# Unit 10: Ecology
# AP Biology

14 Class Meetings
(Plus 5 Class Meetings for AP Exam Review)

*Revised June 2019*

## Essential Questions

- How are the components of an ecosystem interconnected?

## Enduring Understandings with Unit Goals

**EU 1:** Population size and distribution is driven by ecological and evolutionary factors.
- Analyze the factors responsible for influencing population size and distribution.

**EU 2:** Interactions within a community may help, harm, or have no effect on the species involved.
- Identify and describe the types of species interactions within a community and explain their impacts.
- Predict the effects of biogeographic factors on community diversity.

**EU 3:** Energy flow and chemical cycling occur in an ecosystem.
- Calculate the amount of energy available at different trophic levels.
- Describe the cycling of nutrients and water in an ecosystem.

**EU 4:** Human activities are altering trophic structures, energy flow, and natural disturbance.
- Explain the effect of human activities on ecosystem structure and function.
- Describe the field of conservation biology.

## Standards

**Next Generation Science Standards (NGSS):**

- **HS-LS2-6.** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- **HS-LS2-8.** Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

**Common Core State Standards:**

- **RST.11-12.1** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- **RST .11-12.8** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- **MP.2** Reason abstractly and quantitatively.

# Unit 10: Ecology
# AP Biology

14 Class Meetings
(Plus 5 Class Meetings for AP Exam Review)

*Revised June 2019*

## MSMHS Academic, Civic, and Social Competencies

**Competency 1.** Read and write effectively for a variety of purposes.
**Competency 2.** Speak effectively with a variety of audiences in an accountable manner.
**Competency 3.** Make decisions and solve problems independently and collaboratively.
**Competency 4.** Apply scientific knowledge and concepts to a variety of investigative tasks.
**Competency 5.** Contribute to a positive learning environment with respect and responsibility.

## Unit Content Overview

- Climate patterns
- Seasonality
- Terrestrial biomes
- Aquatic biomes
- Population density, dispersion, demographics
- Exponential and logistic growth, rate of increase
- Population dynamics
- Species interactions
- Niches and natural selection
- Species diversity and species richness
- Ecological succession
- Energy, mass, and trophic levels
- Gross and net production
- Nutrient cycling
- Biogeochemical cycles
- Restoration
- Biodiversity
- Human impacts on biodiversity
- Conservation

**Interdisciplinary Connections**

- Marine Science: marine ecosystems
- Marine Studies 1: marine ecosystems
- Mathematics: exponential and logistic growth, rate of increase

# Unit 10: Ecology
# AP Biology

14 Class Meetings
(Plus 5 Class Meetings for AP Exam Review)

*Revised June 2019*

## Daily Learning Objectives with *TWPS Activities*

**Students will be able to…**

- Analyze the factors responsible for influencing population size and distribution.
    - *Mice that experience stress such as food shortages will sometimes abandon their young. Explain how this behavior might have evolved in the context of reproductive trade-offs and life history.*
- Identify and describe the types of species interactions within a community and explain their impacts.
    - *Explain why adaptations of particular organisms to interspecific competition may not necessarily represent instances of character displacement.*
- Predict the effects of biogeographic factors on community diversity.
    - *How might biophilia inspire us to conserve species and restore ecosystems?*
- Test the effect of competitive exclusion on two species of *Paramecium*.
    - *What are the limitations of this simulation?*
- Review the chemical context of life.
- Review cellular structure and function.
- Review cellular metabolism (photosynthesis and cellular respiration).
- Review the cell cycle and genetics.
- Review cell division and genetics.
- Review evolution.
- Review the history of life on Earth.
- Review plant form and function.
- Review animal form and function.
- Analyze the effect of salt on the freezing point of water.
    - *Why did the milk freeze, but the water remained a liquid?*
- Describe the ethical issues surrounding Henrietta Lacks (HeLa cells).
    - *Do you think that the ways researchers obtained and used (use) HeLa cells was justified by the role they played in medical advances? Why or why not?*
- Describe the role of several scientists in scientific and medical advances.
    - *Explain in several sentences what a typical "scientist" looks like in your mind.*

# Unit 10: Ecology
# AP Biology

14 Class Meetings
(Plus 5 Class Meetings for AP Exam Review)

*Revised June 2019*

## Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Daily Warm Up Activities
- Power Point Lecture with note-taking
- Flexible grouping
- Foldables
- Exit slips
- Graphic Organizers
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Student use of headphones
- Independent reading
- Outlining of text
- Reading and Accountable Talk Discussion of Text
- Laboratory exercises

## Assessments

**FORMATIVE ASSESSMENTS:**

- Populations Lab Report
    - MSMHS Rubric 4: Scientific Research
- Close reading and interpretation of text
- Outlining of textbook
- Warm Up Activities
- Exit slips
- Oral questioning
- Accountable Talk Discussions
- Daily Think-Write-Pair-Share (TWPS)
- Daily check-ins with students
- Practice FRQs
- Practice MCQs
- Homework/Reading checks

# Unit 10: Ecology
# AP Biology

14 Class Meetings
(Plus 5 Class Meetings for AP Exam Review)

*Revised June 2019*

**SUMMATIVE ASSESSMENTS:**

- Quiz on EU 1
- Quiz on EU 2
- Quiz on EU 3
- Quiz on EU 4
- Populations Lab Report
- Unit Test
- Final Exam

## Unit Task

**Unit Task Name:** Populations Lab Report

**Description:** Students will use information from this unit about ecosystem structure (EU 1), energy and nutrient cycling (EU 3), and species interactions (EU 2) in order to complete a virtual lab and write a detailed lab report of their findings. They will test the competitive exclusion of two species of *Paramecium*, research species interactions and competition, and complete a lab report using the MSMHS Lab Report Writing Guidelines. Their reports will be scored using MSMHS Rubric 4: Scientific Research.

**Evaluation**: MSMHS Rubric 4: Scientific Research

## Unit Resources

- Textbook (Biology in Focus AP Edition. Campbell et al. 2014. Pearson Education, Inc)
- Interactive Science Notebook
- MSMHS School-wide Rubrics
- Lab Supplies
- Graphing calculators
- Internet databases
- Laptops