Hackensack High School
Advanced Placement Biology
2019 Summer Assignment

Note: I normally hand out textbooks prior to the end of the previous school year, but I have found this open source textbook is an excellent substitute for the summer assignment. I will distribute textbooks once the school year starts, but this online option will serve our purpose well.

https://openstax.org/details/books/biology-2e

I expect this summer assignment to take the average student approximately 10-12 hours of work. If the assignments take you substantially less time than this, you should ask yourself if you did them to a satisfactory level. If the assignments take substantially more time, you may have difficulty keeping up with the workload of this course.

The study of AP Biology focuses on enduring, conceptual understandings and the content that supports them. This will enable you to spend less time on factual recall and more time on inquiry-based learning of the essential concepts. This will allow you to develop the inquiry and reasoning skills necessary to engage in the science practices needed for the course. With that being said, understanding the underlying ideas and concepts is important so you can quickly make connections. Skills such as designing a plan for collecting data, analyzing the data, applying mathematical routines and models to the data and connecting concepts across all domains are paramount to this course.

In order to help you start making these connections, the College Board has divided the curriculum for this course into

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

*Broken down into 4 Enduring Understandings:*

**Enduring Understanding 1.A:** Change in the genetic makeup of a population over time is evolution

*Broken down into 4 Essential Knowledge statements:*

**Essential Knowledge 1.A.1:** Natural selection is a major mechanism of evolution

*There are many illustrative examples for this Essential Knowledge. One is:*

Use and application of the Hardy-Weinberg equilibrium equation is an illustrative example from the course and text book to cover/explain this essential knowledge statement

In order to fulfill the requirements of the class, you would need to know what the equation above is what the terms are, how it is applied, what results can you get.
This is what you will do for part 2 of your summer assignment (after you read and take notes). I will provide you the **Essential Knowledge** statements for the chapters that need to be covered over the summer. You will work to find, learn and explain illustrative examples for the essential knowledge statements. The topic for the summer is Ecology, textbook chapters 44-47. The content covered over the summer allows us to get a head start on the year. The AP exam is in early May, so we have to fit an entire year’s worth of material into 8 months of school. The summer assignment also strives to help you find the balance between content memorization and understanding concepts/big ideas.

Illustrative examples are specific (not general) examples that show you have a clear understanding of what the essential knowledge statement means and how it is seen in a real world example. We need to speak in specifics during this course and not in generalities. Of the 18 essential knowledge statements listed below, you must choose 10 to find and explain illustrative examples of. There is no extra credit for doing more than the 10 required.

**Essential Knowledge Statements (Choose 10 from the list below):**

ENE-3.D.1- Organisms respond to changes in their environment through behavioral and physiological mechanisms.

IST-5.A.2 - Communication occurs through various mechanisms (including signalling, visual, audible, tactile, electrical and chemical signals)

IST-5.A.3 - Responses to information and communication of information are vital to natural selection and evolution. Selection favors innate and learned behaviors that increase survival and reproductive fitness. Cooperative behavior tends to increase the fitness of the individual and the survival of the population.

ENE-1.M.1- Organisms use energy to maintain organization, grow and reproduce (such as mechanisms to regulate body temp and metabolism, different reproductive strategies, relationship between metabolic rate and body mass, etc)

ENE-1.N.1- Changes in energy availability can result in changes in population size

ENE.1.N.2 - Changes in energy availability can result in disruption to an ecosystem

SYI-1.H.1 - A population can produce a density of individuals that exceeds the system’s resource availability

SYI-1.H.2 - As limits to growth due to density-dependent and density-independent factors are imposed, a logistic growth model generally ensues.
ENE-4.A.1 - The structure of a community is measured and described in terms of species composition and species diversity

ENE-4.B.1 - Communities change over time depending on interactions between populations.

ENE-4.B.2 - Interactions among populations determine how they access energy and matter within a community.

ENE-4.B.4 - Competition, predation, and symbioses, including parasitism, mutualism, and commensalism, can drive population dynamics.

SYI-3.F.1 - Natural and artificial ecosystems with fewer component parts and with little diversity among the parts are often less resilient to changes in the environment.

SYI-3.G.2 - The effects of keystone species on the ecosystem are disproportionate relative to their abundance in the ecosystem, and when they are removed from the ecosystem, the ecosystem often collapses.

SYI-2.A.1 - The intentional or unintentional introduction of an invasive species can allow the species to exploit a new niche free of predators or competitors or to outcompete other organisms for resources.

SYI-2.A.2 - The availability of resources can result in uncontrolled population growth and ecological changes.

SYI-2.B.2 - Human impact accelerates change at local and global levels - the introduction of new diseases can devastate native species. Habitat change can occur because of human activity.

SYI-2.C.1 - Geological and meteorological events affect habitat change and ecosystem distribution. Biogeographical studies illustrate these changes.

An example is shown below:

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

**Enduring Understanding 1.B:** Organisms are linked by lines of descent from common ancestry.

**Essential Knowledge 1.B.1:** Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.

**Illustrative Example for 1.B.1:** (This is what you must do for each piece of essential knowledge in the summer assignment) (I am expecting a similar amount of detail for each of
your illustrative examples, as I have shown below, as well as the referenced sections from the text)

- “DNA is an example of a molecule that is found in all living things from the simplest of prokaryotes to the most complex of organisms. The fact that all life forms are linked by this commonality supports the theory that all life arose from a common ancestor (pg. 449). This common ancestor used DNA as the hereditary material to guide the production of proteins and pass on genetic traits to offspring (pg. 516). The DNA molecule is the same in all living things from a structural standpoint. No matter if the organism is a bacteria or a bison, DNA is a double helix made up of a sugar (deoxyribose) – phosphate backbone with a series of 4 nitrogenous bases on the inside of the helix forming the “rungs” of the twisted ladder, and held to their complimentary bases by hydrogen bonds (Adenine always bond to Thymine, and Cytosine always bonds to Guanine) (pg. 297). In all organisms DNA carries out the same function of acting as the code for the production of proteins. The universality of DNA can also be seen in the ability of scientists to insert DNA from one organism into the genome of another and have that organism produce whatever protein was coded for in the original piece of spliced DNA (pg. 449). The law of parsimony states that the simplest explanation is typically the correct one. The simplest way to explain the fact that all organisms have DNA as a hereditary material would be that DNA evolved once in the earliest living organism and has been retained as the genetic material for the past 3.5 billion years.”

The above illustrative example would be a good way to show that you had a solid grasp of the Essential Knowledge 1.B.1. There are numerous examples you could have used to show understanding of this one essential knowledge statement. Your goal should be to clearly explain that you understand the Essential Knowledge by finding various examples throughout the textbook within the chapters assigned (44-47). As you can see, the one example above pulls information from various sections/chapters within the book. Rarely would an essential knowledge statement be entirely explained in just one section of the book. AP Biology is all about making connections between topics, this is the thing most new students struggle with the most. This is what the summer assignment is teaching you how to do as well as learn/comprehend biological content. Ultimately the most successful students in this course are able to see a similar connection between two seemingly unrelated topics. Memorizing a fact has its place under certain circumstances, but in this course being able to explain how hydrogen bonds affects various biological functions from pH to DNA replication to protein synthesis is more important than being able to memorize the angle between hydrogens in a water molecule (104.5° by the way :) .

**TL;DR:**

**What do I need to do?**

1. **Read and take notes on chapters 44-47 in the online textbook.** At the beginning of each section there are 2-4 bulleted statements under the heading of “By the end of this section you should be able to do the following:” Your notes should be about answering those statements. Learning to take efficient and useful notes is a very important skill and one that many of you struggle with. Your notes should help you
to feel comfortable with the content. They SHOULD NOT be a vocabulary list. They SHOULD be a good reference and a link between the content you know and the content in the book. Don’t write down definitions, you can always find those in the book, or online. DO write down what a figure means, or an example that helps you understand a concept, etc.

If you struggle with writing too much when taking notes, ask yourself if what you are writing down is any different than what’s in the book and if it helps you understand the content better than what is written in the book. If it is, then great, include it. If it is just you copying what’s in the book, then it is excessive.

If you struggle with not writing enough when taking notes, ask yourself this: If Mr. Keller sprang an open note quiz on me the day after a reading, would these notes leave me feeling confident? If the answer is no, then figure out what else needs to be in there. If the answer is yes, then cool, you are taking useful notes.

2. Use what you have learned to provide 10 illustrative examples from the list above as shown in this document. They must be explained and referenced to the text (section the content came from is acceptable).

3. We will have our first unit test (chapters 44-47) on the first double period that we have. Exam will be in an AP style and all questions will be tied to the essential knowledge statements in this assignment. Every question is coming from a released AP exam and will be an excellent introduction to what I expect from you on assessments. We will have ~1 class period to review any material you have questions on, otherwise the material is up to you to learn and understand.

4. Illustrative examples must be shared in Google Drive with Mr. Keller. My email is: gkeller@hackensackschools.org

Part 1 of the summer assignment (Chapter notes) must be brought with you to class on day 1.

Part 2 of the summer assignment (Illustrative Examples) must be shared with me through Google Drive by the start of class on day 1

Grading Breakdown

Part 1- Reading Guides - 100 points
Part 2- Illustrative Examples - 100 points
Part 3- Unit Exam - 100 points
-Plagiarism on any portions of the summer assignment will lead to a grade of zero for both parties involved as well as possible removal from the course.

-Failure to complete some/all of the summer assignment may lead to a failing grade for the first marking period. The summer assignment sets the tone for the year. Please put your best foot forward and set yourself up for success.