

## 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
- Semester Final Exam (1<sup>st</sup> Semester Final will be taken by all)

## 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 2018-2019:

**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:

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, 11, and 12

Approximate Dates:

**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:

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:

AP BIOLOGY EXAM is Monday, May 11, 2020.

COURSE OUTLINE

<i>UNIT 1: Evolution</i>			<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	<i>What Darwin Never Knew</i>  Berkeley's "Welcome to Evolution 101!"	Note/Reading Packet  Quizzes  Unit test
B. Hardy-Weinberg Theorem	Chapter 23 from textbook	Lab Investigation 2: Mathematical Modeling-Hardy-Weinberg (SP 2, 4, 5, 7)	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	<i>Blue Planet S1:E2</i>	

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
C. Acids, Bases, and Buffers	Chapter 3 from textbook	Lab Activity: The Role of Buffers and pH (SP 2)	Quizzes
D. Organic Chemistry Basics	Chapter 4 from textbook		Unit Exam
E. Macromolecules	Chapter 5 from textbook	Nutrition Label Analysis	Free Response Practice
F. Enzyme Catalysis	Chapter 8.5 from textbook	Investigative Lab: Enzymes (EU 4.A connects to BI 2)	Written Lab Reports
G. Cellular Structure and Function	Chapter 6 from textbook	Web Activity: "Cell's Alive"  Venn Diagram: Prokaryotic vs. Eukaryotic  Venn Diagram: 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. Cell Cycle- Mechanisms and Controls	Chapter 12 from textbook	Microscopic Close Up: Mammal Cell Undergoing Mitosis in Orange Environment	
J. Introduction to Metabolism	Chapter 8 from textbook		
K. Cellular Respiration and Fermentation	Chapter 9 from textbook	Lab Investigation 6: Cellular Respiration (SP 2, 3, 4, 5, 7)	
L. Photosynthesis	Chapter 10 from textbook	Lab Investigation 5: Photosynthesis (SP 1, 2, 3, 4, 5, 6)	
M. Cell Communication and Signaling	Chapter 11 from textbook		

**UNIT 3: Genetics and Protein Synthesis**

**Big Idea 1, 3**

Topics	Readings	Activities/Labs	Assessments
A. Meiosis	Chapter 13 from textbook	Lab Investigation 7: Cell Division – Mitosis and Meiosis (EU 3.A connects to BI 1)	Note/Reading Packets Quizzes Unit Exam
B. Mendelian Genetics	Chapter 14 from textbook	Lab Activity: Chi-Square analysis of corn crosses (SP 1, 2)	Free Response Practice Written Lab Reports
C. Chromosomal Theory of Inheritance	Chapter 15 from textbook	Lab Activity: Karyotyping	
D. Molecular Genetics	Chapter 16 from textbook	<i>DNA: The Secret Life (PBS Series: Episode 1)</i>	
E. Protein Synthesis	Chapter 17 from textbook	Modeling Activity	
F. Viruses	Chapter 19 from textbook	Venn Diagram	
G. Biotechnology	Chapter 20 from textbook	Lab Activity: DNA Murder Mystery (SP 1, 6)	
H. Control of Gene Expression	Chapter 18 from textbook	Lab Activity: DNA Fingerprinting – BIORAD (SP 6)  Lab Activity: pGLO Bacterial Transformation (SP 6, 7)  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.

<b>UNIT 4: Organisms and Populations</b>			<b>Big Idea 1, 3, and 4</b>
Topics	Readings	Activities/Labs	Assessments
A. Ecology and the Biosphere	Chapter 52 from textbook	<i>Wild Pacific: Fiery Birth</i>  <i>Planet Earth: Pole to Pole</i>	Reading/Note Packet  Free Response Questions  Quizzes
B. Behavioral Ecology	Chapter 51 from textbook	Lab: Termite Behavior (SP 3,4)	Unit Exam
C. Population Ecology	Chapter 53 from textbook		Written Lab Reports
D. Community Ecology	Chapter 54 from textbook	<i>Wild Survivors: Camouflage and Mimicry</i>	“My Footprint” paper discussing each individual’s impact on the Earth (CR 5)
E. Ecosystems	Chapter 55 from textbook	<i>Eternal Enemies: Lions and Hyenas</i>  ACTIVITY: “My Footprint” (EU 4.A connects to BI 1) (CR 5)	

\*Please note that additional material will be covered if time allows.