



**CUPEYVILLE SCHOOL
SCIENCE DEPARTMENT
10th GRADE BIOLOGY PROGRAM**

SYLLABUS

I. GENERAL INFORMATION

Course Title	: Biology
Code & Number	: BIOLOGY/0220
Credits	: One (1)
Academic Term	:
Professor	:
Contact Hours	: 45 min. / 6 times a week
Office Phone	:
Email	:

II. DESCRIPTION

Biology is devoted to the study of living things and their processes. Throughout the year this course will provide an opportunity for students to develop knowledge in scientific process skills, laboratory techniques and an understanding of the fundamental principles of living organisms. Students will explore biological science as a process, cell structure and function, genetics and heredity, evolution and classification, diversity of living organisms and their ecological roles, and an introduction to animal structure and function, as well as a survey of the human body and its organ systems.

III. OBJECTIVES

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

1. Generalize how biology is part of everyday life and describe how scientists work and make measurements.
2. Describe and apply science as a process of the scientific method.
3. Debate on human environmental issues that affect our natural resources.
4. Differentiate the characteristics of organisms and evaluate how they all evolved from a common ancestor.
5. Distinguish how taxonomic relationships are established with the use of phylogenetic diagrams and cladograms.
6. Integrate chemistry to the study of biology.
7. Describe the structure and functions of cells.
8. Compare and contrast photosynthesis and cellular respiration.
9. Compare and contrast mitosis and meiosis.
10. Relate how form fits function as DNA directs the cells' activities in the formation of body organs within body cavities as organogenesis occurs in animals.
11. Demonstrate the formation of proteins in the various steps of protein synthesis.
12. Specify existing ecological relationships between organisms and their environments.
13. Discuss the Genetic Theory, Mendel's Laws and modern advances in Molecular Applied Genetics and Genetic Engineering.
14. Identify and illustrate the anatomy and physiology involved in the following systems: muscular and skeletal, integumentary and immune, circulatory and lymphatic, digestive and nutrition, respiratory and excretory, nervous and endocrine and the male and female reproductive systems including pregnancy.
15. Use the microscope and prepare wet mounts (stained/unstained) in a suitable manner for viewing specimens under various lenses.
16. Design experiments and apply the steps of the scientific method in order to draw conclusions from the experiments performed.
17. Construct Punnett squares to predict the outcome of genetic crosses.
18. Construct graphs and interpret data from these in order to draw conclusions.
19. Interpret phylogenetic trees and cladograms to establish the differences and similarities of Taxonomy, Systematics and Cladistics.
20. Prepare concept maps about the different topics discussed in biology.

IV. COURSE CONTENT

A. The Science of Life

1. The World of Biology
 - a. Biology and You
 - b. Characteristics of Life

A short field trip to the school grounds will serve as an opportunity to assess if the students have grasped the major characteristics of life. The skills of observation and note taking will be assessed here as well; meanwhile, the teacher will ask students when examples of homeostasis, growth, reproduction, etc., are seen in the field. Also, students will gather data through the use of technology: they'll take pictures of every natural instance that accounts for each characteristic of life. The pictures will be displayed in the class blog: The Hypertextual Lounge. These pictures will be aligned with interactive features available with the Smartboard

2. Themes in Biology
 - a. Diversity and Unity of Life
 - b. Interdependence of Organisms
 - c. Evolution
3. The Study of Biology
 - a. Science as a Process
 - b. The Scientific Method
 - c. Communicating Ideas
 - d. Honesty and Bias
4. Lab: Parts and Functions of the Microscope

B. Classification of Organisms

1. Biodiversity
 - a. Classifying Organisms
 - b. Taxonomy
 - c. Levels of Classification
2. Systematics
 - a. Phylogenetics
 - b. Cladistics
 - c. Putting it all together
3. Modern Classification
 - a. The Tree of Life
 - b. Three Domains of Life
 - c. Six Kingdoms
4. Lab: Lab Equipment, Safety Skills and Measuring Skills

C. Chemistry of Life

1. Composition of Matter
 - a. Matter
 - b. Elements and Atoms
 - c. Compounds
2. Energy
 - a. Energy and Matter
 - b. Energy and Chemical Reactions
3. Water and Solutions
 - a. Polarity
 - b. Hydrogen Bonding
 - c. Solutions
 - d. Acids and Bases
4. Lab: Data Gathering

D. Biochemistry

1. Carbon Compounds
 - a. Carbon Bonding
 - b. Functional Groups
 - c. Large Carbon Molecules
 - d. Energy Currency
2. Molecules of Life
 - a. Carbohydrates
 - b. Proteins
 - c. Lipids
 - d. Nucleic Acids
3. Lab: Use of the Compound Microscope
4. Lab: Lipids --

Students will observe the behavior of lipids, a very important macromolecule, especially for the anatomy and physiology of cells. Milk, soap, and food coloring react in ways that prompt inquiry and amazement. Students will explain what is happening in the reaction, applying concepts discussed regarding lipids and their importance in biological systems.

E. Cell Structure and Function

1. Microscopy
2. Cell History Timeline
3. Physiology of the Cell
4. Animal Cell vs. Plant Cell
5. Lab: Microscopy --

Microscope skills will be assessed here. Also, concepts such as 'eukaryotic', 'prokaryotic', etc. will be evaluated through directed questioning while students observe specimens under the microscope.

An activity to assess students' understanding of cell size will be done at this stage. Students will organize a set of cardboard images of microscopic objects, from the smallest one to the largest one.

F. Homeostasis

1. Osmosis
2. Diffusion
3. Active Transport
4. Lab. V: Passive Transport –

Students will observe the processes of osmosis and diffusion with flowers and water. The lab will assess the skills of observation (water moving through the stem of the flowers, up to the white petals). Also, comprehension of concepts such as passive transport will be assessed here.

They will also observe a series of interactive models--via Smartboard Technology, and the blog, The Hypertextual Lounge--of Osmosis and diffusion. Questions will be asked regarding solutes and water while the students observe and interact with the digital models.

G. Photosynthesis

1. The Light Reaction
2. Visible light spectrum
3. The Calvin Cycle

H. Cellular Respiration

1. Glycolysis
2. Fermentation
3. Aerobic Respiration

I. Mitosis and Meiosis

1. Chromosomes
2. Cell Division
3. Meiosis

J. DNA, RNA, and Protein Synthesis

1. Enzymes in DNA management
2. DNA Replication
3. Protein Synthesis

K. Inheritance Patterns and Human Genetics

1. The Case of Henrietta Lacks
2. Karyotypes
3. Biotechnology & Bioethics --

Handout that discusses the groundbreaking case of Henrietta Lacks (Human genetics will be accounted for with this material)

Students will work on a review of the film Gattaca (no more than 750 words).

A rubric will be used to assess the contents of this review.

A series of questions on the Henrietta Lacks case will be answered and discussed. Emphasis on human genetics and bioethics.

L. Evolution

1. Natural Selection
2. Formation of Species
3. Populations

M. Classification of Organisms

1. Biodiversity
 - a. Classifying Organisms
 - b. Taxonomy
 - c. Levels of Classification
2. Systematics
 - a. Phylogenetics
 - b. Cladistics
 - c. Putting it all together
3. Modern Classification
 - a. The Tree of Life
 - b. Three Domains of Life
 - c. Six Kingdoms

N. Human Biology

1. Skeletal, Muscular, and integumentary System
2. Circulatory and Respiratory Systems
3. Digestive and Excretory Systems
4. Nervous System and Sense Organs
5. Lab: Dissections --

The last observation and inquiry based labs of the school year, will account for human anatomy. Cupeyville provides dissection materials—including preserved specimens like cats—to its Biology students.

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.
3. **Class work**: Includes work on study guides, which have to be handed in on time.
4. **Written assignments**- Summaries, Compositions, Research projects, and Film reviews
5. **Blogs**: Participation in The Hypertextual Lounge via the comment section of topic aligned posts. Two times per semester; 100 points each participation. A rubric with an outline of what is expected from the students will be given during the first week of the school year.
6. **Homework**
7. **Oral presentations**
8. **Group presentations**
9. **Final Examination**
10. **Class participation and Behavior**

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)

Postlethwait, John H., and Janet L. Hopson. *Modern Biology*. TE ed. Orlando: Holt, Rinehart and Winston, 2009. Print.

VIII. OTHER RESOURCES

Supplementary Books

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

Tank, Patrick W., and J. C. Boileau Grant. *Grant's Dissector*. 14th ed. Philadelphia: Wolters Kluwer Health/Lippincott, Williams & Wilkins, 2009. Print.

Audiovisual/Electronic Resources

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

AP Biology Course and Exam Description. New York, NY: The College Board, n.d. PDF.

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

NCBI. *Basic Local Alignment Search Tool*. Computer software. *BLAST: Basic Alignment Search Tool*. National Center for Biotechnology Information, Oct. 2014. Web. 20 May 2015. <<http://blast.ncbi.nlm.nih.gov/Blast.cgi>>.

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

VII. OTHER RESOURCES

- 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 speaker Javier Román – ornithologist and copywriter from *Fideicomiso de Conservación de Puerto Rico* – gave a conference on birds and conservation (March, 2015).

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.

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