

Virginia Western Community College

BIO 102

General Biology II

Prerequisites

A passing grade of D or higher in BIO 101 or equivalent.

Course Description

Focuses on diversity of life, anatomy and physiology of organisms, and ecosystem organization and processes in an evolutionary context. Explores the core concepts of evolution; structure and function; information flow, storage and exchange; pathways and transformations of energy and matter; and systems biology. Emphasizes process of science, interdisciplinary approach, and relevance of biology to society. Explores fundamental characteristics of living matter from the molecular level to the ecological community with emphasis on general biological principles. Introduces the diversity of living organisms, their structure, function, and evolution. Part II of II.

Semester Credits: 4

Lecture Hours: 3

Laboratory Hours: 3

Required Materials

Textbooks:

Campbell Biology in Focus. Urry, Cain, Wasserman, Minorsky & Reece. 2nd Edition. Pearson Publishing.
ISBN: 9780134433769

Exploring Biology in the Laboratory Core Concepts. Pendarvis & Crawley. Custom Edition. Morton Publishing.
ISBN: 9781617316371

Course Outcomes

At the completion of this course, the student should be able to:

- Demonstrate an understanding of the diversity of animal life, both invertebrate and vertebrate.
- Demonstrate a knowledge of the basic morphology, physiology, and evolution of the organ systems of animals, with emphasis on human anatomy and physiology, including respiration, circulation, digestion, endocrine, excretion and the reproductive system. While the emphasis will be on the human body, adaptations characteristic of other types of animals will also be discussed.
- Demonstrate a basic understanding of ecological concepts, such as biomes, population ecology, communities, ecosystems, and behavior.
- Demonstrate a knowledge of ecosystem energetics and man's impact on ecosystems.
- Demonstrate knowledge of the concepts of evolution, natural selection and the origin of species.

Topical Description

Animal Diversity

Chapter 33: Animal Diversity and the Evolution of Body Plans

- What is an Animal?
 - Differentiate between a pseudocoelom and a coelom
 - Explain the difference between protostomes and deuterostomes
 - Explain the evolution of the animal body plan in terms of symmetry, tissues and organ systems
 - Identify the characters that distinguish the major phyla
 - Identify the placement of humans among the animal phyla
- Phylum Porifera
 - Describe the different types of cell in the sponge body and their function
- Phylum Cnidaria
 - Explain the defining features of cnidarians

Chapter 34: Protostomes

- Phylum Platyhelminthes
 - List the distinguishing features of flatworms
- Phylum Mollusca
 - List the defining features of phylum Mollusca
 - Describe representatives of the 4 best-known groups of mollusks
- Phylum Annelida
 - Explain how circular and longitudinal muscles in a segmented body facilitate movement
 - Distinguish between polychaetes, earthworms, and leeches
- Phylum Nematoda
 - Describe how musculature relates to the characteristic movement of nematodes
 - Explain the life cycle of a nematode and how it produces disease in humans
- Phylum Arthropoda
 - Name 4 key features of arthropods
 - Describe advantages and disadvantages of an exoskeleton
 - Describe key differences in and list examples of the 4 classes of arthropods
 - Describe ecological roles of key examples of arthropods

Chapter 35: Deuterostomes

- Phylum Echinodermata
 - List the specific characteristics of echinoderms
 - Describe the five classes of and list examples from the five classes of echinoderms
- Nonvertebrate chordates
 - Describe the nonvertebrate chordates and their characteristics
- Vertebrate chordates
 - Distinguish vertebrates from other chordates
 - Describe the major groups of fishes and the evolutionary innovations of fishes

- Describe the characteristics and major groups of amphibians
- Explain the challenges of moving from an aquatic to a terrestrial environment and how various vertebrate groups have dealt with these challenges
- Describe the characteristics of reptiles and compare examples of the major groups of reptiles
- Explain the significance of the evolution of the amniotic egg
- Name the key characteristics of birds
- Explain why some consider birds to be one type of reptiles
- Describe the characteristics of mammals and compare the 3 living groups

Animal Organs and Organ Systems

Chapter 42: The Animal Body and Principles of Regulation

- Organization of the Vertebrate Body
 - List the levels of organization in the vertebrate body
 - Identify the types of tissues found in vertebrates – the following animal tissues should be included, along with their characteristic structures and their functions
 - Epithelial Tissue – Simple Versus Stratified, Squamous, Cuboidal, Columnar
 - Connective Tissue – Blood, Adipose, Dense Fibrous (Ligaments and Tendons), Hyaline Cartilage, Bone
 - Muscle Tissue – Skeletal, Cardiac, and Smooth (Visceral)
 - Nervous Tissue
- Overview of Organ Systems – identify and explain overall functions
- Homeostasis – describe what this is and explain how it works in the human body, in particular temperature regulation

Chapter 47: The Digestive System

- Obtaining and Processing Food
- Human Digestive System
- Comparisons among Animals

Chapter 48: The Respiratory System

- Mechanisms of Gas Exchange
- Comparison among Animals
- Transport of Gases in the Human Body

Chapter 49: The Circulatory System

- Structure and Function of Blood
- Invertebrate and Vertebrate Circulatory Systems
- The Human Cardiovascular System
 - Blood Vessels – Arteries, Veins, and Capillaries
 - Blood Pressure
 - Cardiovascular Disease

Chapter 50: Osmotic Regulation and the Urinary System

- Comparisons among Animals
- The Vertebrate Kidney
- The Mammalian Kidney

Chapter 46: The Musculoskeletal System

- Types of Skeletons
- The Structure of Bone
- Joints and Skeletal Movement
- Muscle Contraction

Chapter 52: The Reproductive System

- Animal Reproductive Strategies
- Vertebrate Fertilization and Development
- Structure and Function of Human Male Reproductive System
- Structure and Function of Human Female Reproductive System

Chapter 53: Animal Development

- Fertilization
- Cleavage and the Blastula Stage
- Gastrulation
- Organogenesis
- Human Development

Chapter 51: The Immune System

- Innate Defenses against Infection
 - Intact Skin and Phagocytes
- Acquired Immunity
 - Antigens
 - Cell Mediated Immunity
 - Humoral Immunity and Antibody Protection
 - Autoimmunity and Hyper sensitivity
 - Antibodies and ABO Blood Typing
 - Defeating Vertebrate Defenses – HIV

Chapter 45: The Endocrine System

- Regulation of Body Processes by Chemical Messengers
- The Pituitary and Hypothalamus and their Hormones
- The Major Peripheral Endocrine Glands and their Hormones

Chapter 43: The Nervous System

- Nervous System Structure and Function
- Nerve Signals and Their Transmission

EcologyChapter 56: Community Ecology

- Biological Communities; Species Living Together
- The Ecological Niche Concept
- Predator-Prey Relationships
- The many types of Species Interactions
- Ecological Succession, Disturbance and Species Richness

Chapter 57: Dynamics of Ecosystems

- Biogeochemical Cycles
- The Flow of Energy in Ecosystems
- Trophic-Level Interactions
- Biodiversity and Ecosystem Stability

Chapter 58: The Biosphere

- Ecosystem Effects of Sun, Wind and Water
- Earth's Biomes
- Freshwater Habitats
- Marine Habitats
- Human Impacts on the Biosphere: Pollution and Resource Depletion
- Human Impacts on the Biosphere: Climate Change

Chapter 59: Conservation Biology

- Overview of the Biodiversity Crisis
- The Value of Biodiversity
- Factors Responsible for Extinction
- Approaches for Preserving Endangered Species and Ecosystems

Notes to Instructors

1. Comprehensive study of the listed topics is beyond the reasonable expectations of a 15-week Biology 102 course. It is up to the discretion of the instructor to choose which topics are more detailed but each topic should be adequately covered.
2. Additional topics to be covered at Instructor's discretion include:
 - a. Chapter 20 Genes Within Populations
 - b. Chapter 22 The Origin of Species
 - c. Chapter 23 Systematics

Laboratory Schedule

<u>Week</u>	<u>Lab</u>	<u>Lab Exercises</u>
1		
2	Animal Diversity Week # 1	26 & 27
3	Animal Diversity Week # 2	28 & 29
4	Animal Diversity Week # 3	30 & 31
5	Lab Practical # 1	
6	Animal Organization (Tissues) Fetal Pig Week # 1	33.1 34.1
7	Fetal Pig Week # 2 Human Circulation	35.1-5 40
8	Fetal Pig Week # 3 Human Skeletal System	36.1-2 39.1
9	Lab Practical # 2	
10	Animal Development	42 & 43
11	The Immune System	
12	Animal Diversity Presentations	
13	Field Trip – Forest Ecology	45
13/14	OR Field Trip – Crystal Spring Filtration Plant	
14	Field Trip – Stream Ecology	
15	Lab Practical # 3	