

Virginia Western Community College

BIO 141

Human Anatomy and Physiology I

Prerequisites

BIO 101 or high school Biology within the past 5 years; an ENG 111 placement recommendation, co-enrollment in ENF 3/ENG 111, or successful completion of all developmental English requirements.

Course Description

Integrates anatomy and physiology of cells, tissues, organs, and systems of the body. Integrates concepts of chemistry, physics and pathology. The course is designed to give the student a detailed, accurate, and up-to-date understanding of the structure and the function of the human body. In Biology 141, the science of anatomy and physiology is introduced on a molecular/cellular level. The tissues of the human body are then studied, followed by organ systems, which are composed of unique tissues. The organ systems covered in this course are the integumentary, skeletal, muscular, and nervous systems. The course also presents the mechanisms of disease, diagnostic techniques, and some therapeutic measures. The course is primarily for health sciences students but is designed so that it provides a good basic background for students in a variety of curricula.

Semester Credits: 4

Lecture Hours: 3

Laboratory Hours: 3

Required Materials

Textbook Bundle:

1) Human Anatomy & Physiology, E.N. Marieb, 10th ed., Pearson Publishing; 2) Human Anatomy & Physiology Laboratory Manual, Cat Version with PhysioEx 9.1, E.N. Marieb, 12th ed., Pearson Publishing.; 3) Photographic Atlas for Anatomy & Physiology, Hebert and Heisler, Pearson Publishing.; 4) Brief Atlas of the Human Body, E.N. Marieb, Pearson Publishing.; 5) Mastering A&P website. *NOTE: These materials are bundled together under one ISBN. ISBN: 9780134730240.

Other Required Materials:

Safety Goggles for Lab

Course Outcomes

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

- Obtain a basic background in anatomy and physiology on a cellular, histological, and gross level.
- Determine the nature of disease, explain various diagnostic techniques, and therapeutic measures for disease control.
- Develop a greater appreciation of the human body, of physiological and anatomical concepts, and of the scientific method.

- Develop abilities in dissection, experimentation, use of equipment, observation, recording of data, and organization and interpretation of results in a scientific manner.
- Best achieve their learning potential, exercise their independence and creativity, and further develop confidence in their scientific ability.

Topical Description

Chapter 1: Introduction to Anatomy and Physiology

- Different approaches to their study, how their coordination supports homeostasis
- Structural levels of the body
- Organ systems
- Anatomical terminology

Chapter 2: Chemistry

- Structure of matter
- How atoms combine
- Chemical reactions
- Properties of water
- Acids and bases
- Important organic compounds: carbohydrates, fats, proteins, nucleic acids, ATP

Chapter 3: The Cell

- Cell Membranes
- Structure
 - Movement through cell membranes
 - Organelles
- Nucleus
- Cell cycle
- Protein synthesis
- Cell differentiation
- Cell aging
- Abnormal cells (cancer)

Chapter 4: Tissues

- Epithelial
 - General characteristics
 - Classification
- Connective tissue (CT)
 - Matrix
 - CT Proper
 - Specialized CT
- Muscle tissue
- Nervous tissue
- Membranes

Chapter 5: The Integumentary System

- Skin
 - Epidermis
 - Dermis
 - Hypodermis
 - Color
 - Wound healing
- Glands of the skin
 - Sweat
 - Oil
- Hair
- Nails
- Effects of aging on skin

Chapter 6: The Skeletal System I

- Types of Bones
- Gross Anatomy of a Bone
- Bone as a tissue
- Microanatomy of bone tissue cells
- Bone development
 - Endochondral
 - Intramembranous
- Bone modeling and remodeling
- Homeostasis and physiological function of bones
- Effects of aging on bones
- Nature and recovery of fractures

Chapter 7: The Skeletal System II

- Skull
 - Paranasal sinuses
 - Bones of Face
 - Bones of Cranium
 - The Vertebral Column
 - The Thorax
- The Appendicular Skeleton
 - Pectoral girdle
 - Bones of arm, forearm and hand
 - Pelvic girdle
 - Bones of the thigh, leg and foot

Chapter 8: Articulations

- Fibrous joints
- Cartilaginous joints
- Synovial joints
 - Structure
 - Types
 - Movements

- Aging and Pathology

Chapter 9: Muscular Tissue

- Skeletal muscle
 - Cell structure
 - Connective tissue association
 - Blood supply
 - Nerve supply
 - Muscle contraction
 - Energy
 - Types of contractions
 - Types of fibers
- Smooth muscle
- Cardiac muscle (discussed with heart)

Chapter 10: The Muscular System

- Attachments
- Actions
- Principal muscles whose action affects:
 - Facial expression
 - Mastication
 - Head and neck
 - Back (vertebral column)
 - Trunk
 - Upper extremity
 - Lower extremity

Chapter 11: Nervous Tissue

- Organization of the nervous system
- Anatomy of a nerve
- Physiology of a nerve
- Associated cells of the nervous system
- Neuronal circuits

Chapter 12: The Brain and Cranial Nerves

- The meninges
- The ventricles and cerebrospinal fluid
- Nutrition of the brain
- Brainstem
- Cerebellum
- Diencephalon
- Cerebrum
- Cranial Nerves I to XII

Chapter 13: The Spinal Cord and Peripheral Nervous System

- Basic anatomy, including sensory receptors and spinal nerves and plexuses
- Functional pathways
- Spinal reflexes

Chapter 14: The Autonomic Nervous System

- Central control
- Sympathetic division
- Parasympathetic division
- Functions of the ANS
- Stress (as it relates to ANS)

Chapter 15: The Special Senses

- Sensory reception
- General senses: touch, temperature, pain
- Specific senses: taste, smell, vision, audition, equilibrium
- Sensory pathways

Laboratory Topics

- Week 1: Introduction
- Week 2: The Microscope
The Cell
- Week 3: Classification on Tissues, Epithelial
- Week 4: Classification of Tissues, Connective, Muscle, and Nervous
- Week 5: Lab Practical 1
- Week 6: Overview of the Skeleton: Classification of Bones
The Axial Skeleton (Skull)
- Week 7: The Axial Skeleton (Vertebrae and Bony Thorax)
- Week 8: Lab Practical 2
- Week 9: Anatomy of the Muscular System
- Week 10: Anatomy of the Muscular System
- Week 11: Lab Practical 3
- Week 12: Anatomy of Brain and Cranial Nerves
- Week 13: Spinal Cord and Nerves
Human Reflex Physiology
- Week 14: Special Senses: The Eye and the Ear
- Week 15: Lab Practical 4

Notes to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final exam counting 15%-20% of the total grade will be given at the end of the semester.
3. The syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.