

# AP Biology

**AP Biology** is designed to be the equivalent of a two-semester college introductory biology course usually taken by biology majors during their freshman year. At Torrey Pines High School AP Biology is an *elective science course* for students who are highly motivated and have a strong interest in science. Major topics of study include biochemistry, cells, cellular energetics, genetics, evolution, classification, organism structure/function, and ecology. As in college biology, the AP Biology course is designed to have both a lecture and a lab component. Labs conducted by AP Biology students are the equivalent of those experienced by college biology students. At the completion of this course, students are expected to take the College Board's AP Biology exam. Some students may earn college credit if they earn high enough marks on this exam. In class, the format of each chapter test is similar to the AP Biology exam. Students are expected to demonstrate critical thinking skills through their answers to both multiple choice questions and essay questions each chapter.

AP course content and pacing are determined by the College Board.

See their website at: [apcentral.collegeboard.com](http://apcentral.collegeboard.com)

The AP Biology course and the AP Biology exam cover these three general areas:

- I. Molecules and Cells, 25%
- II. Heredity and Evolution, 25%
- III. Organisms and Populations, 50%

For sample questions and a detailed course outline see the College Board's AP Biology website at:

[http://www.collegeboard.com/prod\\_downloads/ap/students/biology/ap03\\_biology.pdf](http://www.collegeboard.com/prod_downloads/ap/students/biology/ap03_biology.pdf)

## Textbooks

The lab manual used for this course is entitled, AP Biology Lab Manual compiled by the College Board, 2000. The textbook used is Biology, fifth edition by Campbell, Reece, Mitchell, 1999 (which is currently the leading textbook used by many UC colleges).

## Suggested Prerequisites

The AP Biology course is designed to be taken by 11<sup>th</sup> or 12<sup>th</sup> grade students after their successful completion (grades of A's or B's) of general high school biology and chemistry.

## Coursework

At Torrey Pines, Semester I instruction includes chapters 1-26 and Semester II instruction includes chapters 27-55. This is an extremely fast paced course; students will be assigned written homework and reading for every class period. Note taking is required in class as well as from the text in conjunction with the homework assignments. Students should demonstrate appropriate higher writing skills in their assessments. Assignments should contain correct spelling and grammar, legible writing and complete thoughts. Problem solving and analytical thought are essential components as well. **On average, students should spend at least 6-10 hours each week studying AP Biology outside of class.** Daily attendance is required and late work is not accepted in this course.

## AP Biology Grading Scale

The final grade percentages below correspond to the assigned letter grades in AP Biology.

A 100 - 90%, B 89.9 - 80%, C 79.9 - 67%, D 66.9 - 60%, F  $\leq$  59.9%

The approximate distribution of points toward the final grade each semester is as follows:

Homework/ Labs 10-15%

Tests/ Quizzes 70-75%

Final Exam 15-20%

Extra credit cannot exceed 2.5% of a student's final grade.

### Academic Honesty

ACADEMIC HONESTY is expected. Students must adhere to the District Honesty Policy.

Students should not do anything that would bring their integrity into question. Assessments (homework, labs, quizzes, exams, projects, etc) are expected to be completed only by the student. Collaboration with other students is allowed on homework, but individual work, distinctly original from the lab partners' work is always required or zero credit will be earned. Copying work, full or in part, is in violation of academic honesty. Always cite and credit sources that are not your own. DISHONESTY will always result in a "0" on the test/assignment, lowered citizenship, a referral, contact home and possibly further disciplinary measures as per school/district policy.

### Safety

Safety is paramount in the biological laboratory. Students must exhibit appropriate maturity and responsibility to be admitted to and remain in Biology. Students must follow all safety rules as defined in the safety contract. Safety contracts are distributed in class during the first week of school.

<b>AP Biology</b>	
<p>1. Satisfies Requirements:</p> <p>a) High School Graduation: elective Life Science credit</p> <p>b) UC/CSU approved Lab Science course</p> <p>c) Upon passing the AP Biology Exam, students might earn college course credit</p>	
2. Grade Level	<p>11<sup>th</sup> or 12<sup>th</sup> grade</p> <p>(this is a single period course)</p>
3. Prerequisites	<p>High school Biology and Chemistry (with grades of A or B in both courses)</p>
4. Math/Science Skills	<ul style="list-style-type: none"> <li>• Very strong science student</li> <li>• Highly self-motivated</li> <li>• Interested in &amp; excited about science</li> <li>• Graphing/graph interpretation</li> <li>• Measurement, Metric system</li> <li>• Strong lab skills, strong lab safety awareness               <ul style="list-style-type: none"> <li>• Deductive reasoning skills</li> <li>• Critical thinking, analytical skills</li> <li>• Strong writing ability</li> </ul> </li> <li>• Strong background in high school chemistry</li> </ul> <p>See sample AP Biology questions below or go to p.33 on the following link:  <a href="http://www.collegeboard.com/prod_downloads/ap/students/biology/ap03_biology.pdf">http://www.collegeboard.com/prod_downloads/ap/students/biology/ap03_biology.pdf</a></p>
4. Study Skills	<ul style="list-style-type: none"> <li>• The reading requirements for this class are immense (one chapter every class period)               <ul style="list-style-type: none"> <li>• Excellent study skills</li> <li>• Self-motivated, independent learner</li> </ul> </li> <li>• All assignments done thoroughly and on time every day</li> </ul>

	<ul style="list-style-type: none"> <li>• Understand advanced concepts from textbook readings independently <ul style="list-style-type: none"> <li>• Very strong organization and time management</li> </ul> </li> <li>• High level of class participation (answering and ASKING questions)</li> <li>• Many assessments are a combination of multiple choice tests, essays, and laboratory data analysis <ul style="list-style-type: none"> <li>• Attendance every day is extremely important</li> </ul> </li> </ul>
5. Outside study time requirements (average)	<ul style="list-style-type: none"> <li>• 6-10+ hours of study time per week</li> <li>• Additional time may be necessary for long range projects</li> <li>• Willingness to make up work when absent, self-advocating</li> <li>• Willingness to spend extra time at school if needed, self-advocating</li> </ul>
<p style="text-align: center;">6. Sample multiple choice and essay questions</p> <p style="text-align: center;">Note the level of Chemistry and Biology skills necessary for the critical thinking required in these questions.</p> <p style="text-align: center;">Most of these questions were taken from the College Board website at:  <a href="http://www.collegeboard.com/prod_downloads/ap/students/biology/ap03_biology.pdf">http://www.collegeboard.com/prod_downloads/ap/students/biology/ap03_biology.pdf</a></p>	

Sample AP Biology multiple-choice questions:

- Regarding mitosis and cytokinesis, one difference between higher plants and animals is that in plants:
  - the spindles contain cellulose microfibrils in addition to microtubules, whereas animal spindles do not contain microfibrils
  - sister chromatids are identical, whereas in animals they differ from one another
  - a cell plate begins to form at telophase, whereas in animals a cleavage furrow is initiated at that stage
  - chromosomes become attached to the spindle at prophase, whereas in animals chromosomes do not become attached until anaphase
  - spindle poles contain centrioles, whereas spindle poles in animals do not
- Which of the following statements is true about the Krebs (citric acid) cycle and the Calvin (light-independent) cycle?
  - They both result in a net production of ATP and NADH.
  - They both require a net input of ATP.
  - They both result in a release of oxygen.
  - They both take place within the cytoplasmic matrix.
  - They both are carried out by enzymes located within an organelle matrix.
- The bonding of two amino acid molecules to form a larger molecule requires
  - the release of a water molecule
  - the release of a carbon dioxide molecule
  - the addition of a nitrogen atom
  - the addition of a water molecule
  - an increase in activation energy
- When hydrogen ions are pumped out of the mitochondrial matrix, across the inner mitochondrial membrane, and into the space between the inner and outer membranes, the result is
  - damage to the mitochondrion
  - the reduction of NAD
  - the restoration of the Na-K balance across the membrane
  - the creation of a proton gradient
  - the lowering of pH in the mitochondrial matrix
- The function of water in photosynthesis is to
  - combine with  $\text{CO}_2$
  - absorb light energy
  - supply electrons in the light-dependent reactions
  - transport  $\text{H}^+$  ions in the light-independent (dark) reactions
  - provide  $\text{O}_2$  for the light-independent (dark) reactions

Questions 6-9

- Centriole
- Lysosome
- Nucleolus
- Peroxisome
- Ribosome

### Sample Free-Response/Essay Questions

On the AP Exam four mandatory questions will be asked. In general, there will be one on molecules and cells, one on genetics and evolution, and two on organisms and populations. Some questions may cover more than one of these areas. One or more of the four questions may be designed to test analytical and reasoning skills. The laboratory experiences may be reflected in these questions.

The following are two of the free response questions from the 2002 AP Biology exam. More examples can be found on the College Board website.

1. The human genome illustrates both continuity and change.
  - (a) Describe the essential features of two of the procedures/ techniques below. For each of the procedures/ techniques you describe, explain how its application contributes to understanding genetics.
    - The use of a bacterial plasmid to clone and sequence a human gene.
    - Polymerase chain reaction (PCR)
    - Restriction fragment length polymorphism (RFLP) analysis
  - (b) All humans are nearly identical genetically in coding sequences and have many proteins that are identical in structure and function. Nevertheless, each human has a unique DNA fingerprint. Explain this apparent contradiction.
  
2. The complexity of structure and function varies widely across the animal kingdom. Despite this variation, animals exhibit common processes. These include the following.
  - . transport of materials
  - . response to stimuli
  - . gas exchange
  - . locomotion
  - (a) Choose two of the processes above and for each, describe the relevant structures and how they function to accomplish the process in the following phyla.
    - Cnidaria (e.g., hydra, jellyfish)
    - Annelida (e.g., earthworm)
    - Chordata (e.g., mouse)
  - (b) Explain the adaptive (evolutionary) value(s) of the structural examples you described in part a.