



AP Biology Course Syllabus

2016-2017

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Textbook: Life, the Science of Biology, 7th Edition

Authors: Purves, Sadava, Orianes and Heller

Publication Date: 2004

Required Supplies: 1. Three-Ring Binder with lined paper 2. Lab Notebook (can purchase *after* school starts)

Instructional Resources: 1. Textbook Study Guide and Test File 2. The National Center for Case Study Teaching in Science, University of Buffalo (website) 3. Pearson's "Lab Bench" (website) 4. Bozeman Science website

Recommended Resource: AP Biology Study Guide(s) NOTE: Anything published earlier than 2012 will not be as helpful in preparation for the AP EXAM, which was newly formatted in 2013. There are a couple of copies of review books in the school library available for 90-minute check-out.

Course Introduction

Welcome to AP Biology! This course, like all AP courses, is heavily regulated by the College Board. Please familiarize yourself with the website http://www.collegeboard.com/student/testing/ap/sub_bio.html for information on the course, the AP EXAM, and learning objectives.

Course Description

The AP Biology course is designed to be the equivalent of a two-semester college introductory biology course usually taken by biology majors during their first year. After showing themselves to be qualified on the AP Exam, some students, in their first year of college, are permitted to take upper-level courses in biology or register for courses for which biology is a prerequisite. Other students may have fulfilled a basic requirement for a laboratory-science course and will be able to undertake other courses to pursue their majors.

AP Biology should include those topics regularly covered in a college biology course for majors. The college course in biology differs significantly from the usual first high school course in biology with respect to the kind of textbook used, the range and depth of topics covered, the type of laboratory work done by students, and the time and effort required of students. The textbooks used for AP Biology should be those used by college biology majors. The kinds of labs done by AP students must be the equivalent of those done by college students.

The AP Biology course is designed to be taken by students after the successful completion of a first course in high school biology and one in high school chemistry as well. It aims to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology.

The Emphasis on Science Practices

A practice is a way to coordinate knowledge and skills in order to accomplish a goal or task. The science practices enable you to establish lines of evidence and use them to develop and refine testable explanations and predictions of natural phenomena. Because content, inquiry, and reasoning are equally important in AP Biology, each learning objective combines content with inquiry and reasoning skills described in the science practices.

The science practices capture important aspects of the work that scientists engage in, at the level of competence expected of you, an AP Biology student. Please refer to pages 97-102 in the AP Biology Course and Exam Description document found here: <http://media.collegeboard.com/digitalServices/pdf/ap/ap-biology-course-and-exam-description.pdf>

Key Concepts

The key concepts and related content that define the revised AP Biology course and exam are organized around a few underlying principles called **THE BIG IDEAS**, and their Enduring Understandings (EU's) which encompass the core scientific principles, theories and processes governing living organisms and biological systems.

Big Idea 1: Evolution	The process of evolution drives the diversity and unity of life.
Big Idea 2: Cellular Processes, Energy and Communication	Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.
Big Idea 3: Genetics and Information Transfer	Living systems store, retrieve, transmit, and respond to information essential to life processes.
Big Idea 4: Interactions	Biological systems interact, and these systems and their interactions possess complex properties.

Students will always have electronic access to the Big Ideas, Enduring Understandings, Essential Knowledge, and Learning Objectives via the class website. Each of these is not taught, or learned, in isolation. Students will gain the skill of weaving common themes and concepts together as they progress in the course.

STUDENT ACTIVITIES WHICH MEET LEARNING OBJECTIVES: Some examples...

Example of Activity designed to meet LO 1.2 -- The student is able to evaluate evidence provided by data to qualitatively and quantitatively investigate the role of natural selection in evolution -- in BIG IDEA 1:

HORSE FOSSILS from the John Day Fossil Beds: Students examine replica horse skulls and teeth to make calculations on body size and dimensions. Through examination of this comparative data, students draw conclusions about the role of natural selection in the evolution of *Hyracotherium*, or Dawn Horse, and modern day *Equus*.

Example of Activity designed to meet LO 2.6 -- The student is able to use calculated surface area-to-volume ratios to predict which cell(s) might eliminate wastes or procure nutrients faster by diffusion – in BIG IDEA 2.

AGAR CUBES and FOOD COLORING: In this activity, students begin by calculating the surface area and volume of sets of different sized agar cubes, and then calculating the surface area to volume ratios. The cubes are then placed in colored solutions, and left to sit. Finally, the students use their calculated values to predict which cubes will show diffusion further into the cube than others. Students will make connections between this exercise and the determination of which cells might eliminate wastes or obtain nutrients faster by diffusion.

Example of Activity designed to meet LO 3.4 -- The student is able to describe representations and models illustrating how genetic information is translated into polypeptides – BIG IDEA 3.

SMALL-GROUP STORY BOARDS: Students will demonstrate how DNA is transcribed into mRNA, and then the mRNA is translated into proteins, using a “factory” as their model. So if they decide that their factory is making cell

phones, for example, they have to tell the story of how you make cell phones, citing comparative representations of each phase of THAT process, with each phase of the process of genetic information being translated into proteins. At the end students construct a small poster of their factory, with removable labels for: the cell, the cell membrane, the Nucleus, DNA, Transcription, mRNA, Translation, amino acids, tRNA, ribosome, and the complete protein. Other groups will get the chance to place the labels on the correlating parts of the poster, e.g. the cell membrane label would be placed on the walls of the factory, the DNA label would be placed on the Product Design Plans inside the office (or nucleus).

Example of Activity designed to meet LO 4.17 -- The student is able to analyze data to identify how molecular interactions affect structure and function. – BIG IDEA 4.

THE ROCK POCKET MOUSE: Students will watch the HHMI short film *Making of the Fittest: Natural Selection and Adaptation* featuring the Rock Pocket Mouse, and participate in a Hardy-Weinberg activity (Allele and Phenotype Frequencies of Rock Pocket Mouse Populations) where they calculate allelic frequency changes in mouse populations. These alleles will be connected to the genes on DNA and will relate to evolutionary history when students analyze amino acid data in order to draw conclusions about the evolution of the coat-color phenotypes in the rock pocket mouse (Natural Selection and Evolution of Rock Pocket Mouse Populations). In addition, students will be able to identify various mechanisms of evolution.

SOCIAL AND ETHICAL CONCERNS

It is extremely important that students connect their classroom knowledge to socially important issues. This course will allow students to learn about and discuss timely issues in a variety of formats, e.g. class discussions, posters, videos, web quests, and case studies.

Example: The End of the Line debate – Students see the famous documentary where the demise of the Blue Fin Tuna is presented, along with government policy and advocacy positions. Students answer factual questions about the film as it progresses, and then answer “reflection” questions in a period of quiet in the classroom. Then they take their questions into a SOCRATIC CIRCLES environment, where they contribute their ideas and debate possible solutions to the ethical concerns involved with *the effect of human activity on biodiversity and extinction*.

THE LABORATORY PROGRAM

Students will be engaged in investigative laboratory work approximately 25% of their classroom time. These labs will be inquiry-based, student investigations. There will be at least two laboratory investigations per BIG IDEA selected from the *AP Biology Investigative Lab Manual: An Inquiry-based Approach* (2012) – or an equivalent laboratory instructional resource. Students are required to maintain a laboratory notebook throughout the course of the school year. In addition, students will formally present their lab findings via oral presentations, Google or Power Point presentations and peer-reviewed mini-posters.

APPLICATION OF THE SCIENCE PRACTICES IN THE LABORATORY:

Students will be able to apply the science practices throughout their laboratory work. Many of the science practices will be used in all of the student-directed labs and investigations. Some science practices will be emphasized to a greater degree than others in each particular lab or investigation. A chart indicating their application is shown below.

LAB INVESTIGATION & BI*	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6	SP 7
BLAST (BI 1)	X				X		

HARDY-WEINBERG (BI 1)	X	X			X		
ARTIFICIAL SELECTION (BI 1)	X	X			X		X
CELLULAR RESPIRATION (BI 2)	X	X	X			X	X
PHOTOSYNTHESIS (BI 2)	X	X	X	X		X	X
DIFFUSION & OSMOSIS (BI 2)		X		X	X		
CELL DIVISION: MITOSIS & MEIOSIS (BI 3)	X				X	X	X
BIOTECHNOLOGY: BACTERIAL TRANSFORMATION (BI 3)	X				X	X	X
BIOTECHNOLOGY: RESTRICTION ENZYME ANALYSIS (BI 3)						X	
ENERGY DYNAMICS (BI 4)	X	X	X	X	X	X	X
FRUIT FLY BEHAVIOR (BI 4)	X		X	X	X	X	X
TRANSPIRATION (BI 4)	X	X		X		X	X
ENZYME ACTIVITY (BI 4)					X	X	X

Course Policies

Grading

Exams, quizzes.....85%

Labs.....10%

Worksheets, cases.....5%

Note: *These are approximate percentages.*

I do not round up grades. If you earned a 79.9% at the end of the term, for example, that is a very high 'C' grade – the highest, in fact. Students concerned about being on the border at grading time should take full opportunity of test fixes, and any other chance to earn points – including, most importantly, preparing diligently for exams.

Test re-takes and Test fixes

Re-takes: I strongly discourage retaking exams for a variety of reasons. The re-take may be an entirely different exam, testing the same content, but in an entirely different format – usually essay.

Fixes: Students wishing to improve their score on an exam or quiz can “fix” it by writing complete sentences that feature the information they did not master first time around. Spelling and grammar count, and the amount of fix points is determined by the instructor, but can amount to an entire letter grade improvement. STUDENTS MUST BE PRESENT ON THE ORIGINAL TEST DAY, AND ON THE DAY OF FIXES TO BE ELIGIBLE FOR THESE IN-CLASS FIX POINTS. Other fix points can be earned up to 2 weeks after the exam date, but they often involve considerably more effort and writing.

Late Work

Students are eligible to earn A MAXIMUM OF 75% OF THE POSSIBLE POINTS for late work. Late work is accepted up to 2 weeks after the original due date.

If a student was in class

1. On the day the assignment was given, **AND**
2. On the day it was due

then they need to turn it in when I ask for it. Otherwise, it will be marked "Late".

AP Exam

All students enrolled in AP Biology will be taking the AP Biology exam in May 2017. Students are strongly encouraged to take it from the College Board, where a passing score can often lead to college credit. The exam is approximately \$90. Please inform me of any extenuating financial circumstances as the GHS counseling office can often help offset the cost. Students who do not wish to take the exam from the College Board will be taking it in my classroom on exam day, and their score on that exam will go toward their grade in the class.

Cheating, a.k.a. Academic Dishonesty

The worst a student can do on any whole graded item (exam, quiz, lab, assignment, etc.) is 50% of the points. Students are encouraged to converse and assist with other students when it is in a manner that is not inconsistent with testing or assignment instructions. Assisting others is prohibited, however, when it would constitute academic dishonesty. Prohibited events include, but are not limited to, using or sharing prohibited study aids or other written materials on tests or assignments. Academic dishonesty also includes sharing, collaborating, or communicating with others on tests or assignments, before or during tests or assignments, in violation of direction of the class instructor. Academic dishonesty may also include knowingly sharing false information or knowingly misleading another to reach a false answer or conclusion. Plagiarism, or using ideas or writings of another as your own, will not be tolerated. Students who engage in academic dishonesty may complete an alternative assessment chosen by staff. Discipline may involve the District prohibiting the student from participating in school-sponsored activities or events; detention, denial, or revocation of school-conferred titles, distinctions, honors or privileges; or suspension or expulsion.

Cell phones, ear buds, headphones, and tablets

Phones that are used, or are visible, will be confiscated by the classroom teacher/staff member and turned into the main office. 1st offense – Cell phone confiscated and teacher will return at the end of class. 2nd offense – Cell phone confiscated and parent/guardian may pick-up in main office. 3rd offense – Cell phone confiscated and parent/guardian may pick-up in main office, resulting in suspension for the student.

Laptops, or tablets with a separate keypad, may be permissible per arrangement with instructor.

Kindly,
Mr. Stanley