

ADVANCED PLACEMENT BIOLOGY SYLLABUS



Instructor: Ms. Kendra Radnich
B.S. Kinesiology, Arizona State University
M.S. Secondary Education, Arizona State University

Contact: Kendra.Radnich@dvusd.org
Website: <http://www.dvusd.org/dh-radnich>

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Prerequisites: One year each of Biology and Chemistry

Description: This course provides students with an opportunity to develop conceptual framework for modern biology emphasizing applications of biological knowledge and critical thinking to the world around them. It will also give them the critical thinking skills to be able to evaluate current events and understand scientific societal issues. AP Biology meets once daily for 50 minutes. This course is designed to provide a solid, first-year college biology experience, both conceptually and in the laboratory. The information for this course is provided through lectures and flipped classroom learning. The students are required to do additional readings and write abstracts based on those readings throughout the year. All laboratory exercises are hands-on. These labs serve to supplement the learning in the lecture section of the course. Problem solving skills, both on paper and in the labs, are emphasized.

Because this is a second year course, students should have a sound knowledge of:

- Basic chemical principles
- Basic cellular structure
- Classical genetic concepts
- DNA and RNA structure
- History of DNA
- Taxonomic generalities
- Overview of ecological principles
- Basic chemical properties

Course Objectives:

- Students are prepared to be critical and independent thinkers who are able to function effectively in a scientific and technological society.
- Students will be able to analyze scientific and societal issues using scientific problem solving.
- Students will emerge from this program with an appreciation for the natural world.
- Students will be able to earn an acceptable score on the AP Biology exam in May.

Materials: Please bring the following materials to class everyday:

- iPad
- 3 ring binder
- Pencils/Pens
- Basic calculator
- Nearpod Application on iPad (free in DVUSD App Store)
- Canvas Access

Advanced Placement Examinations: Students enrolled in the course as AP Biology may take the AP Biology exam in the spring. AP students will be provided with study materials, assistance in identifying relevant textbook sections, and practice exam questions. Specific information will be provided as the course progresses.

Safety: This class is conducted in a laboratory setting. As in all laboratories, strict rules must be set to insure the safety of all students and teachers. Toxic substances are present in the laboratory that could result in the contamination of food or beverages. For this reason, **NO EATING OR DRINKING** is permitted. When activities include use of moving objects or chemical compounds, safety glasses are required and **MUST BE WORN**. Horseplay cannot be tolerated and will result in dismissal from the lab. Failure to observe safety rules will also result in a zero score for that lab activity.

Standards and Expectations: This course is a college level course and is intended for high school students at the junior and senior level. This will be a challenging course. Expect to put in a lot of time and effort into learning the information presented in class and also allow ample study time outside of the classroom.

Classroom Expectations: In addition to strictly following all DVHS handbook rules, I expect the following to occur in my classroom:

Be There – It is important that you are in class regularly and on time. Not only should you physically be in class but also mentally. By using MP3 players or cell phones you are not mentally in class. Make sure these items are not in use or they will be confiscated in accordance with the DVHS student handbook.

Play – The best environment for learning is a fun one. We will have fun in class, share stories, play games and have a good time. It is important that you come to class prepared to do this and also with all of your supplies such as pen or pencil, loose leaf paper and a notebook for keeping your assignments. See me individually for any questions or concerns regarding supplies.

Make Their Day – If you do nice things for other people then they will do nice things for you. Treat other people as you would like to be treated. Respect your fellow students and anyone else who is in the classroom.

Choose your attitude – You have no control over the things that other people do. You only have control over your reactions. Make a conscious effort to have a positive attitude. It is not always easy but if you are aware that only you can control your mood every day can be a great day.

No food or drinks in the classroom – We might be using substances that may contaminate what you put in your mouth. This is for your own health and safety.

Be Responsible - You are in charge of YOU. I will provide you with the materials to be successful, it is up to you to study and be prepared. This course is rigorous and will require you to study and do assignments and projects.

Technology - Because we are becoming a technology rich campus, we are expanding the use of iPads as a learning tool. The iPads will be increasingly integrated into the curriculum to reinforce critical thinking, collaboration, and cognitive engagement. I will designate during which activities students may use the device and I will articulate how the device should be used appropriately. If a violation of the stipulated use occurs, consequences will be enforced in accordance with the DVHS Student Handbook. It is also not appropriate to be on cell phones during lecture or labs unless specified by the instructor. By signing this syllabus, I may take away your cell phone or iPad and give them back to you at either the end of the period or school day if you are using them inappropriately

Grading Standards:

- A -90-100%
- B -80-89%
- C -70-79%
- D -60-69%
- F -Below 60%

Attendance: It is extremely important to attend class. This is where you will be receiving the information to be successful in this course. This class also has a very large lab component which can only be done within the classroom due to the materials being used. Students who miss a class period and are unexcused will not be able to makeup labs or activities done in class.

Late/Missed Work Policy:

Grades and attendance may be accessed 24 hours a day online with your Power school access code. Access codes are available in the Administration office Monday – Friday 7:00 – 3:30. You must provide a picture ID to be issued a code.

Homework-Makeup Work-Long Term Assignments: Homework assignments are collected at the beginning of class. No late assignments will be accepted. Any assignments handed in without a name, or the name is illegible, will not be accepted. I keep assignments without names for a short time. This does not mean that if you find your assignment in that basket that you can turn it in for credit.

If you are absent, and it is an excused absence, you have one school day for each day missed to make up work or tests. It is your responsibility to find out what you missed and turn in that work to me in a timely manner. The assignments for the week will be posted on the board and the assignments for the whole month as well as any handouts will be posted at the side of the

room; check those boards first, and then ask if you have any questions. Assignments missed due to an unexcused absence cannot be turned in for credit.

Long-term projects are due on the due date regardless if the student is in class or not. These assignments are due within the first 5 minutes of the class period. These projects will not be accepted after the due date. If it is not brought into class it is important to have the paper time stamped in the office. See handbook guidelines for any questions.

Equipment Use Policies:

In the event a student breaks any laboratory materials, that student will be responsible for paying the replacement cost of each item. A complete list of all laboratory materials and their costs are posted in each classroom. The students are taught proper procedures and laboratory etiquette to ensure the safety of our students during lab activities. This policy helps hold the students accountable for their actions and reinforces careful laboratory procedures.

Time Requirement:

You will need to dedicate significant time to this college level course. Plan to spend at least 6-10 hours a week on homework in addition to class presentation time. This is a lecture course so much of your work will be done outside of the classroom.

Extra Credit Policy:

Extra Credit is not available for this class.

Plagiarism Warning:

Plagiarism includes, but is not limited to, the use of paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling or sharing of term papers or other academic materials. Information gathered from the Internet and not properly identified is also considered plagiarism. We expect every student to produce his/her original, independent work.

Course content and syllabus may vary from the course calendar listed above in order to meet the needs of the particular group in this course section.

Lab Component: The student-directed laboratory investigations used throughout the course allow students to apply the seven science practices defined in the AP Biology Curriculum Framework and include at least two lab experiences in each of the four big ideas. The laboratory portion of this class will be at least 25%.

Lab Reports: Students will be expected to write up formal lab reports for all major labs. This will include analysis and data for each lab.

AP Biology Course Outline

AP Biology Focuses on Four Major 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.

Semester 1:

I. **Biochemistry: The Chemistry of Organic Molecules/Set up for life's Origins:**

A. Unit 1: The Chemistry of Life (Big Idea 2,4)

1. Chapter 2: The Chemical Context of Life
2. Chapter 3: Water and Life
3. Chapter 4: Carbon and the Molecular Diversity of Life
4. Chapter 5: The Structure and Function of Large Biological Molecules

Sample Activities and Labs:

1. "Investigation 13 Enzyme Activity" lab from College Board. Students will explore how pH, temperature, and other biotic and abiotic factors influence enzyme activity.
 - A. 2D1: All biological systems from cells and organisms to populations, communities, and ecosystems are affected by complex biotic and abiotic interactions involving exchange of matter and free energy.
 - B. 4A1: The subcomponents of biological molecules and their sequence determine the properties of that molecule.
 - C. 4B1: Interactions between molecules affect their structure and function.
2. "Properties of Water Laboratory." A lab that allows students to explore the unique properties of water and how they are important for life. Students will experience cohesion and adhesion with plants and also investigate coastal temperatures.
3. "Water Nearpod Activity." An activity that creates a "flipped and blended" classroom environment where students will be able to explore, learn, and create the concepts of water and why it is important to the life.
4. "Chemical Modeling Activity with Carbon." Students will be able to create chemical bonds and compounds using a chemical bonding set. They will also be able to explore how important carbon is in building biological molecules.

II. Origins of Life (The Cell) & Cellular Processes and Energy:

B. Unit 2: The Cell (Big Ideas 1-4)

1. Chapter 6: A Tour of the Cell
2. Chapter 7: Membrane Structure and Function
3. Chapter 8: An Introduction to Metabolism
4. Chapter 9: Cellular Respiration and Fermentation
5. Chapter 10: Photosynthesis
6. Chapter 11: Cell Communication
7. Chapter 12: The Cell Cycle

Sample Activities and Labs:

1. "Investigation 7: Cell Division Mitosis and Meiosis" from College Board. In this lab, students will explore the cell cycle by preparing onion root slides.
 - A. A1: DNA, and in some cases RNA, is the primary source of heritable information.
 - B. 3A2: In eukaryotes, heritable information is passed to the next generation via processes that include the cell cycle and mitosis or meiosis plus fertilization.
 - C. 3A3: The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring.
 - D. 3C2: Biological systems have multiple processes that increase genetic variation
2. Building a Membrane Activity: <http://learn.genetics.utah.edu/>
Students create a membrane from paper cut-outs. They then answer inquiry questions about their 3D model.
3. Class Discussion: "Cellmates" by Radio lab.
<http://www.radiolab.org/story/cellmates/> Students will listen to the podcast and evaluate the Podcast that talks about endosymbiosis. Then, we will have a class discussion on the evolution of cells.

III. Heritable Information:

C. Unit 3 Genetics (Big Ideas 3-4)

1. Chapter 13: Meiosis and Sexual Life Cycles
2. Chapter 14: Mendel and the Gene Idea
3. Chapter 15: The Chromosomal Basis of Inheritance
4. Chapter 16: The Molecular Basis of Inheritance
5. Chapter 17: From Gene to Protein
6. Chapter 18: Regulation of Gene Expression
7. Chapter 19: Viruses
8. Chapter 20: Biotechnology
9. Chapter 21: Genomes and Their Evolution

Sample Labs and Activities:

1. "Investigation Number 8: Biotechnology: Bacterial Transformation." From College Board
 - A. 1A2: Natural selection acts on phenotypic variations in populations.

- B. 1C3: Populations of organisms continue to evolve.
 - C. 3A1: DNA, and in some cases RNA, is the primary source of heritable information.
 - D. 3B1: Gene regulation results in differential gene expression.
 - E. 3C1: Changes in genotype can result in changes in phenotype.
 - F. 3C2: Biological systems have multiple processes that increase genetic variation.
2. "Name that Gene Activity." <https://blast.ncbi.nlm.nih.gov/Blast.cgi>
Students will be able take sample nucleotide sequences and investigate the gene that it makes up. Students will then use inquiry to evaluate that gene.
 3. "Investigation 2: Mathematical Modeling Hardy-Weinberg" From College Board
 - A. 1A1: Natural selection is a major mechanism of evolution.
 - B. 1A2: Natural selection acts on phenotypic variations in populations.
 - C. 1A3: Evolutionary change is also driven by random processes.
 - D. 1C3: Populations of organisms continue to evolve.
 4. "Ethics Debates" Students will be allowed to pick a biotechnology topic, like cloning or stem cell therapy, and research those topics. They will then write a paper stating and if they believe the topic is ethical and the future of their topic in biotechnology and medicine. They will then present their research in class and students can debate whether they believe it is ethical or unethical.
 - 5.

Semester 2:

IV. Evolution:

D: Unit Four Evolution (Big Ideas 1,3, 4)

1. Chapter 22: Descent with Modification: A Darwinian View of Life
2. Chapter 23: The Evolution of Population
3. Chapter 24: The Origin of Species
4. Chapter 25: The History of Life on Earth
5. Chapter 26: Phylogeny and the Tree of Life
6. Chapter 27: Bacteria and Archaea
7. Plant and Animal Diversity*

Sample Activities and Labs:

1. "Plant Diversity Scavenger Hunt." Students will be using their phones/cameras to document different plants and plant structures.
2. "Population Evolution Lab." Students will design a lab demonstrating how different genes and traits will allow for optimal survival of organisms in populations.

V. Animal/Plant Form and Function:

E. Unit Seven Animal Form and Function: (Big Ideas 1-4)

1. Chapter 40: Basic Principles of Animal Form and Function
2. Chapter 42: Circulation and Gas Exchange
3. Chapter 43: The Immune System
4. Chapter 44: Osmoregulation and Excretion
5. Chapter 45: Hormones and the Endocrine System
6. Chapter 48: Neurons, Synapses, and Signaling
7. Chapter 49: Nervous System
8. Chapter 51: Animal Behavior
9. Chapter 39: Plant Responses to Internal and External Signals

Sample Labs and Activities:

1. "Endocrine System Disorders Activity" Students will explore and learn about different hormones and endocrine system disorders. Students will be able to relate those disorders to homeostasis.
2. "Sheep Brain Dissections." Students will explore the major structures of the brain by dissecting a sheep's brain. They will have to demonstrate dissection techniques and well as use critical thinking to understand the connections within the brains structure.
3. "Models." Students will analyze models of the cardiovascular system, nervous system, endocrine system, and urinary system.
4. "Animal Behavior Lab" Students will use pill bugs to design a lab to look at basic animal behavior such as taxis, kinesis, and agnostic behavior.

VI. Ecology:

F. Unit 8 Ecology (Big Idea 4)

1. Chapter 52: An Introduction to Ecology and the Biosphere
2. Chapter 53: Population Ecology
3. Chapter 54: Community Ecology
4. Chapter 55: Ecosystems and Restoration Ecology
5. Chapter 56: Conservation Biology and Global Change

Sample Labs and Activities:

1. Students will design a model of a biome that demonstrates knowledge of biological processes and concepts across scales. Class presentations will demonstrate their knowledge of understanding.
2. "Footprint Project." Students will track and calculate their effect on Earth. They also will investigate and research ways to lower their own personal footprint.

I, _____, have read and acknowledged the AP biology syllabus. I agree to follow the rules and guidelines of the course.

Student Name (Print)

Date

Student Signature

Parent Signature