Virginia Western Community College
BIO 142
Human Anatomy and Physiology II

Prerequisites

BIO 141 or equivalent: 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. This course is the second of a two-semester sequence. Organ systems covered in both the lecture and laboratory portions of the course include the endocrine, hematopoietic, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems. Fluid, electrolyte, and acid-base balance is also covered.

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 bundle 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:

- Understand the structure and function of the organ systems covered, and be able to integrate anatomy and physiology of each system.
- Understand some pathological conditions of systems studied.
- Relate anatomy and physiology of organ systems covered to clinical situations.
- Correctly identify gross and microscopic specimens in the lab and understand principles of physiology studied in lab.

Topical Description

Chapter 16: The Endocrine System (Weeks 1 and 2)

- Overview
- Chemistry of hormones
- Mechanisms of hormone action
- Target cell specificity
- Half-Life, onset, and duration of hormone activity
- Interaction of hormones at target cells
- Control of hormone release
- Pituitary-Hypothalamic relationships
- Thyroid gland
    - Location and structure
    - Thyroid hormone
    - Calcitonin
- Parathyroid glands
- Adrenal glands
    - Adrenal Cortex
    - Adrenal Medulla
- Pineal gland
- Other endocrine glands and tissues
    - Pancreas
    - Gonads
    - Hormone secretion by other organs

Chapter 17: Blood (Weeks 3 and 4)

- Overview
    - Components
    - Physical characteristics and volume
    - Functions
- Blood Plasma
- Formed elements
- Hemostasis
    - Vascular spasm
    - Platelet plug formation
    - Coagulation
    - Clot retraction and repair
    - Fibrinolysis
    - Factors limiting clot growth or formation
    - Disorders of hemostasis
- Transfusion and blood replacement
- Diagnostic blood tests

Chapter 18: Cardiovascular System: The Heart (Weeks 4 and 5)

- Heart anatomy
  - Size, location, and orientation
  - Coverings of the heart
  - Layers of the heart wall
  - Chambers and associated great vessels
  - Pathway of blood through the heart
  - Coronary circulation
  - Heart valves
- Cardiac muscle fibers
  - Microscopic anatomy
  - Mechanism and events of contraction
  - Energy requirements
- Heart Physiology
  - Electrical events
  - Heart sounds
  - Mechanical events: cardiac cycle
  - Cardiac output

Chapter 19: Cardiovascular System: Blood Vessels (Week 6 and 7)

- Structure of blood vessel walls
- Arterial system
  - Elastic arteries
  - Muscular arteries
  - Arterioles
- Capillaries
  - Types of capillaries
  - Capillary beds
- Venous system
  - Venules
  - Veins
- Introduction to blood flow, blood pressure, and resistance
  - Definition of terms
  - Relationship between flow, pressure, and resistance
- System blood pressure
  - Arterial blood pressure
  - Capillary blood pressure
  - Venous blood pressure
- Maintaining blood pressure
  - Short-term mechanisms: neural and hormonal controls
  - Long-term mechanisms: renal regulation
  - Monitoring circulatory efficiency
  - Alterations in blood pressure
- Blood flow through body tissues: Tissue Perfusion
  - Blood flow through capillaries and capillary dynamics
  - Circulatory shock
- Circulatory pathways: blood vessels of the body

- Pulmonary and systemic circulations
- Aorta and major arteries systemic circulation
- Arteries of head and neck
- Arteries of upper limbs and thorax
- Arteries of abdomen
- Arteries of pelvis and lower limbs
- Venae Cavae and major veins of systemic circulation
- Veins of head and neck
- Veins of upper limbs and thorax
- Veins of abdomen
- Veins of pelvis and lower limbs
- Atherosclerosis

Chapter 20: Lymphatic System and Lymphoid Organs and Tissues (Week 7)

- Lymphatic vessels
  - Distribution and structure of lymphatic vessels
  - Lymph transport
- Lymphoid cells and tissues
- Lymph nodes
  - Structure of the lymph node
  - Circulation of the lymph node
- Other lymphoid organs
  - Spleen
  - Thymus
  - Tonsils
  - Aggregates of lymphoid follicles

Chapter 22: Respiratory System (Weeks 8 and 9)

- Functional anatomy of respiratory system
  - Nose and paranasal sinuses
  - Pharynx
  - Larynx
  - Trachea
  - Bronchi and subdivisions
  - Lungs and Pleurae
- Mechanics of breathing
  - Pressure relationships in thoracic cavity
  - Pulmonary ventilation
  - Physical factors influencing pulmonary ventilation
  - Respiratory volumes and pulmonary function tests
- Gas exchange between blood, lungs, and tissues
  - Basic properties of gases
  - Composition of Alveolar gas
  - External respiration
  - Internal respiration
- Transport of respiratory gases by blood
  - Oxygen transport

    - Carbon dioxide transport
- Control of respiration
    - Neural mechanisms
    - Factors influencing breathing rate and depth
- Respiratory adjustments
    - Exercise
    - High altitudes
- Homeostatic imbalances of the respiratory system
    - Chronic obstructive pulmonary disease
    - Asthma
    - Tuberculosis
    - Lung cancer

Chapter Digestive System (Weeks 10 and 11)

- Digestive processes and basic functional concepts
- Digestive system organs: relationship
    - Relationship to the Peritoneum
    - Blood supply
    - Histology of Alimentary Canal
    - Enteric nervous system of the Alimentary Canal
- Mouth and associated organs
    - Mouth
    - Tongue
    - Salivary glands
    - Teeth
- Pharynx
- Esophagus
- Digestive processes: Mouth to Esophagus
    - Mastication and deglutition
- Stomach
    - Gross and microscopic anatomy
    - Digestive processes
- Small intestine and associated structures
    - Small intestine
    - Liver and Gallbladder
    - Pancreas
    - Regulation of bile and pancreatic secretion and entry into small intestine
    - Digestive process occurring in the small intestine
- Large intestine
    - Gross and microscopic anatomy
    - Bacterial Flora
    - Digestive processes occurring in the large intestine
- Chemical digestion
    - Mechanism of chemical digestion: enzymatic hydrolysis
    - Chemical digestion of carbohydrates, proteins, lipids, and nucleic acids
- Absorption
    - Carbohydrate, protein, lipid, nucleic acid absorption

- Vitamin and electrolyte absorption
- Water absorption
- Malabsorption of nutrients

Chapter 25: Urinary System (Week 12)

- Kidney Anatomy
  - Location and external anatomy
  - Internal anatomy
  - Blood and nerve supply
  - Nephrons
- Kidney physiology: mechanisms of urine formation
  - Glomerular filtration
  - Tubular reabsorption
  - Tubular secretion
  - Regulation of urine concentration and volume
- Urine
  - Physical characteristics
  - Chemical composition
- Ureters
- Urinary bladder
- Urethra
- Micturition

Chapter 26: Fluid, Electrolyte, and Acid-Base Balance (Week 13)

- Body fluids
  - Body water content
  - Fluid compartments
  - Composition of body fluids
  - Fluid movement among compartments
- Water balance and ECF osmolality
  - Regulation of water intake
  - Regulation of water output
  - Influence of ADH
  - Disorders of water balance
- Electrolyte balance
  - Central role of sodium
  - Regulation of sodium balance
  - Regulation of potassium balance
  - Regulation of calcium balance
- Acid-Base balance
  - Chemical buffer systems
  - Respiratory regulation of H+
  - Renal mechanisms of acid-base balance
  - Abnormalities of acid-base balance
- Sleuthing: using blood values to determine the cause of acidosis or alkalosis

Chapter 27: The Reproductive System (Weeks 14 and 15)

- Anatomy of the male reproductive system
  - Scrotum
  - Testes
  - Penis
  - Male duct system
  - Accessory glands
  - Semen
- Physiology of the male reproductive system
  - Spermatogenesis
  - Hormonal regulation of male reproductive function
- Anatomy of the female reproductive system
  - Ovaries
  - Female duct system
  - External genitalia and female perineum
  - Mammary glands
- Physiology of female reproductive system
  - Oogenesis
  - Ovarian cycle
  - Hormonal regulation of ovarian cycle
  - Uterine (menstrual) cycle
  - Effects of estrogen and progesterone

Laboratory Topics

Week 1: Endocrine System Physiology
Week 2: Histology of Endocrine System or Endocrine Case Studies
Week 3: Blood
Week 4: Anatomy of the Heart
Week 5: Cardiovascular Dynamics and Cardiovascular Physiology
Week 6: Lab Practical 1
Week 7: Anatomy of Blood Vessels
Week 8: Respiratory System Mechanics
Anatomy of the Respiratory System
Week 9: Anatomy of the Digestive System
Week 10: Dissection of the Cat
Week 11: Lab Practical 2
Week 12: Anatomy of the Urinary System
Week 13: Renal Physiology
Week 14: Anatomy of the Reproductive System
Dissection of the Cat
Week 15: Lab Practical 3

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.