

Biology 3: Environment and Ecology

Week 1: Intro to ecosystems and population ecology

Concepts:

- What is a population/community
- Order of organization from cells to biomes
- Factors that affect a population
- Survivorship curves, species distribution,

Intro article if necessary: <https://www.britannica.com/science/population-ecology>

Activity: compile a list of resources necessary for survival, what is important? What are we missing?

Briefly check out this game: <https://www.youtube.com/watch?v=IhOM8dGuHgM>

Optional Homework: Short video

<https://mass.pbslearningmedia.org/resource/nat35-sci-spruce-beetles/ecological-antagonists-and-partners-trees-beetles-and-woodpeckers/>

Reading:

[https://bio.libretexts.org/Bookshelves/Ecology/Book%3A_Environmental_Biology_\(Fisher\)/04%3A_Community__Population_Ecology/4.04%3A_Community_Ecology](https://bio.libretexts.org/Bookshelves/Ecology/Book%3A_Environmental_Biology_(Fisher)/04%3A_Community__Population_Ecology/4.04%3A_Community_Ecology)

Week 2: Community ecology

Concepts:

- Relationships between species (competition, predation, mutualism)
- Predators/prey

Activity: predator prey activity

<http://mshermanscienceclass.blogspot.com/2013/04/7th-grade-ecology-activity-predator.html>

(Adapt for Zoom)

Optional Homework: <https://www.pnas.org/content/112/16/4915>

Week 3: Keystone species

- Focus on keystone species and examples
- Yellow stone wolf example

Activity: divide into groups and each group receives an article about a different key stone species, summarize the article and present it to the rest of the class

Yellowstone wolves: <https://www.nps.gov/yell/learn/nature/wolf-restoration.htm>

Sea otters:

<https://www.theguardian.com/environment/2016/jul/10/sea-otters-global-warming-trophic-cascades-food-chain-kelp>

Jaguars: <https://www.amnh.org/learn-teach/curriculum-collections/biodiversity-crisis/jaguars>

- Learn about keystone predators

We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.

Optional Homework: research another keystone species and write up **why** they are so vital to their ecosystem.

Week 4: Food chains and Food Webs

Concepts:

- Food chain vs. food web
- Autotrophs vs heterotrophs
- Herbivores, carnivores, omnivores

Activity: <https://plattebasintimelapse.com/ed/chapter/activities-food-chain-food-web/>

Optional Homework: Practice Questions-

https://cpb-us-e1.wpmucdn.com/cobblearning.net/dist/c/50/files/2014/10/food-web-quiz_14-1jt11vo.pdf

Week 5: Energy in the ecosystem

Concepts:

- Trophic levels
- Types of primary, secondary, tertiary consumers, producers, carrion, decomposers
- Importance of decomposers
- Examples

Activity: Video: <https://www.youtube.com/watch?v=nFwODCe8vYA>

Other video: https://www.youtube.com/watch?v=KI7u_pcfAQE

Take a look at this article: <https://www.nationalgeographic.org/encyclopedia/decomposers/>

- Focus on examples, fill in examples on food pyramid diagram

Optional Homework:

<https://climate.nasa.gov/news/645/climate-change-may-bring-big-ecosystem-changes/>

Effect of climate change on ecosystems

Biomass: <https://www.youtube.com/watch?v=yHWcddUZ35s>

Week 6: Intro to ecology

Concepts:

- Abiotic vs. biotic factors,
- Threats of ecosystems
- How to calculate biomass

Reading: <https://www.nationalgeographic.org/encyclopedia/ecosystem/>

Activity: List all the factors of an ecosystem(divide between biotic and abiotic)

Optional Homework: <https://www.youtube.com/watch?v=RnvCbquYeIM>

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Week 7: Biomes

Concepts:

- All aquatic and terrestrial biomes
- Tropical rainforest, temperate forest, desert, tundra, Taiga, Grassland, Savannah, Freshwater, marine, alpine, Chaparral, freshwater wetland, coral reef, estuaries

Activity: split people into groups and have them try to guess the factors of each biome, then come together and explain them all.

Optional Homework:

<https://www.environment.nsw.gov.au/topics/water/estuaries/about-estuaries/why-estuaries-are-important> reading

Week 8: Biodiversity

Concepts:

- importance
- Factors that affect it
- climate change connection

Activity: Test biodiversity of your home environment and compare to find who's environment is most biodiverse

Video: <https://www.youtube.com/watch?v=XFmovUAWQUQ>

Optional Homework: <https://openstax.org/books/biology-ap-courses/pages/23-1-the-plant-body>

Intro reading about plant anatomy

Article-<https://www.nationalgeographic.com/science/2019/11/houseplants-dont-purify-indoor-air/>

Week 9: Beginning plant anatomy

Concepts:

- Plant tissue
- Anatomy of plants (structure)
- Parts of plant

Activity: have students fill out empty diagrams as teaching

Activity: Show three different plants (grass, broadleaf herbaceous plant, woody plant)-Will these plants have the same parts and grow in the same areas?

Optional Homework: Article

-<https://www.sciencenewsforstudents.org/article/parasitic-plant-vampire-plant-definition>

Video: <https://www.youtube.com/watch?v=DGpPHrLF-5M>

Week 10: Plant Growth

Concepts:

- Seed to plant
- plant growth
- Plant hormones

Activities: Reading-

<https://extension.oregonstate.edu/gardening/techniques/environmental-factors-affecting-plant-growth>

Video: <https://www.youtube.com/watch?v=8Ji3g4yp4VE>

Stages of growth: <https://www.saferbrand.com/articles/plant-growth-stages>

Optional Homework:

<https://www.livemint.com/Leisure/sgaNpmEOrXcWREduYSXwsI/Excerpt-The-Hidden-Life-Of-Trees.html>

Week 11: Communication

Concepts:

- Chemical Secretions
- Root systems
- Soil fungi

Watch this long video (or sections): <https://www.pbs.org/video/nature-what-plants-talk-about/>

Optional Homework: Reading

<https://openstax.org/books/biology-ap-courses/pages/23-6-plant-sensory-systems-and-responses>

Look through these practice problems (some might be too difficult)

<https://openstax.org/books/biology-ap-courses/pages/23-review-questions>

Week 12: Wrap up Plants

Concepts:

- Monocots vs dicots
- Tropism
- Parts of a flower

Activity: Complete anatomically correct of one type of flower

Resources

- <https://www.britannica.com/science/population-ecology>
- <https://www.youtube.com/watch?v=IhOM8dGuHgM>
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- <https://plattebasintimelapse.com/ed/chapter/activities-food-chain-food-web/>
- https://cpb-us-e1.wpmucdn.com/cobblelearning.net/dist/c/50/files/2014/10/food-web-quiz_14-1jt11vo.pdf
- <https://www.youtube.com/watch?v=nFwODCe8vYA>
- https://www.youtube.com/watch?v=KI7u_pcfAQE
- <https://www.nationalgeographic.org/encyclopedia/decomposers/>
- <https://climate.nasa.gov/news/645/climate-change-may-bring-big-ecosystem-changes/>
- <https://www.youtube.com/watch?v=yHWcddUZ35s>
- <https://www.nationalgeographic.org/encyclopedia/ecosystem/>
- <https://www.youtube.com/watch?v=RnvCbquYeIM>
- <https://www.environment.nsw.gov.au/topics/water/estuaries/about-estuaries/why-estuaries-are-important>
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- <https://www.saferbrand.com/articles/plant-growth-stages>
- <https://www.livemint.com/Leisure/sqaNpmEOrXcWREduYSXwsl/Excerpt-The-Hidden-Life-Of-Trees.html>
- <https://www.pbs.org/video/nature-what-plants-talk-about/>
- <https://openstax.org/books/biology-ap-courses/pages/23-6-plant-sensory-systems-and-responses>
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