

BIOLOGY 2

Key Features

Focus Areas

- DNA and heredity,
- factors affecting biodiversity and populations in ecosystems, including human impacts,
- the cycling of matter and flow of energy in living systems, and
- biological evolution.

By the end of the Biology 2 course, students can

- Explain how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- Represent and explain how photosynthesis and cellular respiration (including anaerobic processes) account for the cycling of energy and matter in living systems.
- Describe how living and nonliving resources and challenges, including human impacts, play a role in carrying capacity and biodiversity of ecosystems.
- Describe how the interactions in ecosystems maintain consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- Describe and explain how traits are passed from parent to offspring, including representations of the variation and distribution of expressed traits in a population.
- Explain that organisms with advantageous heritable traits tend to increase in proportion to organisms without this trait, including evidence for common ancestry of modern and extinct organisms.
- Develop solutions to sustain biodiversity so that ecosystem functioning, and productivity are maintained.

Home to School Connections

Questions you can ask your learner could include:

- How does DNA code for protein?

- Can populations of organisms continue to rapidly increase indefinitely? Why or why not?
- What role does photosynthesis/respiration play in the cycling of matter and/or flow of energy?
- How do mutations affect heritable traits?

Questions you can ask your learner's teacher could include:

- Are there certain plants and animals to focus on for topics covered in this course?
- What mathematical concepts are used in this course?
- What kind of post-secondary educational and career opportunities could this course inspire my learner to explore?

Activities and learning you can do outside of the classroom to support your learner could include:

- Research different types of genetic disorders to gain a better understanding of the relationships between DNA, RNA, protein, and inheritance.
- Utilize information published by the South Carolina Department of Natural Resources to analyze data on South Carolina wildlife (for example: deer, bats, opossums, river otters, etc.).
- Create a closed-system terrarium in a clear container. Include soil, water, plants, and small organisms. Observe the changes over a long period of time, focusing on the conservation of matter and flow of energy within the system.
- Identify a local event (for example: moderate hunting, seasonal flooding, sea level rise, etc.) and discuss how the ecosystem was impacted.
- Visit a local zoo, aquarium or nature preserve to observe animals interacting with each other. There are many examples of group behaviors: flocking, schooling, or herding, and cooperative behaviors such as hunting, migrating, or swarming.
- Choose two organisms that are known to be closely related and look up their DNA comparison, anatomical structures, and embryological development to gather evidence to explain the relationship.

- South Carolina has an abundance and wide variety of wildlife. Observe organisms both on land and in the water. Identify traits and adaptations they have to support their survival and ability to reproduce in their environment. Discuss what may happen to a population if the environment were to change in a drastic way.
- There are several South Carolina organisms that are classified as threatened or endangered species (for example: sea turtles, whales, piping plovers, whooping cranes, bald eagles, bats, Carolina pygmy sunfish, etc.) Identify and discuss solutions to help these populations.

Resources

- Bozeman Science (<https://www.bozemanscience.com/>)
- CK-12 Foundation (<https://www.ck12.org/student/>)
- Discus (<https://www.scdiscus.org/>)
- Exploratorium (<https://www.exploratorium.edu/>)
- Genetic Science Learning Center (<https://learn.genetics.utah.edu/>)
- Howard Hughes Medical Institute's BioInteractive (<https://www.biointeractive.org/>)
- Khan Academy (<https://www.khanacademy.org/>)
- PBS LearningMedia (<https://scetv.pbslearningmedia.org/>)
- SC Department of Natural Resources (<https://www.dnr.sc.gov/>)