



COVINGTON LATIN SCHOOL

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AP BIOLOGY

Textbook:

Campbell, Reece et al., *Biology* 6th ed. 2002. Pearson Benjamin Cummings.

Prerequisites:

Students should have completed one year of biology and one year of chemistry, prior to enrolling in AP Biology. However, students without the suggested pre-requisites may be admitted by instructor permission.

Course Description:

This AP Biology course is designed to offer students a solid foundation in introductory college-level biology. By structuring the course around the four Big Ideas, Enduring Understandings and Science Practices, the students will be assisted in developing an appreciation for the study of life and helped to identify and understand unifying principles within a diversified biological world.

The Big Ideas:

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

Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic 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 systems and their interactions possess complex properties.

Science is a way of knowing. Therefore, knowing about Biology requires that students learn the process of inquiry and develop critical thinking skills. The course will focus not only on knowing science content, but also learning skills to analyze and interpret data, and to communicate information in a meaningful way to others.

At the end of the course, students will have an awareness of the integration of other sciences into the study of Biology and become knowledgeable and responsible citizens in understanding biological issues that could potentially impact their lives.

Course Goals:

1. To familiarize students with the terminology and concepts of Biology using a theme-oriented approach that emphasizes concepts and science as a process over knowledge of facts.
2. To enhance problem-solving skills of students using hands-on labs, readings, collections, independent projects, and class discussions.
3. To strengthen students' communication skills with the use of written assignments, essays, abstracts, and lab reports.
4. To prepare students for further study in the Biological Sciences.
5. To acquire necessary content and analytical skills for the AP Exam.

Course Objectives:

1. To be able to use representations and models to communicate scientific phenomena and solve scientific problems.
2. To use mathematics appropriately.
3. To engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
4. To plan and implement data collection strategies appropriate to a particular scientific question.
5. To perform data analysis and evaluation of evidence.
6. To be able to work with scientific explanations and theories.
7. To connect and relate knowledge across various scales, concepts and representations in and across fields of study.

Course Sequence:

The course content has been divided into eight instructional units. An attempt has been made to “chunk” chapters into related units. Four units will be presented each semester. The Four Big Ideas will be interwoven within the units.

<p>Unit 1 – Introduction and Biochemistry 1 – Introduction to AP Biology 2 – Chemistry of Life (self-study and recap in class) 3 – Water 4 – Carbon and Molecular Diversity 5 – Macromolecules</p>	<p>Possible Labs Introduction to Inquiry Labs, Graphing Artificial Selection – predator/prey selection simulation Macromolecules – testing and model making Essay Writing, Rubric Setting and Practice Grading</p>
<p>Unit 2 – Cells and Cell Cycle 7 – Membrane Structure and Function 6 – Tour of a Cell 12 – Cell Cycle 44 – Osmoregulation and Excretion (self-study)</p>	<p>Possible Labs Cell observations with a Microscope Osmosis – dialysis tubing, potatoes Mitosis</p>
<p>Unit 3 – Cellular Energy 8 – Introduction to Metabolism 9 – Cellular Respiration 10 – Photosynthesis</p>	<p>Possible Labs Enzymes – computer probe lab Respiration – pea respiration Photosynthesis – computer probe lab</p>
<p>Unit 4 – Organism Form and Function 11 – Cell Communication 45 – Hormones and the Endocrine System 48 – Neurons, Synapses and Signaling 43 – Immune System 40 – Basic Principles of Animal Form and Function (self-study)</p>	<p>Possible Labs Cell Communication – simulation or website investigation Hormones – project (Endocrine diseases) Nerve signaling – simulation or website investigation</p>
<p><u>Semester Break</u></p>	
<p>Unit 5 – Genetic Basis of Life 13 – Meiosis and Sexual Life Cycles 14 – Mendel and the Gene Idea 15 – Chromosome Basis of Inheritance 21 – Genomes and their Evolution</p>	<p>Possible Labs Meiosis simulation Fast Plant – who’s the daddy? Fruit Fly Genetics Human Genetic Diseases</p>

<p>Unit 6 – Gene Activity and Biotechnology</p> <p>16 – Molecular Basis of Heredity 17 – From Gene to Protein 18 – Regulation of Gene Expression 20 – Biotechnology 19 – Viruses (self-study)</p>	<p>Possible Labs</p> <p>DNA Isolation Transformation using pGLO Restriction Enzymes and Gel Electrophoresis</p>
<p>Unit 7 – Evolution and Phylogeny</p> <p>22 – Descent with Modification: Darwin 23 – Evolution of Populations 24 – Origin of Species 25 – History of Life on Earth 26 – Phylogeny and the Tree of Life</p>	<p>Possible Labs</p> <p>Population Genetics Evo-Devo – videos from HHMI Blast Lab</p>
<p>Unit 8 – Ecology</p> <p>52 – Introduction to Ecology 53 – Population Ecology 54 – Community Ecology 55 – Ecosystems 56 – Conservation Biology 51 – Animal Behavior (self-study)</p>	<p>Possible Labs</p> <p>Animal Behavior – red worms or pillbugs Transpiration – whole plant method Conservation of a species</p>

Additional labs will be conducted to deepen students’ conceptual understanding and to reinforce the application of science practices within a hands-on, discoverer based environment. Directed Inquiry will be the most common method of lab instruction used. The course will provide opportunities for students to develop, record, and communicate the results of their laboratory investigations. Lab report format will vary and may include the following: formal lab report, PowerPoint presentation, poster board presentation, oral presentation, response to directed questions on the lab or other format. Students will be required to maintain a portfolio of their lab activities on a flash drive or other storage device to take with them to college.

Evaluation:

Grades will be assessed based on homework, book critiques, tests, quizzes, lab reports, and presentations.

Supplemental Materials

1. *AP Biology Investigative Labs: an Inquiry Based Approach*
2. Darwin, C., & Burrow, J. W. (1985). *The origin of species by means of natural selection, or, the preservation of favoured races in the struggle for life*. ePenguin.
3. Watson, J. (1968). *The Double Helix*. Atheneum.
4. Google Docs – used for posting documents and receiving assignments.
5. Software – Excel and Word (for processing data and writing lab reports).
6. The Web – various web sites (The Biology Project, The Biology Place, NCIM etc.) are used to expand topics, provide reading documents or for searching out answers to questions raised in class.
7. Turnitin.com – all written assignments must be submitted to turnitin.com by 11:59 PM on the day that the assignment is due. Failure to do so will result in a zero for the assignment until it is submitted to Turnitin.
8. Schoology is an online tool that students will be required to use to access videos, important resources, and assignments. Instructions on how to use Schoology will be given in class. All assignment due dates will be posted to the Schoology calendar.