

# BI 223 : PRINCIPLES OF BIOLOGY: POPULATIONS

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## Transcript title

Principles of Bio: Populations

## Credits

5

## Grading mode

Standard letter grades

## Total contact hours

70

## Lecture hours

40

## Lab hours

30

## Prerequisites

BI 221.

## Course Description

Introduces fundamental biological concepts and theories about diversity, evolution, and ecology, specifically evolutionary relationship, transformation of energy and matter, information flow, and systems at a population level or above.

## Course learning outcomes

1. Provide morphological, molecular and developmental evidence for the phylogenetic relationships among and between taxonomic groups illustrating the common ancestry of life.
2. Explain how evolutionary, developmental, and environmental processes influence the evolution of structures, functions, and behaviors that impact fitness.
3. Explain how evolutionary processes impact biodiversity.
4. Use mathematical models to describe how populations change through time in relation to biotic and abiotic factors.
5. Describe the interconnectedness of organisms and their environment at different temporal and spatial scales.
6. Describe how the structure and function of organisms influence ecosystems.
7. Construct models explaining flow of energy and cycling of matter in different ecosystems at human and geologic time scales.

## Content outline

1. Fossil evidence for evolution
2. Using of morphology and embryonic developmental evidence to construct phylogenetic hypotheses
3. Using molecular evidence to construct phylogenetic hypotheses
4. Population genetics and Hardy-Weinberg equilibrium model
5. Allele frequency changes and mechanisms of evolution
6. Natural selection
7. Sexual selection

8. Mechanisms of speciation
9. Biodiversity and extinction through time
10. Population growth models
11. Species interactions
12. Concepts of biologic community organization in space and time
13. Biogeography of terrestrial and aquatic communities at global, regional, and local scale
14. Trophic pyramids and energy flow through ecosystem
15. Recycling of matter and nutrients including decomposition
16. Bacterial metabolism and nitrogen cycling
17. Carbon cycle at annual, decadal, and geologic time scales
18. Climate change evidence, models, and predictions

## Required materials

Required textbook (same for all three Principles of Biology courses), access to a computer with internet

## General education/Related instruction lists

- Science Lab