AP BIOLOGY

SUMMER WORK 2017 (Parts 1-4)

Welcome to AP Biology! AP Biology is a rigorous course designed to be equivalent to a first year biology course at a university. This summer work was designed to get you started on the content material prior to starting the course in the fall. All work is due on the second day of class and will be worth 10% of your quarter 1 grade.

Due Dates: Blue days (1,3,5,7) Monday August 14, 2017

Gold days (2,4,6,8) Tuesday August 15, 2017

Part 1: Introduction Letter

Draft an e-mail to your AP teacher following these rules:

a. Use clearly written, **full sentences**. Use **spell check**! This is a professional communication like you would have with a college professor.

My email: weekssa@pcsb.org

b. Make the **Subject**: **AP Bio: Introduction to <Insert Your Name Here>**

(Do not include the quote marks or the brackets, just the words)

c. Begin the e-mail with a **formal salutation**.

d. Now introduce yourself (your name) and tell me a little bit about yourself, like:

- What do you like to do (hobbies, sports, music, interests, etc.)?
- Do you have a job?
- Tell me a little bit about what is important to you- friends, family, pets, etc.,
- What do your parents do for a living?
- Was there anything that you liked about your earlier biology class?
- What previous science classes have you taken?
- What was the last book you read for fun?
- How do you learn (hands on, visual, verbal)?
- What are you looking forward to the most in AP Biology?
- What are you most anxious about in AP Biology?
- What do you want to do or study after high school?

You do not have to address all of these questions, just giving you some ideas.

Part 2: Macromolecules Review

You will create a poster that will illustrate and explain the four groups of macromolecules: carbohydrates, proteins, lipids, and nucleic acids. You will begin by dividing a large piece of poster board into four equal sections (one section for each category of macromolecule). Label each section of the poster board with the

name of each category of macromolecule. ***Feel free to be more creative with the display(meaning it doesn't have to be a poster) as long as it meets the guidelines below.*

Use the following as a checklist to insure that you have included all the necessary information for each category of macromolecule. Each section of the poster board needs to include the following items…

Carbohydrates

_____Provide an example of a carbohydrate monomer

_____Provide an example of a carbohydrate polymer

_____Explain the function of carbohydrates

_____Explain how carbohydrates relate to the food pyramid

- ____What percent or portion of food consumption should be carbohydrates?
- ____What foods supply carbohydrates? Provide visuals.

Proteins

_____Provide an example of a protein monomer

_____Provide an example of a protein polymer

_____Explain the function of proteins

_____Explain of how proteins relate to the food pyramid

- _____What percent or portion of food consumption should be proteins?
- _____What foods supply protein? Provide visuals.

Lipids

_____Provide an example of a lipid monomer

_____Provide an example of a lipid polymer

_____Explain the function of lipids

_____Explain of how lipids relate to the food pyramid

- _____What percent or portion of food consumption should be lipids?
- _____What foods supply lipids? Provide visuals.

Nucleic Acids

_____Group name

_____Provide an example of a nucleic acid monomer

_____Provide an example of a nucleic acid polymer

_____Explain the function of nucleic acids

Part 3-Cell Analogy

Introduction:

Cells need to carry on the same basic functions as we do to sustain life; the difference is cells do this with much smaller parts. A cell is the inner workings of structures called organelles-tiny organs.

Your Task:

You will come up with an analogy for the cell of your choice (plant or animal) and its organelles. Your analogy will be represented in the form of a **model or poster** that represents a cell and its organelles. You should compare the roles of 10 organelles to a part of the analogy.

Ex. Cell City

The nucleus is the main control center of the cell. Therefore it is like the city hall where information, policy and governing are done to run the city.

The mitochondria of a cell are where energy is created. This would be the power plant for the city.

The model or poster

You should have a well-drawn or constructed model of your cell analogy (i.e. if you were doing the city analogy you would have a picture of a city and each of the parts of your analogy) and short 2-3 sentence descriptions of each organelle function and analogy.

Organelles:

Plasma membrane Nucleus Lysosome Ribosome

Rough Endoplasmic Reticulum Smooth Endoplasmic Reticulum

Golgi Apparatus Mitochondria Chloroplast Vacuole

Extra Credit-cell wall, cytoplasm, nucleolus, cilia and or flagella

Part 4: Curriculum Overview

- Simply read over the curriculum outlined below to get a better understanding of topics that will be covered throughout the year.
- Briefly define and/or explain the handful of terms in ***bold italics*** throughout the curriculum. (example: ***mechanism of evolution*** listed un EU 1A)
- Take it upon yourself to use the College Board website to get familiar with the AP Biology course.

AP Biology Curriculum Outline:

The following is an overview of the main concepts that we will be covering this year. 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. The chapters are included in parenthesis after each sub point. At the end are the science practices that will be emphasized this year through labs and class activities.

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 (CH 22.2, 23.2)

1. Natural selection is a major ***mechanism of evolution***(CH 23.1, 23.4)
2. Natural selections acts on ***phenotypic variation***s in populations (CH 23.3)
3. Evolutionary change is also driven by random processes (CH 22.3, 25.2)
4. Biological evolution is supported by scientific evidence from many disciplines, including mathematics (CH 22.3, 25.2)

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 (CH 25.1, 25.3)
2. ***Phylogenic trees and cladograms*** are graphical representations of evolutionary history that can be tested (CH 26.1-26.3)

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

1. Speciation and extinction have occurred through the Earth's history (CH 24.3, 24.4, 25.4)
2. Speciation may occur when two populations become reproductively isolated from each other (CH 24.1)
3. Populations of organisms continue to evolve (CH 24.2)

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 (CH 4.1, 25.1, 25.3)
2. Scientific evidence from many different disciplines supports models of the origin of life (CH 26.6)

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 (CH 8.1 – 8.3, 9.1-9.5, 10.1-10.3, 40.1-40.4, 51.4, 5302, 53.4, 55.2, 55.3)

2. Organisms capture and store free energy for use in biological processes (CH 9.1-9.5, 10.1, 10.3)
3. Organisms must exchange matter with the environment to grow, reproduce, and maintain organization (CH 3.1-3.3, 4.1, 4.2, 6.23)

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 (CH 7.1, 7.2)
2. Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes (CH 7.3-7.5)
3. Eukaryotic cells maintain internal membranes that partition the cell into specialized regions (CH 6.2-6.5)

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 (CH 402, 40.3)
2. Organisms respond to changes in their external environments (CH 40.3)

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 (CH 52.4, 53.1-53.5, 54.1-54.5, 55.1-55.4)
2. Homeostatic mechanisms reflect both common ancestry and divergence due to ***adaptation*** in different environments (CH 40.2, 40.3, 56.1)
3. Biological systems are affected by disruptions to their dynamic homeostasis (CH 40.2, 40.3, 56.1)
4. Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis (CH 39.5, 43.1 – 43.4)

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 (18.2-18.4, 38.1)
2. Timing and coordination of physiological events are regulated by multiple mechanisms (38.1, 39.2, 39.3, 24.1, 11.1)
3. Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection (CH 51.1, 51.2, 39.2, 39.3, 51.1, 54.1)

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 (CH 5.5, 27.1, 16.1, 16.2, 17.1-17.4, 19.2, 20.1, 20.2)
2. In eukaryotes, heritable information is passes to the next generation in processes that include the cell cycle and ***mitosis or meiosis*** plus fertilization (CH 12.1-12.3, 13.1-13.3)
3. The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring (CH 14.1-14.4)
4. The inheritance pattern of many traits cannot be explained by simple Mendelian genetics (CH 15.1-15.5

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

1. Gene regulation results in differential gene expression, leading to cell specialization (CH 18.1-18.2)
2. A variety of intercellular and intracellular signal transmissions mediate ***gene expression*** (CH 11.1, 11.4, 18.1-18.4)

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*** (CH 15.4, 16.2, 17.5, 23.4)
2. Biological systems have multiple processes that increase genetic variation (CH 27.2, 13.4)
3. Viral replication results in genetic variation, and viral infection can introduce genetic variation into the hosts (CH 19.1, 19.2)

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

1. Cell communication processes share common features that reflect a shared evolutionary history (CH 11.1, 11.2)
2. Cells communicate with each other through direct contact with other cells or from ad distance via chemical signaling (CH 11.1, 11.2)
3. ***Signal transduction pathways*** link signal reception with cellular response (CH 11.3)
4. Changes in signal transduction pathways can alter cellular response (CH 11.4)

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

1. Individuals can act on information and communicate it to others(51.1)
2. Animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses (CH 48.1-48.4, 49.2)

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 (CH 5.1-5.5)
2. The structure and function of subcellular components and their interactions provide essential cellular processes (CH 6.2-6.5)

3. Interactions between external stimuli and regulated gene expression result in specialization of cell, tissues, and organs (CH 18.4)
4. Organisms exhibit complex properties due to interactions between their constituent parts (CH 48.4)
5. Communities are composed of populations of organisms that interact in complex ways (CH 53.1-53.6)
6. Interactions among living systems and with their environment result in the movement of matter and energy (CH 54.2, 55.1-55.4, 56.4)

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

1. Interactions between molecules affect their structure and function (CH 5.4, 84-8.5)
2. Cooperative interactions within organisms promote efficiency in the use of energy and matter (CH 6.4, 40.1)
3. Interactions between and within populations influence patterns of species distribution and abundance (CH 54.1)
4. Distribution of local and global ecosystems changes over time (CH 25.4, 56.1-55.5)

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 (CH 5.1-5.5, 21.5)
2. Environmental factors influence the expression of the genotype in an organism (CH 14.3)
3. The level of variation in a population affects population dynamics (CH 23.1-23.3)
4. The diversity of species within an ecosystem may influence the stability of the ecosystem (CH 14.3, 23.23, 54.2, 56.1)