: Plants and Pigments**
- **AP Lab 5: Cell Respiration**

➤ Unit 5: Cell Reproduction

- Cell cycle and hormonal regulation
- Mitosis
- Meiosis
- Cell communication mechanisms

Reading assignments: Chapters 11 – 13

Labs/Activities:

- **AP Lab 3: Mitosis and Meiosis**

➤ Unit 6: Genetics and Heredity

- Mendelian principles and inheritance
- Chromosomal theory and pedigree analysis
- Genetic Disorders

Reading assignments: Chapters 14 and 15

Articles: Genetic Testing

Building Genes from Scratch

Labs/Activities:

- Fingerprint Analysis
- Photograph comparison: analyze parents/children based on phenotypic features present in high school photographs
- **AP Lab 7: Genetics of Organisms**

December: Semester One Exam: cumulative exam covering Chapters 1 - 15

**AP BIOLOGY SPRING 2009 SCHEDULE WITH COURSE CONTENT**

➤ Unit 7: Molecular Biology

- DNA structure and replication
- RNA structures and types

- Protein Synthesis

Reading assignments: Chapters 16 and 17

Labs/Activities:

- Discussion Topics including:
  - (1) Historical developments in the discovery of DNA
  - (2) DNA Structure
  - (3) DNA Replication and Repair
  - (4) RNA Structure and Types
  - (5) Protein Synthesis
  - (6) Mutations: Causes and Types

➤ Unit 8: DNA Technology

- Transgenic organisms
- Electrophoresis and DNA fingerprinting
- PCR and gene sequencing
- Transformation

Reading assignments: Chapter 20 and 21

Article: The Human Genome Project

Labs/Activities:

- **AP Lab 6: Transformation**
- **AP Lab 6: Restriction Enzyme Cleavage of DNA**

➤ Unit 9: Evolutionary Theory

- Historical perspective and Charles Darwin
- Micro-evolution and Hardy-Weinberg Theory
- Speciation mechanisms
- Macro-evolution

Reading assignments: Chapters 22 – 24

Articles: Origins

From Bones to Brains

Labs/ Activities:

- Virtual Voyage using disk from Campbell-Reece
- Observations of variation in species
- **AP Lab 8: Population Genetics**

➤ Unit 10: Organisms and populations

- Prokaryotes and bacteria
- Protists and algae
- Fungi and slime molds
- Animals: invertebrates
- Animals: vertebrates

Reading Assignment: Chapters 26 – 28 and 31 - 34

Labs/Activities:

- Collection, growth and identification of bacteria from school
- Observations of various selected protists (euglena, amoeba, paramecium)
- Mushroom and mold Lab
- Classification of invertebrate and vertebrate specimens
- **AP Lab 10: Physiology of the Circulatory System**

➤ Unit 11: Plant Structure and Function

- Classification of plants
- Structure and life cycle of bryophytes
- Structure and function of gymnosperms
- Structure and function of angiosperms
- Plant hormones and growth

Reading assignments: Chapters 29 and 30, 35 – 39

Labs/Activities:

- Classification of various plant specimens  
(moss, liverworts, spruce, pine, carnations, lilies, etc.)
- **AP Lab 9: Transpiration**

➤ Unit 12: Ecology

- Ecosystem dynamics
- Biogeochemical cycles
- Populations and limiting factors
- Biomes
- Conservation and pollution

Reading assignments: Chapters 50 -55

Labs/Activities:

- Water Cycle Lab
- **AP Lab 11: Animal Behavior**
- **AP Lab 12: Dissolved Oxygen**
- Field Study:
  - (1) Obtain data on the abiotic factors of a Wetland, Upland or Coastal ecosystem
  - (2) Collect specimens of flora and fauna
  - (3) Classify the specimens collected
  - (4) Compile a field report presenting the findings

May : Review and prepare for the AP Exam in Biology

- All unit exams are written in the same format as the AP Exam
- Unit exams include challenging multiple choice questions as well as essay questions requiring extended constructed responses
- Review sessions are conducted in the evening so as not to disrupt the instructional time necessary to complete the units of study