

January 12, 2012

Dear Students,

January snow is falling gently outside my window as I write to you today. The skies are gray and even the chickadees are tucked in to wait out the storm. At this point, you've completed the first semester of AP Biology. With great support from Mr. Yoskowitz, you've studied ecology, evolution, biodiversity, human systems and plant systems. It may feel like you have learned so much already this year—and you have—but there is still a lot ahead.

While May probably feels incredibly far away in the midst of January's cold and gray weather, we have just 15 weeks of classes until you take your AP Exam on May 14, 2012. In this relatively short period of time, we will dive into the microscopic world of biology. While your first semester mainly focused on biology at and above the organism level, the second semester will focus at and below the cellular level. I fully expect you to make countless connections between our studies in biochemistry, cell biology, and molecular genetics and what you learned in the first semester. The connections between areas of study in biology are emphasized on the AP exam and help bring the material we study to life.

We have a lot to accomplish this semester. You'll complete eight AP labs including DNA Fingerprinting and transforming a jellyfish's glowing florescent protein gene to bacteria (creating a genetically modified organism). You'll become adept at writing formal lab reports, practicing AP essay questions and applying the themes of AP Biology to our studies. Dinnertime conversations will become more lively as you expound on the connections between osmosis and brining turkey, describe people's characteristics in terms of genetic traits, and hypothesize about the enzymes present in your food.

Expect to work harder than you ever have in the next fifteen weeks. You will eat, think and breathe biology—and that's a good thing. Because, when May 14<sup>th</sup> arrives, you'll be ready. I'm so excited about all that we will learn and do in the next semester.

Sincerely,

Ms. Chabot

## AP Biology, Spring 2012—Course Description & Syllabus

This course is built on the conceptual framework described in the AP Biology Course Description. The AP Biology course covers topics in three general areas:

- **Molecules & Cells (25%),**
- **Heredity & Evolution (25%) and**
- **Organisms & Populations (50%).**

### Big Ideas in AP Biology

*This course is organized around four big ideas described in the AP Biology Course Description:*

**Big Idea 1:** The process of evolution drives the diversity and unity of life.

**Big Idea 2:** Biological systems utilize energy and molecular building blocks to grow, to reproduce and to maintain homeostasis.

**Big Idea 3:** Living systems store, retrieve, transmit, and respond to information essential to life processes.

**Big Idea 4:** Biological systems interact, and these interactions possess complex properties.

### Major Themes in AP Biology

A goal of the AP Biology program is to give students an understanding of biology as a process rather than to make the course and learning process nothing more than an accumulation of discrete and unrelated facts to be memorized. The AP Biology Development Committee has identified eight major themes that recur throughout the course.

**Theme 1: Science As a Process**—Science is a way of knowing. It can involve a discovery process using inductive reasoning, or it can be a process of hypothesis testing.

*Example: The theory of evolution was developed based on observation and experimentation.*

**Theme 2: Evolution**—Evolution is the biological change of organisms that occurs over time and is driven by the process of natural selection. Evolution accounts for the diversity of life on Earth.

*Example: Widespread use of antibiotics has selected for antibiotic resistance in disease-causing bacteria.*

**Theme 3: Energy Transfer**—Energy is the capacity to do work. All living organisms are active (living) because of their abilities to link energy reactions to the biochemical reactions that take place within their cells.

*Example: The energy of sunlight, along with carbon dioxide and water, allows plant cells to make organic materials, synthesize chemical energy molecules, and ultimately release oxygen to the environment.*

**Theme 4: Continuity and Change**—All species tend to maintain themselves from generation to generation using the same genetic code. However, there are genetic mechanisms that lead to change over time, or evolution.

*Example: Mitosis consistently replicates cells in an organism; meiosis (and hence sexual reproduction) results in genetic variability.*

**Theme 5: Relationship of Structure to Function**—The structural levels from molecules to organisms ensure successful functioning in all living organisms and living systems.

*Example: Aerodynamics of a bird’s wing permits flight.*

**Theme 6: Regulation**—Everything from cells to organisms to ecosystems is in a state of dynamic balance that must be controlled by positive or negative feedback mechanisms.

*Example: Body temperature is regulated by the brain via feedback mechanisms.*

**Theme 7: Interdependence in Nature**—Living organisms rarely exist alone in nature.

*Example: Microscopic organisms can live in a symbiotic relationship in the intestinal tract of another organism; the host provides shelter and nutrients, and the microorganisms digest the food.*

**Theme 8: Science, Technology, and Society**—Scientific research often leads to technological advances that can have positive and/or negative impacts upon society as a whole.

*Example: Biotechnology has allowed the development of genetically modified plants.*

## Grading & Assessment Scheme, AP Biology Spring 2012

	<b>Tests</b>	<b>Labs</b>	<b>Article Response</b>	<b>Presentation</b>	<b>Concept Synthesis</b>	<b>Class Participation &amp; Timeliness</b>
	<b>30%</b>	<b>30%</b>	<b>10%</b>	<b>10%</b>	<b>10%</b>	<b>10%</b>
<b>D U E</b>		<b>Mondays</b>	<b>Thursdays</b>	<b>Fridays</b>	<b>Mondays</b>	
<b>Q u a r t e r 3</b>	Biochemistry Cells Cell Energy Cell Reproduction	<b>AP Lab 2</b> <b>AP Lab 1</b>  <i>AP Lab 4</i>  <b>AP Lab 5</b> <b>AP Lab 7</b>  <i>AP Lab 8</i>	Biochemistry Cells Metabolism Cell Disease	Five minute presentation on a current science article  Five minute presentation on a scientist	One/Week	Daily assessment
<b>Q u a r t e r 4</b>	Mendelian & Molecular Genetics  Ecology	<i>Gene Regulation Lab</i>  <i>AP Lab 6a</i>  <i>AP Lab 6b</i>	Genetics DNA Technology Epigenetics	Five minute presentation on a current science article  Five minute presentation on a scientist	One/Week	Daily assessment

## **Assignment Descriptions**—*Detailed descriptions are in attached documents*

**Formal Lab Report:** Scientific report based on a lab performed in class. Formal lab reports include the following sections: Introduction, Methods & Materials, Results, and Conclusion. The writing style is formal, scientific and impartial. All lab reports are assessed with a rubric.

**Informal Lab Report:** An abbreviated scientific report that summarizes and analyzes the results of an investigation.

**Concept Synthesis:** One page, single spaced (typed) maximum, the concept synthesis summarizes the concepts studied during the week. Included in this summary are the following:

- Summarize the concepts studied during the week
- Explain how the concepts connect to at least three AP Themes
- Make a personal connection to the content studied and/or make a connection to current events
- Assess yourself: What do you get? Where are you confused?

**Article Response:** Read an article that relates to each unit of study. This includes a summary (including author, date of publication and publication source), connection to current study, personal or other connection, and questions.

Sources for articles: New York Times, Scientific American, Discover or other comparable source. Articles must have been published in the past year.

**Presentation:** Each quarter you will give two five minute presentations. One presentation will be on a current science article & the other will be on a scientist.

**Class Participation:** All students start with 100 points. Arriving to class late or using inappropriate technology during class results in the loss of 1 point each time

**Timeliness of Assignments:** Each assignment will have a timeliness grade, independent of its assessed grade. On time = 100%, 5 percent is deducted for each day late.

**Detailed AP Biology Syllabus**—This is a living document to guide our work—changes may occur.

Week	Dates	Unit	Key Topics	Key Learning Experiences	Reading & Writing Assignments	Lab Reports & Tests
1	1/17-1/20	Biochemistry	Structure of an atom Types of chemical bonding Functional groups Classification & formation of macromolecules	Bacteria Inquiry  Five sense biochemistry  Model formation of macromolecules	Chapter 2: Chemical Foundations of Cells  <i>Concept Synthesis</i>	
2	1/23-1/27	Biochemistry	Characteristics and function of enzymes Properties of Water	AP Lab 2: Enzyme Catalysis	Chapter 3: Carbon Compounds in Cells  <i>Concept Synthesis</i> <b>Biochemistry Article Response</b>	<b>Biochemistry Test</b>
3	1/30-2/3	Cell Structure & Function  Cell Transport	Sub-cellular organization Prokaryotic vs. eukaryotic cells Fluid mosaic model of the cell membrane Types of cell transport	How do cell organelles interact to perform the functions of the cell? <u>Lorenzo's Oil</u> & a Disease of the Eukaryotic Cell: Adrenoleukodystrophy (ALD)	Chapter 4: Cell Structure & Function Chapter 5: A Closer Look at Cell Membranes  Excerpt from <u>Acquiring Genomes</u> by Lynn Margulis  <i>Concept Synthesis</i>	Formal Lab Report: AP Lab 2
4	2/6-2/10	Cell Transport  Cell Communication  Nervous & Endocrine Systems	Types of cell transport  Cell to cell communication	AP Lab 1: Diffusion & Osmosis	Campbell Chapter 11: Cell Communication Chapter 34: Chapter 36: Excerpt from <u>The Molecules of Emotion</u> by Candace Pert  <i>Concept Synthesis</i>  <b>Cell Article Response</b>	<b>Cell Structure &amp; Function, Cell Transport &amp; Cell Communication Test</b>
5	2/13-2/17	Cell Energy & Metabolism  Cell Energy: Photosynthesis	Free energy changes Molecules & reactions involved in metabolism  Light independent & light dependent reactions	Model metabolic processes  AP Lab 4: Photosynthesis	Chapter 6: Ground Rules of Metabolism  Chapter 7: How Cells Acquire Energy <i>Concept Synthesis</i>	Formal Lab Report: AP Lab 1
6	2/20-2/24	Cell Energy: Cellular Respiration & Fermentation	Cellular respiration Fermentation	Lab 5: Peas & Cellular Respiration  Kitchen Fermentation	Chapter 8: How Cells Release Stored Energy  <i>Concept Synthesis</i>	Informal Lab Report: AP Lab 4  <b>Cell Energy Test</b>

7	3/7-3/9	Cell Reproduction  Reproductive System	Cell Cycle Stages of mitosis	AP Lab 3: Mitosis & Meiosis  Model mitosis	Chapter 9: Cell Division & Mitosis  <i>Concept Synthesis</i>	Formal Lab Report: AP Lab 5
Week	Dates	Unit	Key Topics	Key Learning Experiences	Reading & Writing Assignments	Lab Reports & Tests
8	3/12-3/16	Cell Reproduction	Stages of meiosis Alternation of generations Spermatogenesis & oogenesis	Model meiosis	Chapter 10: Meiosis  <i>Concept Synthesis</i>  <b>Cell Disease Article Response</b>	Cell Reproduction Test
9	3/19-3/23	Mendelian Genetics	Mendelian & non-mendelian genetics Inheritance patterns: monohybrid, lethal, sex-linked, codominance and multi-hybrid crosses	AP Lab 7: Genetics of Organisms  Chi Square Analysis  AP Lab 8: Hardy Weinberg Genetic Equilibrium	Chapter 11: Observable Patterns of Inheritance Chapter 12: Human Genetics  <i>Concept Synthesis</i>	
10	3/26-3/29	Molecular Genetics  Central Dogma of Molecular Biology	Structure of prokaryotic and eukaryotic chromosomes RNA & DNA Structure & function Central Dogma: RNA-> DNA -> Protein-> Trait	Central Dogma Derby	Chapter 13: DNA Structure & Function Chapter 14: From DNA to Proteins  <i>Concept Synthesis</i>  <b>Genetics Article Response</b>	Formal Lab Report: AP Lab 7  Informal Lab Report: AP Lab 8
11	4/2-4/6	Prokaryotic Genetics Gene Regulation	Gene regulation in prokaryotic & eukaryotic cells	Gene Regulation Lab	Chapter 15: Control Over Genes  <i>Concept Synthesis</i>	Informal Lab Report: Gene Regulation
12	4/9-4/13	DNA Technology	DNA Fingerprinting	AP Lab 6a: DNA Fingerprinting & Gel Electrophoresis	<i>Concept Synthesis</i>  <b>DNA Technology Article Response</b>	Informal Lab Report: AP Lab 6a
13	4/23-4/27	DNA Technology & Epigenetics	Epigenetics	AP Lab 6b: pGlo & Genetic Engineering	Chapter 16: Recombinant DNA & Genetic Engineering Epigenetics Articles  <i>Concept Synthesis</i>  <b>Epigenetics Article Response</b>	Mendelian & Molecular Genetics Test  Informal Lab Report: AP Lab 6b
14	4/30-5/4	Evolution Recap	Evidence of Evolution Mechanisms of Evolution		Symbiogenesis Articles (Lynn Margulis)	
15	5/7-5/11	REVIEW Week	Review concepts, connect themes		Re-read Concept Synthesis Papers	Study, study, study

**AP Biology Exam: May 14, 2012 at 8 am**