TO: 2016-2017 AP Biology Students

FROM: Mr. Furiosi

DATE: May 18th, 2016

SUBJECT: AP Biology Summer Assignment & Textbook

Please stop by Mr. Furiosi’s classroom, Room 12-018, sometime during remaining days of school to pick up a textbook and some informational papers to take home for the summer.

The assignment for the summer is that you read the ecology unit of our textbook and outline the assigned chapters.

- Chapter 51 – Animal Behavior
- Chapter 52 – Introduction to Ecology
- Chapter 53 – Population Ecology
- Chapter 54 – Community Ecology
- Chapter 55 – Ecosystems
- Chapter 56 – Conservation Biology

These chapters are material that will be covered pretty quickly at the beginning of the year, and should be somewhat of a review from Biology. The notes will be for a grade when you return from break, and you will have a culminating project regarding the content at the end of the year.

For any reading you do, you must take reading notes. Instructions for reading notes are attached to this letter. Reading notes will be your ticket for doing test corrections and completing in-class quizzes. Furthermore, notes will help you better understand the complex material, participate in class discussions, and help you be an active participant in your learning by knowing what questions you should ask.

I look forward to seeing you and working with you next year!

Sincerely,

Mr. Furiosi
**Instructions for Reading Notes**

The key to success in AP Biology is taking adequate notes from the textbook **BEFORE** attending class. These notes are also free to be used on reading quizzes. **The reading notes will be your only reference during test corrections; textbooks or electronic resources are not allowed.** Reading notes are not typically graded, but can turn into a graded assignment if students are failing to keep up with the responsibility.

**NOTES MUST BE IN AN OUTLINE FORMAT**

An outline presents a picture of the main ideas and subsidiary, or minor, ideas of any subject. When you take notes while reading, an outline format will provide both a basic overview and important details from the text.

Below are two templates for taking notes. **Keep in mind that the preference of style for notes is your own, and I will not force a particular style on you.** You are free to choose the style that best fits your learning needs.

The textbook will help determine how many main ideas and supporting points adequately describe a topic. Look for the following when reading:

1. **Key Concepts:** These could represent the Roman numerals in your outline.
2. **Blue Headings:** These could represent the capital letters under the roman numerals.
3. **Italicized Blue Headings:** These could represent the Arabic numerals under the capital letters.
4. **Your notes** can and should be placed under each of these headings as appropriate.

**Note Taking Suggestions**

1. **Number the pages of your outline for easy reference.**
2. **IMPORTANT:** Do NOT list a bunch of rote facts or copy sentences straight from the book.
3. **IMPORTANT:** Summarize the readings in your own words.
   a. When you write information in your own words, you actively think about what you have read.
   b. Thinking about the reading is the purpose of taking notes, as well as for a quick reference when studying.
4. Information in your reading notes should be enough to answer the **Concept Check** questions at the end of each section and the **Learning Objectives** provided for each chapter.
5. **Draw boxes around, highlight, or star vocabulary words.**
6. **Notes must be your own work.**

If notes are typed, they must be submitted to “Safe Assign” to verify they are not plagiarized. **Plagiarized of any kind, including notes, will result in a referral to discipline and a zero on the assignment**

**Learning Objectives**

If you are struggling with where to begin or what to cover in your notes, there are learning objectives provided on eCampus for all chapters. They provide an outline of the important topics that should be understood following successful reading of the chapter. Additionally, **your reading quiz questions come directly from the learning objectives.** If you follow the learning objectives when taking notes, you should score high on your reading quizzes.
Examples of Reading Notes

Below are two templates for taking notes. As mentioned earlier, the preference of style for notes is your own, and I will not force a particular style on you. Choose whichever style you prefer.

**Basic Roman Numeral Outline**

I. Main Idea 1
   - A. Subsidiary or supporting idea to the main idea.
   - B. Subsidiary or supporting idea to the main idea.
     1. Subsidiary idea to B.
     2. Subsidiary idea to B.

II. Main Idea 2
   - A. Subsidiary or supporting idea to the main idea.
   - B. Subsidiary or supporting idea to the main idea.
   - C. Subsidiary or supporting idea to the main idea.

**Cornell Notes**

<table>
<thead>
<tr>
<th>Topic 1</th>
<th>Supporting main ideas and questions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Key words and ideas.</td>
</tr>
<tr>
<td></td>
<td>Important dates/people/places.</td>
</tr>
<tr>
<td></td>
<td>Repeated/stressed information.</td>
</tr>
<tr>
<td></td>
<td>Personal thoughts ideas.</td>
</tr>
<tr>
<td></td>
<td>Diagrams and pictures.</td>
</tr>
<tr>
<td></td>
<td>Formulas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 2</th>
<th>Supporting main ideas and questions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Key words and ideas.</td>
</tr>
<tr>
<td></td>
<td>Important dates/people/places.</td>
</tr>
<tr>
<td></td>
<td>Repeated/stressed information.</td>
</tr>
<tr>
<td></td>
<td>Personal thoughts ideas.</td>
</tr>
<tr>
<td></td>
<td>Diagrams and pictures.</td>
</tr>
<tr>
<td></td>
<td>Formulas.</td>
</tr>
</tbody>
</table>

**Summary:** Type up a paragraph summary of the section that encompasses the notes you wrote above.

**Learning Objectives**

At the end of this packet, there are a set of learning objectives for you to follow while you take notes. The learning objectives provide you with a framework in order to identify important information necessary to understanding the chapter. **Reading quiz questions come from the chapter learning objectives.** Remembering that reading notes are allowed on reading quizzes, if you follow the learning objectives, you should do well. **When the school year begins, learning objectives will be provided on eCampus for you to access on your own.**
Examples of Reading Notes

Roman Numeral Notes Example

Chapter 9: The Cell Cycle

9.1 The Cell Cycle
A. Interphase
   1. Most of a cell’s life is spent in interphase, in which the cell performs its usual functions.
   2. Time spent in interphase varies by cell type: nerve and muscle cells do not complete the cell cycle and remain in the G0 stage while embryonic cells complete the cycle every few hours.
   3. The G1 stage is just prior to DNA replication; a cell grows in size, organelles increase in number, and material accumulates for DNA synthesis.
      a. Following the G1 stage, there is a checkpoint that cells must pass through before moving on with the cell cycle.
      b. Failure to have the appropriate number of chromosomes cues the cell to halt the cell cycle to fix the error.
      c. If a cell has an error but passes through a checkpoint anyway, it can lead to cancer.
   4. The S stage is the DNA synthesis (replication) period; proteins associated with DNA are also synthesized; at the end of the S stage, each chromosome has two identical DNA double helix molecules, called sister chromatids.
   5. The G2 stage occurs just prior to cell division; the cell synthesizes proteins needed for cell division, such as proteins in microtubules.
   6. Interphase therefore consists of G1, S, and G2.

Cornell Notes Example

Unit: Ecology

Questions | Notes
--- | ---
What is the biosphere? Why is it important to us? | **Biosphere:** All life on earth and parts of earth where life exists.
   - Humans are impacting the biosphere in ways faster than previously imagined.
   - Pollution, carbon dioxide emissions, and depletion of the ozone layer are resulting in higher temperatures, change in wind patterns, and changing of landscapes.
What are differences between biotic and abiotic factors? | **Biotic Factor:** Living part of the environment with which an organism might interact.
   - *Examples:* Wolves in the Midwest interacting with elk populations
What are some examples of how biotic and abiotic factors affect the environment? | **Abiotic factor:** Any nonliving part of the environment
   - *Examples:* Amount of sunlight available through tree cover

Summary: Ecology is the study of how all living things act with each other along with nonliving things in the environment. Ecologists organize these levels of interaction into different groups (ex. Biosphere) and categories (biotic and abiotic factors).

Personal Notes Example

CHAPTER 18: Limbic System

Emotion

- **Emotion:** An intense mental state produced by neuronal activity.
  - It is spontaneous, rather than through conscious effort.
  - **Emotional Expression:** The behavioral output from somatic motor neurons, autonomic neurons, and the hypothalamus that leads to the expression of emotion.
- **Cannon-Bard Theory:** Emotional experience leads to emotional expression.
  - Experience precedes expression.
  - Cannon stated the thalamus/hypothalamus is responsible for emotional response.
CHAPTER 51: ANIMAL BEHAVIOR

Introduction to Behavior
1. Define behavior.
2. Ask a proximate question and an ultimate question about bird song.

Sensory Input as Stimuli for Animal Behavior
3. Define a fixed action pattern and give an example.
4. Distinguish between kinesis and taxis.
5. Explain how migrating animals may track their position relative to the sun, the North Star, or Earth’s magnetic field.
6. Distinguish between circadian and circannual behavioral rhythms.
7. Explain courtship behavior in *Drosophila melanogaster* as a stimulus response chain.
8. Describe the information content in the round dance and waggle dance of a honeybee.
9. Define pheromone. Provide examples of pheromones that function in reproductive and nonreproductive behavior.

Learned Behaviors
10. Explain how habituation may influence behavior and why it may be selectively advantageous.
11. Define imprinting. Suggest a proximate cause and an ultimate cause for imprinting in newly hatched geese.
12. Describe Tinbergen’s classic experiment on spatial learning in digger wasps.
13. Distinguish between landmarks and cognitive maps.
14. Explain how associative learning may help a predator to avoid toxic prey.
15. Distinguish between classical conditioning and operant conditioning.
16. Describe an experiment that demonstrates problem solving in non-human animals.
17. Describe the stages of song learning in white-crowned sparrows.

Genetic Contributions to Behavior
18. Explain how genes and environment both contribute to behavior.
19. Describe how cross-fostering experiments help identify the relative importance of environmental and genetic factors in determining specific behaviors.
20. Describe the evidence of a genetic basis for the willingness of garter snakes to eat slugs.
21. Explain how differences in expression of the vasopressin receptor gene explain differences in paternal behavior in meadow and prairie voles.

Evolution of Behavioral Traits by Natural Selection
22. Describe the selective benefits of the phenotypes associated with the two *forager* alleles under conditions of low and high *Drosophila* population density.
23. Describe optimal foraging theory.
24. Explain how behavioral ecologists carry out cost-benefit analyses to determine how an animal should forage optimally, using the example of crows feeding on whelks.
25. Explain how predation risk may affect the foraging behavior of a prey species.
26. Define and distinguish among promiscuous, monogamous, and polygamous mating relationships. Define and distinguish between polygyny and polyandry.
27. Describe how the certainty of paternity may influence the development of mating systems.
28. Explain why males are more likely than females to provide parental care in fishes.
29. Distinguish between intersexual and intrasexual selection.
30. Suggest an ultimate explanation for female stalk-eyed fly’s preference for mates with relatively long eyestalks.
31. Agonistic behavior in males is often a ritualized contest rather than combat. Suggest an ultimate explanation for this.
32. Explain how game theory may be used to evaluate alternative behavioral strategies.

The Evolution of Altruistic Social Behavior
33. Define altruistic behavior, providing examples.
34. Define Hamilton’s rule and explain the conditions under which altruistic behaviors will be favored by natural selection.
35. Relate the coefficient of relatedness to the concept of altruism.
Summer Assignment Textbook Learning Objectives

36. Distinguish between kin selection and reciprocal altruism.

Social Learning and Sociobiology
37. Define social learning and culture.
38. Explain why mate choice copying by a female may increase her fitness.
39. State the main premise of sociobiology.

CHAPTER 52: AN INTRODUCTION TO ECOLOGY AND THE BIOSPHERE

The Scope of Ecology
1. Define ecology.
2. Describe the relationship between ecology and evolutionary biology.
3. Distinguish between abiotic and biotic components of the environment.
4. Distinguish among organismal ecology, population ecology, community ecology, ecosystem ecology, and landscape ecology.
5. Clarify the difference between ecology and environmentalism.

Interactions between Organisms and the Environment Limit the Distribution of Species
6. Define biogeography.
7. Describe the questions that might be asked in a study addressing the limits of the geographic distribution of a particular species.
8. Explain how dispersal may contribute to a species’ distribution.
9. Distinguish between the potential and actual range of a species.
10. Explain how habitat selection may limit distribution of a species within its range of suitable habitats.
11. Describe, with examples, how biotic and abiotic factors may affect the distribution of organisms.
12. List the four abiotic factors that are the most important components of climate.
13. Distinguish between macroclimate and microclimate patterns.
14. Explain, with examples, how a body of water and a mountain range might affect regional climatic conditions.
15. Provide an example of a microclimate.
16. Describe how an ecologist might predict the effect of global warming on distribution of a tree species.
17. Name three ways in which marine biomes affect the biosphere.

Aquatic Biomes
18. Define each layer in a stratified aquatic biome: photic zone, aphotic zone, benthic zone, abyssal zone.
19. Define the following characteristics of lakes: thermal stratification, thermocline, seasonal turnover.
20. Explain why the following statement is false: “All communities on Earth are based on primary producers that capture light energy by photosynthesis.”
21. Describe the characteristics of the major aquatic biomes: lakes, wetlands, streams, rivers, estuaries, intertidal biomes, oceanic pelagic biomes, coral reefs, and marine benthic biomes.

Terrestrial Biomes
22. Define a climograph. Compare the climographs of taiga, grassland, and desert biomes.
23. Describe the vertical layering of a forest and grassland.
24. Give an example of a biome characterized by periodic disturbance.
25. Describe the characteristics of the major terrestrial biomes: tropical forest, desert, savanna, chaparral, temperate grassland, coniferous forest, temperate broadleaf forest, and tundra.

CHAPTER 53: POPULATION ECOLOGY

Characteristics of Populations
1. Distinguish between density and dispersion of a population.
Summer Assignment Textbook Learning Objectives
2. Explain how ecologists may estimate the density of a species.
3. Describe conditions that may result in clumped dispersion, uniform dispersion, and random dispersion of individuals in a population.
4. Explain how a life table is constructed.
5. Distinguish between a life table and a reproductive table.
6. Describe the characteristics of populations that exhibit Type I, Type II, and Type III survivorship curves.

Life Histories
7. Define and distinguish between semelparity and iteroparity. Explain what factors may favor the evolution of each life history strategy.
8. Explain, with examples, how limited resources and trade-offs may affect life histories.

Population Growth
9. Compare the exponential model of population growth with the logistic model.
10. Explain how an environment’s carrying capacity affects the per capita rate of increase of a population.
11. Explain the meaning of each of the following terms in the logistic model of population growth:
   a. \( r_{\text{max}} \)
   b. \( K - N \)
   c. \( \frac{(K-N)}{K} \)
12. Distinguish between \( r \)-selected populations and \( K \)-selected populations.

Population-Limiting Factors
13. Explain how density-dependent and density-independent factors may affect population growth.
14. Explain, with examples, how biotic and abiotic factors may work together to control a population’s growth.

Human Population Growth
17. Compare the age structures of Italy, Afghanistan, and the United States. Describe the possible consequences for each country.
18. Describe the problems associated with estimating Earth's carrying capacity for the human species.
19. Define the demographic transition.
20. Explain how an ecological footprint can be calculated for an individual or country. Describe the possible currencies of this calculation.

CHAPTER 54: COMMUNITY ECOLOGY

Interspecific Interactions
1. List the categories of interspecific interactions. Explain how each interaction affects the survival and reproductive success of the two species involved.
2. State the competitive exclusion principle.
3. Define an ecological niche and restate the competitive exclusion principle using the niche concept.
4. Explain how interspecific competition may lead to resource partitioning.
5. Distinguish between fundamental and realized niche.
6. Give specific examples of adaptations of predators and prey.
7. Explain how cryptic coloration and aposematic coloration may aid an animal in avoiding predators.
8. Distinguish between Batesian mimicry and Müllerian mimicry.
9. Describe how predators may use mimicry to obtain prey.
10. Give specific examples of adaptations of herbivores.
11. Distinguish among endoparasites, ectoparasites, and parasitoids.
12. Distinguish among parasitism, mutualism, and commensalism.
13. Explain why it is difficult to classify a symbiotic relationship as commensal.
Summer Assignment Textbook Learning Objectives

Community Structure
14. Explain the relationship between species richness and relative abundance and explain how both contribute to species diversity.
15. Distinguish between a food chain and a food web.
16. Describe two ways to simplify food webs.
17. Summarize two hypotheses that explain why food chains are relatively short. Explain the experimental evidence that supports the energetic hypothesis.
18. Explain how dominant and keystone species exert strong control on community structure. Describe an example of each.
19. Explain how a foundation species may facilitate the survival and reproduction of other species.
20. Distinguish between the bottom-up and top-down models of community organization.
21. Describe the successful biomanipulation of Finland’s Lake Vesijärvi.

Disturbance and Community Structure
22. Define stability and disturbance.
23. Describe the intermediate disturbance hypothesis. Explain why moderate levels of disturbance may create conditions that foster greater species diversity than low or high levels of disturbance.
24. Distinguish between primary and secondary succession.
25. Describe how species that arrive early in succession may facilitate, inhibit, or tolerate later arrivals.
26. Describe the biotic and abiotic changes that have occurred during primary succession on glacier moraines in Glacier Bay, Alaska.
27. Describe an example of humans acting as agents of disturbance.

Biogeographic Factors Affect Community Biodiversity
28. Explain why species richness declines along an equatorial-polar gradient.
29. Explain the significance of measures of evapotranspiration to species richness.
30. Define the species-area curve.
31. Explain how species richness on islands varies according to island size and distance from the mainland.

The Effects of Pathogens on Community Ecology
32. Describe one terrestrial and one marine example of a pathogen that has altered the structure of the community in which it is found.
33. Define a zoonotic pathogen. Explain, with an example, how zoonotic pathogens may be controlled.

CHAPTER 55: ECOSYSTEMS

Physical Laws Govern Ecosystems
1. Describe the fundamental relationship between autotrophs and heterotrophs in an ecosystem.
2. Explain how the first and second laws of thermodynamics apply to ecosystems.
3. Explain how decomposition connects all trophic levels in an ecosystem.

Primary Production in Ecosystems
4. Explain why the amount of energy used in photosynthesis is so much less than the amount of solar energy that reaches Earth.
5. Define and compare gross primary production and net primary production.
6. Define and compare net primary production and standing crop.
7. Compare net primary production in specific marine, freshwater, and terrestrial ecosystems.

Secondary Production in Ecosystems
8. Explain why energy is said to flow rather than cycle within ecosystems.
9. Explain what factors may limit primary production in aquatic ecosystems.
10. Describe an experiment that provided evidence that iron availability limits oceanic primary production in some regions. Explain how iron availability is related to nitrogen availability in these regions.
11. Explain why areas of upwelling in the ocean have exceptionally high levels of primary production.
Summer Assignment Textbook Learning Objectives

12. Distinguish between each of the following pairs of terms:
   a. primary and secondary production
   b. production efficiency and trophic efficiency

13. Explain why the production efficiency of a human is much less than the production efficiency of a mosquito.

14. Distinguish between a pyramid of net production and a pyramid of biomass.

15. Explain why aquatic ecosystems may have inverted biomass pyramids.

16. Explain why worldwide agriculture could feed more people if all humans consumed only plant material.

17. Explain the green-world hypothesis. Describe four factors that may act to keep herbivores in check.

The Cycling of Chemical Elements in Ecosystems

18. Explain why nutrients are said to cycle rather than flow within ecosystems.

19. Describe the four nutrient reservoirs and the processes that transfer the elements between reservoirs.

20. Name the main processes driving the water cycle.

21. Name the major reservoirs of carbon.

22. Describe the nitrogen cycle and explain the importance of nitrogen fixation to all living organisms. Name three other key bacterial processes in the nitrogen cycle.

23. Describe the phosphorus cycle and explain how phosphorus is recycled locally in most ecosystems.

24. Explain how decomposition affects the rate of nutrient cycling in ecosystems.

25. Describe how net primary production and the rate of decomposition vary with temperature and water availability.

Human Impact on Ecosystems and the Biosphere

26. Describe how agricultural practices can interfere with nitrogen cycling.

27. Describe the causes and consequences of acid precipitation.

28. Explain why toxic compounds usually have the greatest effect on top-level carnivores.

29. Describe how increased atmospheric concentrations of carbon dioxide are changing Earth’s heat budget.

30. Describe the causes and consequences of ozone depletion.

CHAPTER 56: CONSERVATION BIOLOGY AND RESTORATION ECOLOGY

The Biodiversity Crisis

1. Distinguish between conservation biology and restoration biology.

2. Describe the three levels of biodiversity.

3. Explain why biodiversity at all levels is vital to human welfare.

4. List the three major threats to biodiversity and give an example of each.

Conservation at the Population and Species Levels

5. Define and compare the small-population approach and the declining-population approach.

6. Explain how an extinction vortex can lead to the extinction of a small population. Describe how a greater prairie chicken population was rescued from an extinction vortex.

7. Distinguish between the total population size and the effective population size. Explain why this distinction is crucial in determining the minimum viable population size.

8. Describe the basic steps that are used to analyze declining populations and determine possible interventions in the declining-population approach. Describe the case of the red-cockaded woodpecker to illustrate this approach.

9. Describe the conflicting demands that may accompany species conservation.

Conservation at the Community, Ecosystem, and Landscape Levels

10. Explain how edges and corridors can strongly influence landscape biodiversity.

11. Define biodiversity hot spots and explain why they are important.

12. Explain why natural reserves must be functional parts of landscapes.

13. Define zoned reserves and explain why they are important.

14. Define restoration ecology and describe its goals.

15. Explain the importance of bioremediation and biological augmentation of ecosystem processes in restoration efforts.

16. Describe the process of adaptive management.

17. Describe the concept of sustainable development.