

University of Arkansas – Fort Smith  
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## General Syllabus

### BIOL 2213 Human Physiology

Credit Hours: 3                      Lecture Hours: 3                      Laboratory: 0

Prerequisite: BIOL 2203/2201 Human Anatomy/ Lab

Prerequisite or corequisite: BIOL 2211 Human Physiology Laboratory

Effective Catalog: 2018- 2019

#### I. Course Information

##### A. Catalog Description

Provides students with an understanding of the function of the human body. Emphasis will be placed on the integration and regulation of various organ systems. Course content will include neural and hormonal homeostatic control mechanisms, as well as study of the musculoskeletal, circulatory, respiratory, digestive, urinary, immune, reproductive, and endocrine organ systems. (ACTS: BIOL 2414; must complete BIOL 2213/2211)

##### B. Additional Information - None

#### II. Student Learning Outcomes

##### A. Subject Matter

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

1. Explain physiological processes of all body systems in detail and on an appropriate level (knowledge, comprehension, application and analysis.)
2. Explain the role of body systems and mechanisms in maintaining homeostasis.
3. Explain how the activities of organs are integrated.

##### B. University Learning Outcomes

This course enhances student abilities in the following areas:

##### **Analytical Skills**

**Critical Thinking Skills:** Student will solve problems by integrating knowledge of the physiology of cells, tissues, organs, organ systems, to the organism as a whole.

### **Ethical Decision Making**

Students will reflect upon dilemmas of moral principles, values and judgments that apply to the ethical practice of medicine.

## **III. Major Course Topics**

- A. Homeostasis
  - 1. Enzymatic regulation
  - 2. Cell-to-cell communication
  - 3. Signal molecules
  - 4. Signal pathways
  - 5. Modulation of signal pathways
  - 6. Homeostatic reflex pathways
  - 7. Homeostatic control of metabolism by availability of energy
- B. Membrane Functions
  - 1. Osmosis and tonicity
  - 2. Membrane transport mechanisms
  - 3. Epithelial transport
  - 4. Resting membrane potential
- C. Neurophysiology
  - 1. Graded ion potential
  - 2. Initiation of an action potential
  - 3. Gated ion channels and the action potential
  - 4. Refractory periods
  - 5. Strength and speed of conduction
  - 6. Synaptic transmission
  - 7. Synaptic modulation
  - 8. Brain function
- D. Autonomic Regulation
  - 1. Differences between the somatic and autonomic nervous system pathways, signal molecules, receptors, pathways, and effects
  - 2. Differences between the sympathetic and parasympathetic nervous system pathways, signal molecules, receptors, pathways, and effects
  - 3. Autonomic reflexes
- E. Senses
  - 1. Sensory transduction of the various senses
  - 2. Receptor potentials
  - 3. Sensory integration
- F. Muscle Physiology
  - 1. Signal transmission at the neuromuscular junction
  - 2. Excitation-contraction coupling
  - 3. Cross-bridge formation
  - 4. Relaxation
  - 5. Fatigue
  - 6. Force of contraction

7. Single-unit vs. multi-unit smooth muscles
  8. Initiation of contraction of smooth muscles
  9. Differences among cardiac, smooth, and skeletal muscle physiology
- G. Cardiac Physiology
1. Pressure, volume, flow, and resistance related to blood
  2. Blood flow through the heart
  3. Pacemaker potential and heart rate
  4. Normal electrocardiogram
  5. Cardiac cycle
  6. Stroke volume and cardiac output
  7. Regulation of the heart rate and force of contraction
  8. Factors affecting preload and afterload
- H. Vascular Physiology
1. Cardiac output and peripheral resistance effects on mean arterial blood pressure
  2. Blood volume and blood pressure
  3. Regulation of resistance in arterioles regulation blood pressure
  4. Regulation of cardiovascular function
  5. Capillary exchange
  6. Lymphatic resorption
- I. Blood
1. Hematopoiesis
  2. Hemostasis and coagulation
- J. Respiratory Physiology
1. Gas laws and ventilation
  2. Airway resistance and ventilation
  3. Partial pressure and gas exchange in the lungs
  4. Gas transport in the blood
  5. Regulation of ventilation
- K. Renal Physiology
1. Renal filtration and GFR
  2. Reabsorption and secretion at the nephron
  3. Countercurrent multiplier and exchange system at the nephron
  4. Fluid, electrolyte, and acid-base balance
- L. Immune System
1. Innate (nonspecific) immune responses
  2. Acquired (antigen-specific) T and B cell immune responses
- M. Digestive Physiology
1. GI motility
  2. Regulation of the GI function
  3. Cephalic, gastric, and intestinal phases of digestion
- N. Hormones
1. Hormones as signal molecules
  2. Control of hormone release
  3. Hormone interactions
  4. Glucose regulation
  5. Hypothalamic control of homeostasis through the endocrine system

6. Pituitary, thyroid, and adrenal hormones and regulation
- O. Reproductive Physiology
  1. Sperm and egg production
  2. Procreation
  3. Hormonal regulation of reproduction
  4. Fertilization