



COURSE OUTLINE

Course Number BIO 102	Course Title General Biology II	Credits 4
Hours: Lecture/Lab/Other 3 lec/3 lab	Co- or Pre-requisite Pre: C or better in BIO 101	Implementation Semester & Year Fall 2022

Catalog description:

Introduces fundamental concepts, principles, and applications of biology. Topics include photosynthesis, plant structure, growth, and reproduction, animal diversity, animal form and function, evolution, population ecology, community ecology, and ecosystem dynamics. Investigative laboratory exercises develop skills in basic techniques and reinforce lecture material. Required for biology majors.

General Education Category:
Goal 3: Science

Course coordinator:
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Required texts & Other materials:

Biology 12th Edition, Urey, Cain, Wasserman, Minorsky, Orr, 2020, Pearson
ISBN: 9780135188743

Course Student Learning Outcomes (SLO):

Upon successful completion of this course the student will be able to:

1. Examine the diversity of life and explain the biological processes that link them together. [Supports ILG #1, 3, 4, 10, 11 and PLO #1, 2, 3, 4, 5]
2. Apply concepts of biological evolution to all course topics. [Supports ILG #1, 3, 4, 10, 11 and PLO #1, 2, 3, 4, 5]
3. Describe the process of photosynthesis and develop an understanding of its role for supporting life. [Supports ILG #1, 3, 4, 10, 11]
4. Examine plant diversity and explain the process of photosynthesis, nutrient uptake, reproduction, and adaptation to the environment. [Supports ILG #1, 3, 4, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]
5. Examine animal diversity and explain how structure and function regulate bioenergetic, physiological, and behavioral processes. [Supports ILG #1, 2, 3, 4, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]
6. Describe the early conditions of Earth and investigate key events that shaped the evolutionary pathways of modern organisms. [Supports ILG #1, 3, 4, 5, 7, 8, 9, 10, 11 and PLO #1, 2, 3, 4]
7. Develop an understanding of Earth's biomes and describe how climate and disturbance shape them. [Supports ILG #1, 3, 4, 8, 9, 10, 11 and PLO #1, 2, 3, 4]
8. Explore ecological principals that link individuals at populations and community levels. [Supports ILG #1, 2, 3, 4, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]
9. Investigate the effects humans are having on disrupting energy flow and geochemical cycles through ecosystems. [Supports ILG #1, 2, 3, 4, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]

Program Learning Outcomes (PLO)

1. Demonstrate understanding of the fundamental principles, concepts, and terminology of biology.
2. Explain structures and fundamental processes of life at molecular, cellular, and organismal levels.
3. View the living world with greater understanding, insight, and appreciation as it relates to the field of biology and contemporary problems and issues.
4. Demonstrate the ability to apply the scientific method of inquiry to gather and use information for the purposes of critical thinking, information analysis, and problem solving.
5. Exhibit proficiency in the laboratory and in the field by using standard equipment and measurement and observation techniques that allow one to gather, analyze, and interpret qualitative data.

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 8. Diversity and Global Perspective: Students will understand the importance of a global perspective and culturally diverse peoples.

Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.

Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of Study in Detail – Unit Student learning Outcomes:

Unit I Photosynthesis [Supports SLO #1, 2, 3, 4, 6, 7, 8, 9]

Learning Objectives

The student will be able to:

- Understand how photosynthesis converts light energy to the chemical energy of food.
- Identify the nature of sunlight and photosynthetic pigments.
- Learn alternative mechanisms of carbon fixation and why they have evolved in hot, arid climates.

Unit II Plant Structure, Growth, and Development [Supports SLO #1, 2, 3, 4, 6, 7, 8, 9]

Learning Objectives

The student will be able to:

- Identify the organs, tissues, and cells of a plants body.
- Discuss the mechanism as to how meristems generate cells for new organs.
- Learn how primary growth lengthens roots and shoots.
- Learn how secondary growth adds girth to stems and roots in woody plants.

Unit III Soil and Plant Nutrition [Supports SLO #1, 2, 3, 4, 6, 7, 8, 9]

Learning Objectives

The student will be able to:

- Explain how soil is a living, finite resource.
- Discuss the essential elements plants require to complete their life cycle.
- Learn how plant nutrition involves relationships with other organisms.

Unit IV Angiosperm Reproduction and Biotechnology [Supports SLO #1, 2, 3, 4, 6, 7, 8, 9]

Learning Objectives

The student will be able to:

- Describe how flowers, double fertilization, and fruits are unique features of the angiosperm life cycle.
- Learn how flowering plants reproduce sexually, asexually, or both ways.
- Discuss how humans modify crops by plant breeding and genetic engineering.

Unit V An Overview of Animal Diversity [Supports SLO #1, 2, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Discuss how animals are multicellular, heterotrophic eukaryotes with tissues that develop from embryonic layers.
- Identify characteristics of animals.
- Describe features of animal body plans.

Unit VI Invertebrates [Supports SLO #1, 2, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Identify organisms that are grouped as invertebrates.
- Describe body plan, characteristics, and life cycles of the phyla Porifera, Cnidaria, Platyhelminthes, Rotifera, Nemertea, Mollusca, Annelida, Nematoda, Arthropoda, and Echinodermata.
- Identify the characteristics that group echinoderms and chordates as deuterostomes.

Unit VII Vertebrates [Supports SLO #1, 2, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Describe body plan, characteristics, and life cycles of the phylum Chordata and subphylum Vertebrata.
- Describe the characteristics of vertebrates divided into the groups of craniates and gnathostomes.
- Describe the characteristics of vertebrates divided into the groups of tetrapods and amniotes
- Identify unique characteristics of animals that fit the categories of mammals, primates, and humans.

Unit VIII Basic Principles of Animal Form and Function [Supports SLO #1, 2, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Describe how animal form and function are correlated at all levels of organization.
- Discuss how feedback control loops maintain the internal environment in many animals
- Identify how the homeostatic process for thermoregulation involves form, function, and behavior.
- Explain how energy requirements are related to animal size, activity, and environment.

Unit IX The History of Life on Earth [Supports SLO #1, 2, 3, 4, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Describe how the conditions on early Earth made the origin of life possible.
- Discuss how the fossil record documents the history of life.
- Define the key events in life's history including the origins of single-celled and multi-celled organisms.
- Identify how major changes in body form can result from changes in developmental genes.
- Discuss the idea that evolution is not goal oriented.

Unit X An Introduction to Ecology and the Biosphere [Supports SLO #1, 2, 3, 4, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Discuss how ecology integrates all areas of biological research and informs environmental decision-making.
- Identify how interactions between organisms and the environment limit the distribution of species.
- Describe the aquatic biomes and discuss why they are diverse and dynamic systems that cover most of the earth.
- Describe the structure and distribution of terrestrial biomes and how they are controlled by climate and disturbance.

Unit XI Population Ecology [Supports SLO #1, 2, 3, 4, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Determine the dynamic biological processes that influence population density, dispersion, and demographics.
- Explain how life history traits are products of natural selection.
- Discuss how the exponential model describes population growth in an idealized, unlimited environment.
- Demonstrate how the logistic model describes how a population grows more slowly as it nears the carrying capacity.
- Identify the factors that regulate population growth that are density dependent and density independent
- Discuss how the human population is no longer growing exponentially but it is still increasing rapidly and how this impacts the environment.

Unit XII Community Ecology [Supports SLO #1, 2, 3, 4, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Explain community interactions and how they are classified by whether they help, harm, or have no effect on the species involved.
- Discuss why dominant and keystone species exert strong controls on community structure.
- Explain how disturbance influences species diversity and composition.
- Determine the biogeographic factors that affect community biodiversity.
- Identify how community ecology is useful for understanding pathogen life cycles and controlling human disease.

Unit XIII Ecosystems [Supports SLO #1, 2, 3, 4, 5, 6, 7, 9]

Learning Objectives

The student will be able to:

- Describe the physical laws that govern energy flow and chemical cycling in ecosystems.
- Identify limiting factors that control primary production in ecosystems.
- Discuss energy transfer between trophic levels and why it is typically only 10% efficient
- Explain the biological and geochemical processes, which cycle nutrients between organic and inorganic parts of an ecosystem.
- Explain how human activities now dominate most chemical cycles on earth.

Evaluation of student learning:

Questions on exams are from lecture, lecture assignments, reading assignments, handouts, or other material presented. It is the student's responsibility to be present and on time for all exams. Absence constitutes a zero score on any missed exam. Each exam can be taken one time only and there normally will be no make-ups. In the case of an emergency, the student must contact the instructor within 24 hours. Grades are based on the total accumulation of earned points. All exams covering the lecture and textbook material, homework, in-class graded activities, all laboratory quizzes, lab reports and lab practicals contribute to the total number of possible points.

Assignment	Number @ point value	Total Point Value
Lecture Quizzes	10 @ 10 points	100 points
Lecture Tests	3 @ 100 points each	300 points
Homework Assignments	5 @ 10 points each	50 points
Biomes Writing Assignment	50 points	50 points
Lab Reports	8 @ 5 points each	40 points
Lab Quizzes	8 @ 10 points each	80 points
Lab Practical	2 @ 50 points each	100
TOTAL POINTS		720 points
Final Grade =	25% of Lab Points + 75% of Lecture points / 430	

A	93-100%	B+	87-89%	C+	77-79%	D	60-69%
A-	90-92	B	83-86	C	70-76	F	<60%
		B-	80-82				