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AP BIOLOGY SYLLABUS 2023-2024

***Mission: To offer inspiration through advanced instruction and authentic experiences.***

**Instructor:** Tasnuva Jhileek, M.A.T

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Please allow 24 hours for a response.

Conferences can be scheduled via the counselors’ office.

**Course Description**

Advanced Placement Biology is designed to offer students a solid foundation in college level introductory biology based on the belief that many students are ready for college work while still in high school. This course is aligned to the College Board AP Biology Curriculum Framework and is based on four Big Ideas, which encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about living organisms and biological systems. Twenty-five percent of instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations require students to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress. Upon completion of the course students should be able to have the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology. Students who earn a qualifying score on the AP Biology Exam are typically eligible to receive college credit and placement in an advanced science courses in college; please note that this varies by university, so please look into the AP Exam scores the colleges to which you are applying accept.

**Prerequisites**

It is required that all students have passed Honors Biology and Honors Chemistry prior to AP Biology. Due to this requirement, most students will be juniors or seniors before qualifying to take this course.

**Textbook**

Title: Biology for the AP Course.

Authors: James Morris, Domenic Castignetti, John Lepri, Rick Relea

Publisher: W.H. Freeman and Company

Published Date: 2022

Many other resources such as scientific articles, case studies, essays, and news articles will be used throughout the school year. These will all be posted on Canvas assignments as they are assigned.

**Course Objectives**

The College Board has organized the AP Biology course around the Curriculum Framework which is broken into four big ideas that our course will be based on.

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.

**These four Big Ideas will be divided up over eight different units of study.**

1. Biochemistry/Chemistry of Life 8-11%

2. Cellular and Organismal Structure and Function 10-13%

3. Cellular Energetics 12-16%

4. Cellular Communication & Cell Cycle/Cellular Reproduction 10-15%

5. Genetics & Heredity 8-11%

6. Gene Expression and Regulation 12-16%

7. Evolution & Natural Selection 13-20%

8. Ecology & Systems Interactions 10-15%

The College Board emphasizes students understanding the practice of science. It is pertinent that students enter college with a specific set of skills. A set of skills designed to allow students to succeed in the science world. The College Board focuses curriculum on six specific skills.

1. Concept Explanation

2. Visual Representations

3. Questions and Methods

4. Representing and Describing Data

5. Statistical Tests and Data Analysis

6. Argumentation

Specific Overview Documents for AP Biology course content are provided at the end of this syllabus.

**The AP Exam**

The AP Biology Exam is scored on a scale from 1-5. A student must receive a score of 3 or higher to receive college credit for the course. Remember, the scores that universities accept differ, so please double check what scores the college to which you are applying accepts. The AP Biology Exam is made up of two sections. The AP Biology Exam will be given on **May 16, 2024 and will be 3-hours in length**. The breakdown of each section is as follows:

Section I: Multiple Choice (50%) 90 minutes – 60 Questions

Section II: Free Response Questions (50%) 90 minutes – 6 Questions; 2 long essays (8-10 pts each), 4 short essays (4 pts each)

**Biology End-of-Course Exam/GA Milestones Exam**

Biology will have a culminating state exam that assesses associate learning of the semester’s course content. The state exam will be 20% of the overall course grade.

**Grading Policy**

Practice work (CW, HW, Labs, Activities, CERs) – 40%

Assessments (Unit Tests) – 40%

EOC/Final – 20%

**Lab Component**

You will work in groups to complete each lab during the class period. You will engage in and complete a minimum of eight inquiry-based investigations (two per Big Idea). Additional labs will be conducted to deepen your understanding and reinforce the application of science practices within a hands-on environment. This course will provide opportunities for you to develop, record, and properly communicate the results of your laboratory investigations. Materials, lab setups, preparation of stock solutions, and cultures of the specimen may need to be done prior to the class for some labs.

**AP Classroom**

AP Classroom is a new College Board resource which will be utilized throughout the school year to take practice assessments that will track student progress over the course of the year. AP Classroom will provide study guides which note areas strengths and weaknesses for concepts learned throughout the school year, allowing students to properly prepare for the AP Exam.

**Course Materials**

• One 1.5” 3-ringed binder

• One Composition Notebook

• 8 dividers

• Loose leaf paper and Graph Paper

• Scientific or Graphing calculator

**Classroom Policy and Expectations**

* NO phone, NO air pods, NO apple watches
* Attend class daily and submit work on time.
* Respect yourself and others.

**Late Work / Make-up Work**

Missing work can be submitted (with a 10% deduction) prior to the end of the unit. **Once a unit is over, no more work from that unit will be accepted**.

**Extra Credit:**

**No end-of-the unit or end-of-the semester extra credit is available or offered in this class.**

**Employability/Soft Skills**

School Wide Activities:

* Follow school dress code
* Punctuality
* Professionalism and Courtesy

**Academic Honesty**

On my honor, I pledge that the work submitted over the course of the school year is of my own production. Work and ideas that are not my own will be properly cited as to not plagiarize. I understand that Ragsdale High School takes cheating very seriously and accept all consequences of my actions should I break the Academic Integrity Expectations. Students are more than welcome to work together or receive outside help on homework and classroom assignments; however, each student should turn in their own work separate from other students. Students may not cite another student or copy their work. There are times throughout the school year where students will turn projects and reports as a group effort, even this work is expected to be written individually by each student showing their own work and knowledge. I am excited to spend the next school year delving into the world of Biology with you!

**Enduring Understandings with Their Alignment to the Four Big Ideas**

The following is a list of the specific College Board content that this course is structured around. Each ‘Big Idea’ has Enduring Understandings (EU) and sub points for each EU. Although the outline does not go into detail on each sub point, it will help you to know what the important understandings are for each section.

**Big Idea 1 – Evolution: The process of evolution drives the diversity and unity of life**

EU 1A – Change in the genetic makeup of a population over time is evolution.

1. Natural selection is a major mechanism of evolution.

2. Natural selections acts on phenotypic variations in populations.

3. Evolutionary change is also driven by random processes.

4. Biological evolution is supported by scientific evidence from many disciplines, including mathematics.

EU 1B – Organisms are linked by lines of descent from common ancestry

1. Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.

2. Phylogenic trees and cladograms are graphical representations of evolutionary history that can be tested.

EU 1C – Life continues to evolve within a changing environment

1. Speciation and extinction have occurred through the Earth’s history.

2. Speciation may occur when two populations become reproductively isolated from each other.

3. Populations of organisms continue to evolve.

EU 1D – The origin of living systems is explained by natural processes

1. There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence.

2. Scientific evidence from many different disciplines supports models of the origin of life.

**Big Idea 2 – Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis**

EU 2A – Growth, reproduction, and maintenance of the organization of living systems require free energy and matter

1. All living system require constant input of free energy.

2. Organisms capture and store free energy for use in biological processes.

3. Organisms must exchange matter with the environment to grow, reproduce, and maintain organization.

EU 2B – Growth, reproduction and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environment

1. Cell membranes are selectively permeable due to their structure.

2. Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes.

3. Eukaryotic cells maintain internal membranes that partition the cell into specialized regions.

EU 2C – Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.

1. Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes.

2. Organisms respond to changes in their external environments.

EU 2D – Growth and dynamic homeostasis of a biological system are influenced by changes in the system’s environment.

1. 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.

2. Homeostatic mechanisms reflect both common ancestry and divergence due to adaptation in different environments.

3. Biological systems are affected by disruptions to their dynamic homeostasis.

4. Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis.

EU 2E – Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.

1. Timing and coordination of specific events are necessary for the normal development of an organism, and these events are regulated by a variety of mechanisms.

2. Timing and coordination of physiological events are regulated by multiple mechanisms.

3. Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection

Big Idea 3 – Living systems store, retrieve, transmit and respond to information essential to life processes.

EU 3A – Heritable information provides for continuity of life

1. DNA and in some cases RNA, is the primary source of heritable information.

2. In eukaryotes, heritable information is passed to the next generation in processes that include the cell cycle and mitosis or meiosis plus fertilization.

3. The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring.

4. The inheritance pattern of many traits cannot be explained by simple Mendelian genetics.

EU 3B – Expression of genetic information involves cellular and molecular mechanisms.

1. Gene regulation results in differential gene expression, leading to cell specialization.

2. A variety of intercellular and intracellular signal transmissions mediate gene expression.

EU 3C – The processing of genetic information is imperfect and is a source of genetic variation.

1. Changes in genotype can result in changes in phenotype.

2. Biological systems have multiple processes that increase genetic variation.

3. Viral replication results in genetic variation and viral infection can introduce genetic variation into the hosts.

EU 3D – Cells communicate by generating, transmitting, and receiving chemical signals.

1. Cell communication processes share common features that reflect a shared evolutionary History.

2. Cells communicate with each other through direct contact with other cells or from a distance via chemical signaling.

3. Signal transduction pathways link signal reception with cellular response.

4. Changes in signal transduction pathways can alter cellular response.

EU 3E – Transmission of information results in changes within and between biological systems

1. Individuals can act on information and communicate it to others.

2. Animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses.

Big Idea 4 – Biological systems interact, and these systems and their interactions possess complex properties

EU 4A – Interactions with biological systems lead to complex properties.

1. The subcomponents of biological molecules and their sequence determine the properties of that molecule.

2. The structure and function of subcellular components and their interactions provide essential cellular processes.

3. Interactions between external stimuli and regulated gene expression result in specialization of cell, tissues, and organs.

4. Organisms exhibit complex properties due to interactions between their constituent parts.

5. Communities are composed of populations of organisms that interact in complex ways.

6. Interactions among living systems and with their environment result in the movement of matter and energy.

EU 4B – Competition and cooperation are important aspects of biological systems.

1. Interactions between molecules affect their structure and function.

2. Cooperative interactions within organisms promote efficiency in the use of energy and matter.

3. Interactions between and within populations influence patterns of species distribution and Abundance.

4. Distribution of local and global ecosystems changes over time.

EU 4C – Naturally occurring diversity among and between components within biological systems affects interactions with the environment

1. Variation in molecular unites provides cells with a wider range of functions.

2. Environmental factors influence the expression of the genotype in an organism.

3. The level of variation in a population affects population dynamics.

4. The diversity of species within an ecosystem may influence the stability of the ecosystem.

**Course Syllabus**

**Advanced Placement Biology Spring 2023**

**Instructor: Tasnuva Jhileek-Tomashevich**

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| **18 - WEEK PLAN\*** |
| **WEEKS 1-2****(8/7-8/18)** | Unit #1 - Chemistry of Life (Chapters 1-5)* Structure of water and hydrogen bonding
* Elements of life
* Introduction to Biological Macromolecules
* Properties of Biologicals Macromolecules
* Structures and Function of Biological Macromolecules
* Nucleic Acids
 |
| **WEEKS 3-4****(8/21-9/4)** | Unit #2 – Cell Structure and Function (Chapters 6-12)* Cell Structure: Subcellular Components
* Cell Structure and Function
* Cell Size
* Plasma Membranes
* Membrane Permeability
* Membrane Transport
* Facilitated Diffusion
* Tonicity and Osmoregulation
* Mechanisms of Transport
* Cell Compartmentalization
* Origins of cell Compartmentalization
 |
| **WEEKS 5-6****(9/5-9/15)** | Unit # 3 – Cellular Energetics (Chapters 13-19)* Enzyme Structure
* Enzyme Catalysis
* Environmental Impacts on Enzyme Function
* Cellular Energy
* Photosynthesis
* Cellular Respiration
* Fitness
 |
| **WEEKS 7-8****(9/25-10/6)** | Unit #4 – Cell Communication and Cell Cycle (Chapters 20-25)* Cell Communication
* Introduction to Signal Transduction
* Signal Transduction
* Changes in Signal Transduction Pathways
* Feedback
* Cell Cycle
* Regulation of Cell Cycle
 |
| **WEEKS 9-10****(10/9-10/20)** | Unit #5 – Heredity (Chapters 26-30)* Meiosis
* Meiosis and Genetic Diversity
* Mendelian Genetics
* Non-Mendelian Genetics
* Environmental Effects on Phenotype
* Chromosomal Inheritance
 |
| **WEEKS 11-12****(10/23-11/3)** | Unit #6 – Gene Expression and Regulation (Chapters 31-39)* DNA and RNA Structure
* Replication
* Transcription and RNA Processing
* Translation
* Regulation of Gene Expression
* Gene Expression and Cell Specialization
* Mutations
* Biotechnology
 |
| **WEEKS 13-14****(11/6-11/17)** | Unit #7- Natural Selection (Chapters 40-50)* Introduction to Natural Selection
* Natural Selection
* Artificial Selection
* Population Genetics
* Hardy-Weinberg Equilibrium
* Evidence of Evolution
* Common Ancestry
* Continuing Evolution
* Phylogeny
* Speciation
* Extinction
* Variations in Populations
* Origin of Life on Earth
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| **WEEKS 15-16****(11/27-12/8)** | Unit #8- Ecology (Chapters 51-57)* Responses to the Environment
* Energy Flow through Ecosystems
* Population Ecology
* Effect of Density of Populations
* Community Ecology
* Biodiversity
* Disruptions to Ecosystems
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| **WEEKS 17-18****(12/11-12/20)** | Review -> GA Milestones. |