

• AP Biology

- The student who enrolls in AP Biology will go beyond general Biology, Chemistry, and Physics. AP Biology “puts it all together” as students study the BIG IDEAS of life while improving/perfecting their use of models/representations, laboratory skills, experimental design, and data analysis. Evolution is a reoccurring and underlying theme in Biology and, therefore, any student that cannot or does not want to study the Theory of Evolution by Natural Selection should not sit for this course.
- Big Ideas of AP Biology:
 - The process of evolution drives the diversity and unity of life.
 - Biological systems utilize free energy and molecular building blocks to grow, reproduce, and maintain a dynamic homeostasis.
 - Living systems store, retrieve, transmit, and respond to information essential to life processes.
 - Biological systems interact, and these systems and their interactions possess complex properties.
- AP Biology students will be expected to read and analyze assigned chapters in the textbook independently. Generally, 2 chapters a week are covered. It is imperative that students take this active role in their learning outside of the classroom as the majority of class time is spent in discussion or laboratory activities where concepts are applied. In addition, students will be required to keep a formal laboratory notebook. This notebook will also serve as evidence of laboratory work to colleges when seeking AP Biology course credit.
- Moreover, the student who chooses AP Biology has had experience in an Honors-level SCIENCE course, earned an A or B, and proven to be self-motivated in his/her learning, punctual in work completion, willing to complete course work outside the classroom (ie: reading/writing assignments). Students are eager to engage in class discussions and activities to strengthen depth of knowledge over course materials.

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 (1st Semester Final will be taken by all)

REQUIRED MATERIALS:

1. Text: **Biology (8th 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 2019-2020:

SEMESTER 1

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

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

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

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

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

AP BIOLOGY EXAM is the second Monday in May.

UNIT 1: Evolution		Big Idea 1 and 4	
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"	
E. Phylogeny and Systematics	Chapter 25, 26 from textbook	BBC: <i>Wild Pacific-Strange Evolution</i> 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
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		

<i>UNIT 3: Genetics and Protein Synthesis</i>			<i>Big Idea 1, 3</i>
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.

<i>UNIT 4: Organisms and Populations</i>			<i>Big Idea 1, 3, and 4</i>
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.