

Biology/Botany/Zoology 151/152 Course-level Learning Outcomes

Subject-based learning outcomes:

Demonstrate a broad knowledge base sufficient to understand, connect, and synthesize core *AAAS Vision and Change* biological concepts: Evolution; Structure and function; Information flow, exchange, and storage; Pathways and transformations of energy and matter; Systems; Processes underlying patterns of biological diversity.

151/3 subject learning outcomes (semester 1)

1. Cell Biology:

- Relate the structure of cellular components such as water, ions, organic chemicals, macromolecules, membranes, and prokaryotic and eukaryotic organelles, to their functions.
- Outline structures and transformations cells use to store and release energy via chemical reactions, enzymes, membranes, and the pathways of respiration, fermentation, and photosynthesis.

2. Genetics:

- Demonstrate how chromosomal DNA stores and replicates information and uses it to direct the synthesis of RNA and proteins.
- Demonstrate how cells pass chromosomal information from cell to cell, including via different types of prokaryotic and eukaryotic cell division.
- Model the relationships between genetic information and physical traits and predict how information is transmitted during eukaryotic sexual reproduction.

3. Animal physiology:

- Relate cellular, tissue, and organ structures and processes to their functions in animal and human physiology and homeostasis. Topics include nervous (including sensory and motor) systems, endocrine systems, respiration and circulation, digestion and nutrition, and osmoregulation.

152 subject learning outcomes (semester 2)

1. Plant physiology

- Relate cellular, tissue, and organ structures and processes to their physiological functions in the plant life cycle. Topics include the processes by which plants acquire and use energy and material resources, and that govern how plants respond to environmental stimuli.

2. Evolution

- Define biological evolution as changes in the genetic composition of populations over time, and explain the source of genetic variation and the mechanisms by which biological evolution occurs.
- Describe the evidence that living species share a common ancestry that explains the traits of living organisms.

3. Ecology

- Describe the structure and function of ecological systems and explain how ecological systems work at different spatial and temporal scales.
- Relate abiotic and biotic factors to their effects on the distribution, dispersal, and behavior of organisms and on biological diversity and ecological systems in Wisconsin.
- Use ecological vocabulary, concepts, and theories in arguments, explanations, and examples of ecological phenomena, and analyze and interpret ecological information, research, and data

Process and skills-based outcomes (both semesters)

4. Identify and solve scientific problems by developing and testing hypotheses.
5. Practice the practical teamwork, laboratory, and quantitative skills necessary for a professional biologist.
6. Accurately analyze and evaluate scientific literature.
7. Successfully communicate evidence, analyses, and concepts.

- 8.** Describe and utilize conceptual and content connections between biology and other scientific disciplines (e.g., chemistry, geology, math, physics).
- 9.** Explain and assess the biological underpinnings of current societal issues and global citizenship.