

## Course Overview

Students in AP Biology meet 5 days a week for 36 weeks. Periods are 56 minutes long.

In general, the course is divided into three teaching components: laboratory, lecture, and discussion.

The lecture component, roughly 1/3 of instructional time, is devoted to material presentation. Prior to lecture, students are provided a note-taking template that guides them through assigned readings and prepares them for lecture. During lecture, unit topics and their relationship to the 4 BIG IDEAS of Biology are discussed. These ideas are presented using images, video, web resources, and general discussion.

The laboratory component, roughly 1/3 of instructional time, is devoted to hands-on application of unit topics. During laboratory time, students are required to conduct extension experiments in which they formulate hypotheses, design experiment to test variables in a controlled setting, analyze and discuss their data, and then present their findings in a formal laboratory report. A minimum of two labs in each big idea will be conducted. In addition, laboratory time includes on-line web explorations, field trips, and paper labs to further enhance student understanding of unit topics. Students are required to maintain and submit a record of laboratory experiences in a laboratory notebook.

The discussion component, roughly 1/3 of instructional time, is devoted to small group and class discussion of unit topics and themes. It is designed to integrate the laboratory and lecture components. During discussion, student assessment in the form of quizzes, homework assignments, etc. is reviewed and areas of deficiency are remediated. Collaborative learning is encouraged. Furthermore, supplementary material from outside sources is presented.

Assessments include, but are not limited to:

- Formal laboratory reporting
- Homework question packets
- “Free-response” written assignments
- Quizzes
- Unit Exams
- 2 semester exams

## REQUIRED MATERIALS:

1. Text: **Biology (8<sup>th</sup> Ed. AP Edition)**. Campbell, N. & Reece, Jane. Benjamin Cummings, San Francisco. **2008.**
2. Study Guide: **AP\* Biology**. Holtzclaw, F.W. & Holtzclaw T.E., Benjamin Cummings, San Francisco. **2008.**
3. Laboratory Notebook (bound graph paper)
4. 3-Ring Binder (I recommended a 3-inch binder)

## THE CONCEPT OUTLINE:

### **SEMESTER 1**

UNIT 1: EVOLUTION - The process of evolution drives the diversity and unity of life.

Chapters: 22, 23, 24, 25, and 26

Approximate Dates: August 13<sup>th</sup> – September 25<sup>th</sup>\*

UNIT 2: BIOCHEMISTRY AND CELLULAR PROCESSES - Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.

Chapters: 2, 3, 4, 6, 7, 8, 9, 10 and 11

Approximate Dates: September 28<sup>th</sup> – December 11<sup>th</sup> \*

### **SEMESTER 2**

UNIT 3: GENETICS AND PROTEIN SYNTHESIS - Living systems store, retrieve, transmit, and respond to information essential to life processes.

Chapters 12, 13, 14, 15, 16, 17, 18, and 19

Approximate Dates: January 4<sup>th</sup> – February 25<sup>th</sup> \*

UNIT 4: ORGANISMS AND POPULATIONS - Biological systems interact, and these systems and their interactions possess complex properties.

Chapters 5, 6, 8, 14.3, 18.4, 21.5, 23, 25.4, 48.4, 53, 54, 55, and 56

Approximate Dates: March 1<sup>st</sup> – May 6<sup>th</sup>\*

\*Please note that all dates are tentative and can be changed at any time.

COURSE OUTLINE

<b>UNIT 1: Evolution</b>		<b>Big Idea 1 and 4</b>	
Topics	Readings	Activities/Labs	Assessment
A. Darwin's Theory of Evolution by Natural Selection	Chapter 22 from textbook	Berkeley's "Welcome to Evolution 101!"	Note/Reading Packet Quizzes
B. Hardy-Weinberg Theorem	Chapter 23 from textbook	Lab Investigation 2: Mathematical Modeling-Hardy-Weinberg (SP 2, 4, 5, 7)	Unit test Free Response Practice Written Lab Reports
C. Microevolution	Chapter 23 from textbook		
D. Speciation	Chapter 24 from textbook	<i>Planet Earth: Jungles</i> <i>Arctic Tale</i> Web Activity "Evolution: Species and Speciation" <i>BBC: Wild Pacific-Strange Evolution</i>	
E. Phylogeny and Systematics	Chapter 25, 26 from textbook	Making Cladograms Lab Investigation 3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST (EU 1.B connects to BI 4)	
F. Origin of Life	Chapter 25 from textbook		

Topics	Readings	Activities/Labs	Assessment
A. Elements and Compounds	Chapter 2 from textbook	Using kits to build molecule models (SP 1)	Note/Reading Packets
B. Water and its importance to biological systems	Chapter 3 from textbook	Water Superhero Comic Strip	Venn Diagrams Quizzes
C. Acids, Bases, and Buffers	Chapter 3 from textbook	Lab Activity: The Role of Buffers and pH (SP 2)	Unit Exam Free Response Practice
D. Organic Chemistry Basics	Chapter 4 from textbook		Written Lab Reports
E. Macromolecules	Chapter 5 from textbook	Nutrition Label Analysis	
F. Enzyme Catalysis	Chapter 8 from textbook	Investigative Lab: Enzymes (EU 4.A connects to BI 2)	
G. Cellular Structure and Function	Chapter 6 from textbook	Web Activity: "Cell's Alive"  Venn Diagram: Prokaryotic vs. Eukaryotic  Animal Cell vs. Plant Cell  Lab Activity: Microscope Techniques	
H. Membrane Structure and Function	Chapter 7 from textbook	Lab Investigation 4: Diffusion and Osmosis (SP 3,4, 5)	
I. Introduction to Metabolism	Chapter 8 from textbook		
J. Cellular Respiration and Fermentation	Chapter 9 from textbook	Lab Investigation 6: Cellular Respiration (SP 2, 3, 4, 5, 7)	
K. Photosynthesis	Chapter 10 from textbook	Lab Investigation 5: Photosynthesis	
L. Cell Communication and Signaling	Chapter 11 from textbook		

**UNIT 3: Genetics and Protein Synthesis** **Big Idea 1, 3**

Topics	Readings	Activities/Labs	Assessments
A. Cell Cycle – Mechanisms and Controls	Chapter 12 from textbook	Microscopic Close Up: Mammal Cell Undergoing Mitosis in Orange Environment  Lab Investigation 7: Cell Division – Mitosis and Meiosis (EU 3.A connects to BI 1)	Note/Reading Packets  Quizzes  Unit Exam  Free Response Practice  Written Lab Reports
B. Meiosis	Chapter 13 from textbook	Lab Activity: Karyotyping	Genetics Research Paper
C. Mendelian Genetics	Chapter 14 from textbook	Lab Activity: Chi-Square analysis of corn crosses (SP 1, 2)	
D. Molecular Genetics	Chapter 15 from textbook	<i>DNA: The Secret Life (PBS Series: Episode 1)</i>	
E. Protein Synthesis	Chapter 17 from textbook	Modeling Activity	
F. Control of Gene Expression	Chapter 18 from textbook		
G. Biotechnology	Chapter 19 from textbook	FIELD TRIP: Genetic Update Conference by Sam Rhine. Students will complete a research paper on their choice of topic presented by Mr. Rhine. (CR5)	Students will be exposed to the latest information in genetic research. Often Mr. Rhine is citing publication merely weeks old. *Please see last years' lecture outline attached at end of syllabus.

**UNIT 4: Organisms and Populations** **Big Idea 1, 3, and 4**

Topics	Readings	Activities/Labs	Assessments
A. Viruses vs. Cells	Chapter 19 from textbook	Venn Diagram	Venn Diagram
B. Ecology	Chapters 50-55	<i>Wild Pacific: Fiery Birth</i>  Lab: Termite Behavior (SP3,4)  ACTIVITY: “My Footprint” (EU 4.A connects to BI 1) (CR 5)	Reading/Note Packet  Free Response Questions  Quizzes  Unit Exam  Written Lab Reports  “My Footprint” paper discussing each individual’s impact on the Earth (CR 5)