

CUPEYVILLE SCHOOL SCIENCE DEPARTMENT 12th GRADE AP BIOLOGY PROGRAM

SYLLABUS

I. GENERAL INFORMATION

Course Title	: Advanced Placement Biology
Code & Number	: AP BIOLOGY/0214
Credits	: One (1)
Academic Term	:
Professor	:
Contact Hours	: 45 min. / 5 times a week
Office Phone	· 7877616305
Email	:

II. DESCRIPTION

AP BIOLOGY IS AN INTRODUCTORY COLLEGE-LEVEL BIOLOGY COURSE. STUDENTS CULTIVATE THEIR UNDERSTANDING OF BIOLOGY THROUGH INQUIRY-BASED INVESTIGATIONS AS THEY EXPLORE THE FOLLOWING TOPICS: EVOLUTION, CELLULAR PROCESSES — ENERGY AND COMMUNICATION, GENETICS, INFORMATION TRANSFER, ECOLOGY, AND INTERACTIONS.

III. OBJECTIVES

Upon the completion of the course, the student will be able to:

- 1. Describe biological events in every day settings and/or the context of a college Biology course
- 2. Compare and contrast between molecular and organismal aspects of Biology
- 3. Manipulate instrumentation and proper lab techniques
- 4. Develop advanced inquiry and reasoning skills.
- 5. Analyze data and reach conclusions according to the gathered information.

IV. COURSE CONTENT

Themes in the Study of Life

Levels of biological organization What is life? (Requirements for life on Earth) Main themes in biology

Water and life

The chemical nature of water Properties of water

Carbon and the molecular diversity of life

What is carbon? Carbon allotropes and the diversity of molecules it can interact with. Chemical groups that interact with carbon

At this stage of the course, a short **lab** will be given short, in which students will identify which compounds are organic and which are not.

Macromolecules

Carbohydrates Lipids Proteins Nucleic acids

The Cell and the cellular membrane

Microscopy Eukaryotic vs. Prokaryotic The endomembrane system Mitochondria vs. Chloroplasts Transport across the cell membrane: passive & active Mosaic membrane models

This section will require **labs** for microscopy and surface-area-to volume ratio: While students observe microorganisms under the microscope, questions will be asked regarding the nature of the cell. Also, students will skills associated with microscope use. A lab to discuss the surface area and size ratio of the cell will be used to assess student's understanding of why cells are small.

Metabolism: Cellular respiration and Fermentation

The laws of thermodynamics What is energy? Anatomy of a mitochondria ATP: biochemical energy Glycolysis The Krebs Cycle Fermentation

Hands-on activity in which students will build the catabolic pathway of Cellular Respiration and Fermentation with cardboards and construction paper. Models and specific concepts of metabolism will be assessed here.

Chapter VII: Metabolism: Photosynthesis

The sun and the spectrum of visible light Anatomy of a Chloroplast Chlorophyll The Calvin Cycle Alternative pathways: C4, CAM

The **lab** for this topic will require data gathering skills and proper use of instrumentation. Also, graphs will be plotted here with data gathered from the measurement of the rate of photosynthesis.

Mendel and the Gene Idea

Mendel and the Nature of Science Mendelian Crosses & Laws of Inheritance Extension of Mendelian Genetics Human traits and Mendelian Genetics

The Chromosomal Basis of Inheritance

The Chromosome Sex-linked Genes Recombination and Crossing over

The Molecular Basis of Inheritance

DNA – how it was discovered DNA structure DNA Mechanics – replication DNA packaging An inquiry based DNA Model **lab**—using web based, interactive models of the DNA Molecule—will be done at this point to assess student's knowledge of the structure of DNA.

From Gene to Protein

Codon, anticodons, codon table Gene expression Transcription and Translation (enzymes involved) Biotechnology

Inquiry based **lab** titled 'BLAST: Sequencing genes', will be given at this stage of the semester. Students will perform genetic sequencing using web based computer programs that are capable of establishing genetic relationships between very different organisms.

The films GATTACA and The Way of All Flesh will be watched and discussed at this stage to account for Bioethics and Biotechnology. The assessment will include a short review of both films.

Descent with modification: A Darwinian View of Life, and Populations

Nature of science: How Darwin came up with his theory The role of evolution in Modern Biology The Mechanism of Natural Selection. Anatomical and Molecular homologies Evolution in the context of populations

In this Inquiry Based **lab**, students will mimic* the conditions of natural selection; they will gather data, as well as interpret it, using a statistical value known as chi squared. These results will be graphed and presented. will assess concepts of speciation and population technology. Students will record data—also, they will graph their results.

*1,000 short segments of yarn; twelve different colors or 'phenotypes.' These short segments of yarn will represent 12 possible phenotypes of worms. They will be

Unit V: The Evolutionary History of Biological Diversity Chapter 26: Phylogeny and the Tree of Life Topics:

- Phylogenics
- Linnaean Classification vs. Systematics
- Relationship between genetics, evolution and phylogenics. Materials:
- Bio in Focus Textbook

- notebook
- Infocus projector
- Specimens: live and dead
- Microscope
- The Hypertextual Lounge
- Assessment:

• Students will classify organisms according to their morphological characteristics. These organisms will be provided via a lab. on Taxonomy. They will identify organisms in their respective taxa.

Unit 8: Ecology (two weeks)

Chapters: 52, 53, 56: The Biosphere, Population Ecology, and Climate Change

Topics:

- Biomes
- Fundamental concepts of Ecology
- Statistics
- Demography
- Climate Change and Conservation Ecology

Materials:

- Campbell Textbook, 9th edition
- notebook
- Infocus projector
- The Hypertextual Lounge
- The film Children of Men

Assessment:

• A short test on population ecology, and the basic concepts of ecology covered in the textbook, will be given at this stage.

• The human involvement in the current global crisis—climate change—will be accounted for with the film Children of men. A discussion of the film and a review—no more than 1,000 words—will suffice for this section.

Human Biology—which is accounted for with chapters 41 through 45—will be assessed via the last lab of the school year; The dissection of cats, pigs, and frogs. Students will compare and contrast what they will see in this lab with what was discussed is class.

V. EVALUATION STRATEGIES

The students will be evaluated on the following aspects of their performance:

- 1. Quizzes- unannounced or announced quizzes may be given at any time
- 2. Tests- announced at least a week in advance (in the classroom and Edline)
 - a) Students who know beforehand that they will be absent to a test should inform it to the teacher and arrange to take it before the announced absence or right after it. Unplanned absences on a test day require a

written excuse from the parent in order to take a make-up on an arranged day.

- b) At least four tests, ranging from 80 to 100 points, will be given during each semester.
- 3. Class work
- 4. Written assignments- Summaries, and Research projects
- 5. **Blogs:** Participation in the Comment Section of 'The Hypertextual Lounge.' This will happen two times per semester; 100 points each participation. A rubric with the specific guidelines will be provided during the first few weeks of the school year.
- 6. Homework
- 7. Oral presentations
- 8. Group presentations
- 9. Final Examination
- 10. Class participation and Behavior
- 11. Labs: 8—12 labs per semester. Labs will be done during the lab period. Some labs will require 2 or more days to complete. The value of labs depends on the topic being discussed, but the total amount of points per semester could range from 150 to 200 points. Lab assistance is compulsory.

VI. SPECIAL NOTES

A. Auxiliary Services or Special Needs

All students who need reasonable accommodations during the school year must provide a certificate from a Mental Health Professional (psychologist, neurologist, or psychiatrist) stating the diagnosis of the learning disability that justifies the services. To provide the accommodations parents must:

- 1. Fill out accommodation request form at the Bridges Program office.
- 2. Include a copy of the diagnosis of the student's disability and the required accommodations from the Mental Health Professional.
- 3. Provide the above information every school year even if the condition has not changed.

B. Plagiarism & Academic Honesty

Comply with trademark and copyright laws and all license agreements. Ignorance of the law is not immunity. If you are unsure, ask a teacher or parent. b. Plagiarism is illegal and a violation of the Cupeyville School's Student Handbook. Give credit to all sources used, whether quoted or summarized. This includes all forms of media on the Internet, such as graphics, movies, music, and text. Use or possession of hacking

software is strictly prohibited and violators will be subject to consequences; such action is a violation of applicable local or federal law.

C. Electronic Devices Use

Students in grades 6 – 12 will be using tablets or laptops on a daily basis for their English classes. In addition, students in grades 9 and 10 will be using their tablets or laptops for their history classes as well. Use of technology in school is for educational purposes only consistent with the mission, goals, and objectives of Cupeyville School. All students must follow the rules and guidelines listed in this document so they may use their tablet or laptop appropriately. Non-compliance with the policies for the correct use of tablets and laptops will result in disciplinary action as outlined in Cupeyville School's Student Handbook

VII. EDUCATIONAL RESOURCES

Text Book(s):

Campbell, Neil A., and Jane B. Reece. *Campbell Biology*. San Francisco, CA: Benjamin Cummings, 2011. Print.

Supplementary Books

Freeman, Scott. *Biological Science*. 3rd ed. San Francisco, CA: Pearson Benjamin Cummings, 2008. Print.

Urry, Lisa A. Campbell Biology in Focus. Boston: Pearson, 2014. Print.

Barstow, William, and Louise Paquin. *Test Bank for Campbell Reece Biology*. Eighth ed. San Francisco, CA: Pearson Benjamin Cummings, 2008. Print.

Audiovisual/Electronic Resources

Adrover, Miguel C. *The Hypertextual Lounge*. N.p., n.d. Web. https://thehypertextuallounge.wordpress.com/>.

Green, Hank. "Crash Course Biology." *YouTube*. YouTube, 30 Jan. 2012. Web. 19 May 2015. https://www.youtube.com/playlist?list=PL3EED4C1D684D3ADF>.

Khan, Salman. "Khan Academy Biology." *Khan Academy*. N.p., Sept. 2006. Web. May 2015. https://www.khanacademy.org/science/biology.

VII. OTHER RESOURSES

- Power Point Presentations
- Preserved and/or live specimens (for use in lab dissections).
- Field trips to the school grounds for observation and data gathering.

- WIFI connection, infocus projector, and a Netflix account for course aligned films and documentaries.
- Guest speakers (Javier Román ornithologist and copywriter from *Fideicomiso de Conservación de Puerto Rico*).

NOTE

This syllabus is subject to changes without prior notification depending on the needs of the group and/or class interruptions due to hurricanes and/or other unexpected events or emergencies. It can be updated depending on availability of materials; i.e. extra labs.

Fuente: Artículo 2.2, Sección 2.2.3.5. del Reglamento para Otorgar Licencias a Instituciones Privadas, Consejo General de Educación, agosto de 2013