

AP Biology Summer Assignment

Welcome to Advanced Placement Biology! I am looking forward to another exciting year of AP Biology. We will work hard and learn a great deal of material. This is a fast paced college level class and will require a great deal of independent work and study on your part. Unfortunately due to the amount of material we will cover a summer assignment is essential. *While you are doing the assignment be sure to highlight any part that you have questions about or need clarification on.* This assignment will take you some time to complete, so pace yourself.

- (1) - Read, study and outline the following chapters (sections): C50 (1&2), C51(all), C52(all), C53(all), C54(all) and C55(1&4) from your AP Biology textbook. I will not be collecting these outlines and returning them to you, these are your notes.
- (2) Answer the Summer Assignment questions pertaining to each chapter. I have separated out the questions by chapter. Each chapter should be done separately with the question sheet attached to your responses. If you choose to type your responses rather than hand write them, all typed work must be done in google docs and shared with me.
- (3) Know the key terms. I have listed all of the Key Terms for each chapter, you are expected to know these. You need not define terms that you already know, but be sure that you know, understand, and can use all of the key terms listed.
- (4) Familiarize yourself with the class website at: www.pannoneapbio.weebly.com. There is a great deal of important information there for you: unit pages, assignments, powerpoints, scheduled tests and due dates, assignments, review questions, cram sheets, research and summer opportunities, ect. (too much to list). You will notice some of the links are inactive, this is because I want to keep you from going ahead too far. (yes, some of you are that ambitious 😊)

When you return to school in the fall, we will review any questions* you may have regarding the material in these chapters in class during the first week. At the end of the first full week there will be an exam on the material in these chapters.

I have posted this assignment in MS Word. If you have chosen to type your assignment, please upload this document to Google Docs and edit it there with your responses.

Have a great summer!
Mrs. Conover-Pannone

Chapter 50 – Introduction to Ecology and the Biosphere (sections 1 and 2)

The Scope of Ecology

1. Define ecology. Identify the two features of organisms studied by ecologists.
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.

Chapter 51 – Behavioral Ecology

Introduction to Behavior

1. Define behavior.
2. Distinguish between proximate and ultimate questions about behavior. Ask a proximate question and an ultimate question about bird song.
3. Explain how the classical discipline of ethology led to the modern study of behavioral ecology.
4. Define a fixed action pattern and give an example.
5. Define imprinting. Suggest an appropriate cause and an ultimate cause for imprinting in young geese.
6. Explain how genes and the environment contribute to behavior. Explain what is unique about innate behavior.
7. Distinguish between kinesis and taxis.
8. Define pheromone. Provide examples of pheromones that function in reproductive and non-reproductive behavior.

Learned Behaviors

9. Explain how habituation may influence behavior and why it may be selectively advantageous.
10. Distinguish between landmarks and cognitive maps.
11. Explain how associative learning may help a predator to avoid toxic prey.
12. Distinguish between classical conditioning and operant conditioning.
13. Describe an experiment that demonstrates problem solving in non-human animals.

Behavioral Traits Can Evolve by Natural Selection

14. Describe optimal foraging theory.
15. 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.
16. Define and distinguish among promiscuous, monogamous, and polygamous mating relationships. Define and distinguish between polygyny and polyandry.
17. Explain why males are more likely than females to provide parental care in fishes.
18. Distinguish between intersexual and intrasexual selection.
19. Agonistic behavior in males is often a ritualized contest rather than combat. Suggest an ultimate explanation for this.

The Evolution of Altruistic Social Behavior

20. Define altruistic behavior, providing examples.
21. Define Hamilton's rule and explain the conditions under which altruistic behaviors will be favored by natural selection.
22. Relate the coefficient of relatedness to the concept of altruism.
23. Distinguish between kin selection and reciprocal altruism.

Social Learning and Sociobiology

24. Define social learning and culture.
25. Explain why mate choice copying by a female may increase her fitness.
26. State the main premise of sociobiology.

Chapter 52 – Population Ecology

Characteristics of Populations

1. Distinguish between density and dispersion of a population.
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_{max}
 - b. $K - N$
 - c. $(K - N)/K$
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.
15. Describe boom-and-bust population cycles, explaining possible causes of lynx/hare fluctuations.

Human Population Growth

16. Describe the history of 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.

Chapter 53 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. Distinguish among endoparasites, ectoparasites, and parasitoids.
11. Distinguish among parasitism, mutualism, and commensalism.

Community Structure

12. Explain the relationship between species richness and relative abundance and explain how both contribute to species diversity.
13. Distinguish between a food chain and a food web.
14. Summarize two hypotheses that explain why food chains are relatively short. Explain the experimental evidence that supports the energetic hypothesis.
15. Explain how dominant and keystone species exert strong control on community structure. Describe an example of each.
16. Distinguish between the bottom-up and top-down models of community organization.

Disturbance and Community Structure

17. Define stability and disturbance.
18. 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.
19. Distinguish between primary and secondary succession.
20. Describe how species that arrive early in succession may facilitate, inhibit, or tolerate later arrivals.
21. Describe an example of humans acting as agents of disturbance.

Biogeographic Factors Affect Community Biodiversity

22. Explain why species richness declines along an equatorial-polar gradient.
23. Explain the significance of measures of evapotranspiration to species richness.
24. Define the species-area curve.
25. Explain how species richness on islands varies according to island size and distance from the mainland.
26. Define and contrast the following pairs of hypotheses:
 - a. *Interactive hypothesis* versus *individualistic hypothesis*

Chapter 54 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. Explain why areas of upwelling in the ocean have exceptionally high levels of primary production.
11. Distinguish between each of the following pairs of terms:
 - a. primary and secondary production
 - b. production efficiency and trophic efficiency
12. Distinguish between a pyramid of net production and a pyramid of biomass.
13. Explain why aquatic ecosystems may have inverted biomass pyramids.
14. Explain the green-world hypothesis. Describe four factors that may act to keep herbivores in check.

The Cycling of Chemical Elements in Ecosystems

15. Explain why nutrients are said to cycle rather than flow within ecosystems.
16. Describe the four nutrient reservoirs and the processes that transfer the elements between reservoirs.
17. Name the main processes driving the water cycle.
18. Name the major reservoirs of carbon.
19. 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.
20. Describe the phosphorus cycle and explain how phosphorus is recycled locally in most ecosystems.
21. Explain how decomposition affects the rate of nutrient cycling in ecosystems.
22. Describe how net primary production and the rate of decomposition vary with temperature and water availability.

Human Impact on Ecosystems and the Biosphere

23. Describe how agricultural practices can interfere with nitrogen cycling.
24. Describe the causes and consequences of acid precipitation.
25. Explain why toxic compounds usually have the greatest effect on top-level carnivores.
26. Describe the causes and consequences of ozone depletion.

Chapter 55 – 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.

Key terms by chapter

Chapter 50

abiotic
biome
biosphere
biotic
climate
community
ecology
ecosystem
population

Chapter 51

agonistic behavior
altruism
associative learning
behavioral ecology
classical conditioning
coefficient of relatedness
cognition
cognitive ethology
cognitive map
communication
culture
ethology
fixed action pattern (FAP)
foraging
game theory
habituation
Hamilton's rule
imprinting
inclusive fitness
innate behavior
kin selection
kinesis
landmark
learning
mate-choice copying
monogamous
operant conditioning
optimal foraging theory

pheromone
polyandry
polygamous
polygyny
promiscuous
proximate question
reciprocal altruism
sensitive period
sign stimulus
signal
social learning
sociobiology
spatial learning
taxi
ultimate question

Chapter 52

age structure
big-bang reproduction
carrying capacity
clumped
cohort
demographic transition
demography
density
density dependent
density independent
dispersion
ecological capacity
ecological footprint
emigration
exponential population growth
immigration
infant mortality
iteroparity
K-selection
life expectancy at birth
life history
life table
logistic population growth
mark-recapture method
meta-population

population
population dynamics
population ecology
random
repeated reproduction
reproductive table
r-selection
semelparity
survivorship curve
territoriality
uniform
zero population growth (ZPG)

Chapter 53

aposematic coloration
Batesian mimicry
biomanipulation
biomass
bottom-up model
character displacement
coevolution
commensalism
community
competitive exclusion
cryptic coloration
disturbance
dominant species
dynamic stability hypothesis
ecological niche
ecological succession
ectoparasite
endoparasite
energetic hypothesis
evapotranspiration
facilitator
food chain
food web
herbivory
host
individualistic hypothesis
integrated hypothesis
intermediate disturbance hypothesis

interspecies interaction
interspecific competition
keystone species
Müllerian mimicry
mutualism
niche
non-equilibrium model
parasite
parasitoidism
pathogen
predation
primary succession
redundancy model
relative abundance
resource partitioning
rivet model
secondary succession
species diversity
species richness
species-area curve
top-down model
trophic structure

Chapter 54

actual evapotranspiration
biogeochemical cycle
biological magnification
critical load
decomposer
detritivore
detritus
ecosystem
eutrophication
greenhouse effect
green-world hypothesis
gross primary production (GPP)
limiting nutrient
net primary production (NPP)
primary consumer
primary producer
primary production
production efficiency

secondary consumer
secondary production
tertiary consumer
trophic efficiency
turnover time

Chapter 55

biodiversity hot spot
biological augmentation
bioremediation
conservation biology
restoration ecology
sustainable development
zoned reserve