

AP Biology Class Expectation and Syllabus

Mr. Tomik
Jason.tomik@vbschools.com
Voicemail: 78719



Philosophy

AP Biology has a wide scope and a considerable amount of breadth. Students are provided first hand experience in the process of science. Students are expected to apply knowledge obtained in the class to current research, global issues and their own health. I use the provided materials from College Board, approved curricular resources, and scientific journals to link biological themes to environmental and social concerns.

Course Overview

The **AP Biology** course is designed to be the equivalent of a college introductory biology course usually taken by biology majors during their first year. The course meets on an alternating A/B block schedule, each block is 90 minutes in duration. Our school year begins the day after Labor Day in September and continues until the middle of June. The AP Biology curriculum is completed prior to the AP exam. Blocks remaining until the end of the year are used to complete a fetal pig dissection and/or research and presentation of issues of environmental and social concerns.

Since this course is a two semester course in most colleges, it is fast paced and intense. Self-motivated students with excellent reading comprehensions and firm backgrounds in chemistry usually excel in the classroom and on the AP exam. AP Biology includes the topics regularly covered in a college biology course for majors. The textbook, Biology, 6th edition, by Solomon, Berg, & Martin, (Thomson Brooks/Cole, 2002), used for AP Biology is one that is used by college biology majors and the reading level is that of at least a college freshman. Developing students with critical thinking skills is a strong component of any AP Biology curriculum. Being able to understand lab design and to perform acceptable analysis are common themes throughout inquiry labs. To experience laboratory work, my students perform the twelve required labs from College Board and other college equivalent activities that correlate to core concepts. The amount of time spent doing lab activities exceeds 25% of the course.

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. 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 two main goals of my AP Biology course are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The ongoing information explosion in biology makes these goals even more challenging. Primary emphasis in an AP Biology course should be developing an understanding of concepts rather than memorizing terms and technical details. For example, the consequences of mitosis and meiosis are the focus instead of individual steps. Essential to this conceptual understanding are the following: a grasp of science as a process rather than as an accumulation of facts; personal experience in scientific inquiry; recognition of unifying themes that integrate the major topics of biology; and application of biological knowledge and critical thinking to environmental and social concerns.

Evolution is continuously addressed throughout the course since it is one of the fundamental concepts in Biology. Discussions include endosymbiosis in cellular studies, comparative structures in anatomy, phylogenetic trees in taxonomy, speciation patterns in ecology, and plant adaptations in photosynthesis.

Student assessments include end-of-unit tests, writing AP essays, reading and outlining the text, quizzes, informal assessments, projects, and lab reports.

Resources

Textbook: Biology, 6th edition, by Solomon, Berg, & Martin, (Thomson Brooks/Cole, 2002).

Lab book: General Biology Laboratory Manual, by Eberhard, (Thomson Brooks/Cole, 1996).

Additional supplemental materials include:

Masterman, Holman, Biology with Computers, 3rd edition, Vernier Software & Technology, 2003.

Lab Component

Over 25% of class time is spent performing labs, including all twelve of the required AP Biology. Supplemental activities include field trips, inquiry investigations, nature walks, comparative vertebrate anatomy lab, and food science labs dealing with carbohydrates and proteins, survey labs, and labs using scientific probes and software. Labs are used to help student develop a firm understanding of the process of science. Students formulate hypotheses, develop data charts, collect and analyze data, and draw conclusions. These are often documented through the use of formal lab reports.

-Students will need a separate section of their binder or a ½ inch binder to use as a lab notebook.

THEMES

The emphasis throughout the various units how the material relates to each theme. For example in every unit, related adaptations are described as a result of the process of evolution. At the end of each unit, as a review, students are given a list of the themes and asked to related the current unit to each theme.

- Theme 1 – Science as Process – Students demonstrate the use of scientific reasoning to solve a problem by designing and performing a lab to answer a question posed by the teacher.
- Theme 2 – Evolution – Students compare ecological time with evolutionary time and examine how they correspond. Adaptations are stressed.
- Theme 3 – Energy transfer – Students are asked to describe the movement, conversion, and storage of energy within an ecosystem, usually originating with the sun, then stored and converted to chemical energy by autotrophs, then passed on to heterotrophs and/or dissipated as heat.
- Theme 4 – Continuity and change – Students recognize that genetics is the basis of change and continuity in population studies. Environmental changes can affect population dynamics.
- Theme 5 – Relationship of Structure to Function – Students realize that the structure of molecules, organelles, cells, organs, systems, and organisms is related to function.
- Theme 6 – Regulation – Students are to understand how regulation is needed for homeostasis at all levels. Examples include hormonal controls, cell membrane permeability, temperature changes, and osmoregulation
- Theme 7 – Interdependence in Nature – Students will describe how organisms affect each other. For example, symbiosis can lead to coevolution.
- Theme 8 – Science, Technology and Society – Students are encouraged to keep informed about current developments and issues. Examples may range from global warming to biotechnological advances conflicting with societal belief system.

Teaching Strategies

I try to provide my students with a variety of teaching techniques that encourage both independent and group activities.

- The eight major themes from the AP[®] *Biology Course Description* (science as process; evolution; energy transfer; continuity and change; structure and function; regulation; interdependence; and science, technology and nature) are stressed throughout the course. In particular, evidence of evolution is employed as a unifying theme across topics.
- Students are given many hands on activities that keep them interacting with the material in the class. Demos, simulations and short student presentations are often interspersed into the lectures.
- Students are given readings from current journals and newspapers. These are often used as a starting point to discuss ethical, social and political implications of current biological advances
- The availability of computers has also allowed us to move into the area of computer exploration.

For example, simulations on genetic engineering, photosynthesis, and genetics are all available to us. The software does not replace traditional labs on the topic but does provide a great deal of background support for the students.

AP BIOLOGY SYLLABUS

Each unit will take about 3½ weeks (9 class periods). On the final day of each unit there will be a 90 minute test. During each unit there will also be about two class periods that will be lab days, students will perform the labs independently and submit data and discussion questions the following class period. On about 5th day of most units there will be a quiz assessing how well the students understand the material up to that point. For homework students are expected to read the book and take notes on the material, notes are turned in on the day of the test.

Unit 1 – Evolution and classification - early life, evidence of evolution and mechanisms of evolution, evolutionary patterns, survey of the diversity of life, phylogenetic classification, evolutionary relationships

Additional topics – plant structures and reproduction, animal body plans

Labs – 8 Hardy-Weinberg Equilibrium

Unit 2 – Ecology - population dynamics, communities and ecosystems and global issues

Additional topics – Animal behavior, scientific method

Labs – Lab 10 Animal Behavior, Lab 12 Primary Productivity

Unit 3 – Biochemistry - water, organic molecules, free energy change and enzymes

Additional topics – Vascular Tissues, Digestion

Labs – Lab 2 Enzymes, Lab 9 Transpiration

Unit 4 – Cells and membranes - prokaryotic and eukaryotic cells, membranes, subcell organization, cell cycle

Additional topics – Excretion, Nervous system and Endocrine system

Labs – Lab 1 Osmosis

Unit 5 – Heredity - meiosis, gametogenesis, Eukaryotic chromosomes, inheritance patterns

Additional topics – Animal and Plant Reproduction

Labs – Lab 7 Heredity, Lab 3 mitosis and meiosis

Unit 6 – Molecular Genetics - DNA, RNA, gene regulation, mutation, viral structure / replication, Nucleic acid technology and applications

Additional topics – Plant and Animal Development

Labs – Lab 6 Electrophoresis and transformation

Unit 7 – Photosynthesis and Respiration - coupled reactions, fermentation, cellular respiration and photosynthesis

Additional topics – Respiration, Circulation

Labs – Lab 4 Photosynthesis, Lab 5 Respiration

Review

Additional topics – immune system, muscles

Labs – Lab 10 circulation

AP EXAM Monday, May 10 2010

POST EXAM

Case Study - adrenoleukodystrophy

Fetal Pig Dissection

Wetland Ecosystems

AP BIOLOGY SUMMER ASSIGNMENT - 2009

There are two parts to this summer assignment: the first part is an introduction to classification, the second part is a review of your SOL Biology class. The summer assignment will combine to make just over one test grade and will count as about 20% of your first nine weeks grade. Email me by July 1st and tell me why you decided to take AP Biology. If you have any questions concerning the assignment this summer, email me at jason.tomik@vbschools.com and I will try to get back to you as soon as I can. There will be two discussion sessions during the summer that you can come and ask questions about the assignments, if you show up you will receive an extra discussion grade. You can submit the assignment either by email or by dropping off at school and asking it to be placed in my mailbox.

Discussion sessions

Classification	Thursday - July 16 th 1-3 PM	Tallwood HS Room 234
Book	Thursday - August 27 th 1-3 PM	Tallwood HS Room 234

Due Dates and values

Email –

Email me	-10 points	July 1 st
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Classification –

Completed chart	-35 points	July 23 rd
Quiz on Kingdoms	-10 points	3 rd day of class
Quiz on Plants	-10 points	4 th day of class
Quiz on Animals	-10 points	5 th day of class

Book–

Book Questions	-35 points	September 3 rd
Reading Quiz	-30 points	2 nd day of class

Extra Credit

Discussion session	-15 points	July 16 th and August 27 th
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PART 1 - CLASSIFICATION

Attached is a small packet of domains, kingdoms and phyla of organisms. I want you to use whatever resources you can to fill in the tables (except other students). There will be three quizzes during the first few weeks based on the information that you filled into these tables. The quizzes will consist of several descriptors of organisms (or in some cases actual organisms) and you must tell me the phylum, kingdom or domain it is in (depending on the quiz). The most important boxes on each page are the ones which ask you to give characteristics of the group. The more information you have the more it will help you on the quizzes; these will be the only notes you will have to study for the quizzes. On a separate sheet of paper (or the back of the packet) make a list of all of the sources that you consulted. Be sure to use reliable sources. (Wikipedia is not always a reliable source). This will be due July 23rd and returned to you the first day of class.

PART 2 - BIOLOGY REVIEW

Instead of reading out of a dry, factual textbook over your summer vacation, I thought this would be a good opportunity for you to see science from a different perspective. You will read a portion of [A Short History of Nearly Everything](#), a novel about the history of science. After reading, you will answer ten short answer discussion questions.

The Book:

[A Short History of Nearly Everything](#) by Bill Bryson

There are two copies of this book at the Kempsville Library and nine total copies in the Virginia Beach Library system and it is available at Amazon.com for \$11.53. I have also found at least one copy of the book at several bookstores around the city (Borders, Barnes & Noble). If you know someone else taking the class you can share a book and split the cost. I would suggest not waiting until late August to find a copy of the book, since 30 students trying to get the same book from the same bookstores in the last week of summer may make the book difficult to find. If you have problems obtaining a copy of the book (logistically or financially), please email me.

The book has six parts covering everything from physics, chemistry, astronomy, anthropology, geology and biology. You only need to read part five: "Life Itself". For each chapter you need to answer one discussion question, which are found on the next page. Each of the chapters are independent of each other and do not need to be read sequentially. While you are only required to read the parts dealing with Biology, feel free to read other parts of the book for enjoyment.

Reading Quiz:

On the second day of class there will be a quiz on the concepts covered in the book. Many of them should be a review of your previous Biology classes.

A Short History of Nearly Everything Questions

Below are the response questions for the book. For each questions, you should write about three to five sentences to answer the questions based upon what you read in the book.

Ch16 - Lonely Plant

What characteristics of Earth molded all of the life which developed on it? OR Why is Earth perfect for life as we know it?

Ch17 - Into the Troposphere

What role do the troposphere and oceans play in the water and carbon cycles?

Ch18 - The Bounding Main

Water, what makes it so amazing?

Ch19 - The Rise of Life

How did cyanobacteria revolutionize Earth and pave the way for life as we know it?

Ch20 – Small World

What makes bacteria so different from all of the other living things on earth? Why do some people think that “the world belongs to the very small”?

Ch21 – Life Goes On

How do the organisms in the Burgess Shale compare to modern day organisms? Why are the organisms in the Burgess Shale and the Cambrian “explosion” so important to life on earth?

Ch22 – Good-bye to All That

What events could cause a mass extinction (a large percentage of species on Earth going extinct)? How do they cause extinction?

Ch23 – The Richness of Being

What did Linnaeus do that made him such an important figure in Biology? What are some of the problems that still exist in his field?

Ch24 – Cells

What discoveries would not have been possible without the advancements made by Leuwenhoek? Give several specific examples.

Ch25 – Darwin’s singular Notion

How were Darwin’s ideas so different from those of scientists that came before him?

Ch26 – The Stuff of Life

What are two the physical and two chemical properties of DNA that make it so important to life?

Other

List the five most interesting things you learned in the book that were not mentioned in the above questions.

NAME _____

DOMAINS

DOMAIN	KINGDOMS THAT IT INCLUDES	A FEW EXAMPLES OF ORGANISMS	CHARACTERISTICS OF THE DOMAIN
Archaeobacteria			
Eubacteria			
Eukarya			

KINGDOMS

KINGDOM	EXAMPLES	CELL TYPE eukaryote / prokaryote	Cell wall? Y/N	Cell wall made of?	CHARACTERISTICS
EUBACTERIA (formerly monera)					
ARCHAEBACTERIA (formerly monera)					
PROTISTA					
FUNGI					
PLANTAE					
AMIMALIA					

PLANT PHYLA

Phylum	Common Name	Examples	Vascular /nonvascular	Seeds / seedless	Dominant generation	Characteristics
					sporophyte or gametophyte	
Bryophyta						
Pterophyta						
Corniferophyta						
Anthophyta						

ANIMAL PHYLA

PHYLUM	Common Name	Examples	Coelomate/ pseudocoelomate acoelomate	Protostome/ deuterostome	Symmetry	Characteristics
Porifera			XXX XXX XXX XXX XXX XXX XXX	XXXX XXXX XXXX XXXX XXXX XXXX XXXX		
Cnidaria			XXX XXX XXX XXX XXX XXX XXX	XXXX XXXX XXXX XXXX XXXX XXXX XXXX		
Platyhelminthes						
Mollusca						

PHYLUM	Common Name	Examples	Coelomate/ pseudocoelomate acoelomate	Protostome/ deuterostome	Symmetry	Characteristics
Annelida						
Nematoda						
Arthropoda						
Echinoderata						
Chordata						