

BIOLOGY 311D

INTRODUCTORY BIOLOGY II

Introduction to mechanisms of inheritance and evolution, plant and animal physiology, and species interactions



Big Idea I - EVOLUTION & DIVERSITY

Organisms inherit genes, which are modified by evolutionary processes over time, resulting in the past and present diversity of life on Earth.

- 1 Genetic information is transmitted from generation to generation by mitosis, meiosis and fertilization.
- 2 Phenotypes can be predicted based on Mendelian inheritance and chromosome linkage, and as influenced by environment.
- 3 Microevolution produces changes in allele frequency from one generation to the next. Adaptations are the products of evolution by natural selection.
- 4 Speciation bridges microevolution and macroevolution, occurs when populations become genetically isolated from one another.
- 5 Evolutionary relationships can be depicted using phylogenetic trees.



Big Idea II - PHYSIOLOGY STRUCTURE & FUNCTION

Organisms demonstrate a wide variety of distinct evolutionary adaptations to physiological and environmental challenges

- 6 The evolution of multicellularity and cellular specialization allowed organisms to survive in a range of environments
- 7 Differences between early embryonic cells lead to differential gene expression and development of complex body plans.
- 8 Diverse life cycles and modes of reproduction maximize reproductive success and reflect evolutionary tradeoffs.
- 9 Diverse adaptations maximize ability to acquire energy, exchange resources, and eliminate wastes.
- 10 Plants and animals evolved gas exchange systems to maximize diffusion and to maintain optimal cellular conditions, despite potential wide fluctuations in external environment
- 11 Plants and animals have vascular systems to transport materials from sites of exchange with the environment to sites of exchange with cells.
- 12 Organisms detect, integrate, and coordinate responses to environmental stimuli.
- 13 Cell communication and hormone systems serve to maintain homeostatic environments and coordinate physiology.



Big Idea III - ECOLOGY

Organisms evolve as a result of interactions with one another and with their environment, and these interactions change over time.

- 14 Variations in abiotic and biotic environment determine distributions of organisms and their adaptations.
- 15 Populations are dynamic and limited, varying in size and spatial distribution over time.
- 16 Biological community structure is shaped by diverse interactions among species, including trophic interactions.
- 17 Energy flows through ecosystems, and nutrients cycle within ecosystems and between biotic and abiotic components.
- 18 Human activities have disrupted ecosystems and accelerated the rate of species extinction.

COURSE COMPETENCIES

CONTENT INDEPENDENT

A

Ability to apply the process of science, by practicing observation, hypothesis testing, and experimental design.

B

Ability to use quantitative reasoning, in data analysis and interpretation.

C

Ability to use modeling to describe interactions and predict changes in complex systems.

D

Ability to communicate and collaborate with other disciplines.

E

Ability to understand the relationship between science and society.