

# BIOL 0006 - HUMAN PHYSIOLOGY

## Catalog Description

Prerequisite: Completion of CHEM 2A or 1A or 3A/3B; AND BIOL 5 or 7A/7B or 55 with grades of "C" or better

Advisory: Completion of MATH D with grade of "C" or better; completion of a non-majors general biology course with grade of "C" or better; and eligibility for ENGL 1A

Hours: 126 (72 lecture, 54 laboratory)

Description: Study of the physiology, integration, and homeostasis of the human body from chemical through organism levels. Organ systems covered are integumentary, muscular, nervous, sensory, cardiovascular, lymphatic and immune, respiratory, urinary, digestive, endocrine, and reproductive system. Experiments using living and non-living models are performed in lab using methods of data acquisition, recording systems, and analysis of data. Primarily intended for Nursing, Allied Health, Kinesiology, and other health or life science majors. (C-ID BIOL 120B) (CSU, UC-with unit limitation)

## Course Student Learning Outcomes

- CSLO #1: Identify the functions of the human organ systems and describe the physiological mechanisms underlying their operation from the chemical through systems levels of organization.
- CSLO #2: Apply the processes of homeostatic and feedback control mechanisms to explain how the various organ systems are regulated and integrated to maintain homeostasis between organ systems and the body as a whole.
- CSLO #3: Identify metabolic and physiological changes that occur in the human body systems as a result of disease, genetics, injury, or aging.
- CSLO #4: Collect, analyze, and interpret experimental data to demonstrate physiological principles.

## Effective Term

Fall 2022

## Course Type

Credit - Degree-applicable

## Contact Hours

126

## Outside of Class Hours

144

## Total Student Learning Hours

270

## Course Objectives

Lecture Objectives:

1. Define homeostasis and apply the processes of feedback control mechanisms to explain how the various organ systems are regulated and

integrated to maintain homeostasis between organ systems and the body as a whole.

2. Describe and distinguish various roles of major classes of biomolecules in living cells.

3. Describe the basic functions of cellular components, the cell membrane, and factors influencing membrane transport and permeability.

4. Compare and contrast mechanisms of cellular communication and describe receptors and messenger molecules involved in cell signal reception, transduction, and response;

5. Outline the steps involved in DNA replication and explain how genetic information is transmitted through cell division and sexual reproduction.

6. Outline the steps involved in gene expression and explain how the genetic code determines cell function via gene regulation and protein synthesis.

7. Define metabolism, describe the steps involved in carbohydrate, lipid, and protein metabolism, and the mechanisms by which metabolic rate is regulated in the body.

8. Explain the functional roles of the major components of the nervous system in communication, control, and integration.

9. Explain the functional role of the muscle tissue in body movement, maintenance of posture, and thermoregulation.

10. Explain the functional role of sensory organs and receptors in processing of sensation and perception of stimuli.

11. Identify the major endocrine tissues and explain the function of their hormones in communication, control, and integration of body systems.

12. Explain the functional role of the cardiovascular system in transport and hemodynamics.

13. Discuss and classify the homeostatic mechanisms responsible for regulation of cardiac output and blood pressure.

14. Identify the major components of the lymphatic system and explain their functional role in fluid dynamics and immunity.

15. Discuss the functions of the integumentary system and describe the role it plays in pathogen resistance, thermoregulation, excretion, and sensory.

16. Explain the functional role of the digestive tract and accessory organs in digestion, absorption, secretion, and elimination.

17. Analyze the functions of the respiratory system including gas exchange, ventilation control, external and internal respiration.

18. Explain the functional processes of urine formation including filtration, reabsorption, secretion, and excretion.

19. Analyze the factors that regulate and alter urine volume and composition.

20. Describe the homeostatic mechanisms that control fluid/electrolyte balance and acid/base balance in the body.

21. Compare and contrast the functional anatomy of male and female reproductive systems and describe the regulation of reproductive functions including puberty, gametogenesis, fertilization, pregnancy, parturition, and lactation.

22. Identify metabolic and physiological disorders of the major organ systems.

Laboratory objectives:

1. Demonstrate application of the scientific method by designing components of, and carrying out, physiologic experiments.

2. Demonstrate competency in the use of laboratory equipment and data acquisition software to accurately measure human physiological processes.

3. Qualitatively and quantitatively analyze and interpret experimental results, and effectively communicate the results orally, through written word, or graphs.

4. Demonstrate safe laboratory techniques and working effectively in a group.

## General Education Information

- Approved College Associate Degree GE Applicability
  - AA/AS - Life Sciences
  - AS - Life Science Lab
- CSU GE Applicability (Recommended-requires CSU approval)
  - CSUGE - B2 Life Science
  - CSUGE - B3 Lab Activity
  - CSUGE - E1 Lifelong Learning and Self-Development
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)
  - IGETC - 5B Biological Science
  - IGETC - 5C Laboratory Science

## Articulation Information

- CSU Transferable
- UC Transferable

## Methods of Evaluation

- Essay Examinations
  - Example: Lecture Objective 8 "Explain the functional roles of the major components of the nervous system in communication, control, and integration." Students will be given an exam on the nervous system that will include short essay questions they will be required to answer. Students will be graded on the content and accuracy of the response. An example essay question is: Compare and contrast the roles of the parasympathetic and sympathetic divisions. What is the goal of each division and use examples of their effects on at least three various organs or tissues.
- Objective Examinations
  - Example: Lecture Objective 12 "Explain the functional role of the major components of the cardiovascular system in transport and hemodynamics." Students will take a multiple choice test on the cardiovascular system. The tests will be scored and assigned a grade on a traditional grading scale. An example exam question is: The amount of blood pumped by each ventricular contraction is the: a. Heart rate b. Stroke volume c. Systolic pressure d. Afterload
- Problem Solving Examinations
  - Example: Lab objective 3 "Qualitatively and quantitatively analyze and interpret experimental results, and effectively communicate the results orally, through written word, or graphs." On a lab exam students will be given an example pneumogram tracing and a known calibration. They will be required to calculate tidal volume, inspiratory reserve, inspiratory capacity, expiratory capacity, expiratory reserve, and vital capacity from this tracing. Students will be graded on the accuracy of their calculations.

## Repeatable

No

## Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Building on assigned reading, the instructor will present a lecture/discussion on the relationship between posture and blood pressure. Students will then be divided into pairs and measure blood pressure in a variety of postures and activities. Instructor has students record these measurements and calculate the mean arterial pressure for each of the conditions.

Lecture:

1. Instructor will present a lecture on the endocrine system and the systemic effects of thyroid hormones. Students will then discuss in groups the effects hypersecretion and hyposecretion of thyroid hormones has on organ systems and metabolism.

Distance Learning

1. Students will watch the endocrine lecture video posted on LMS by their instructor and read the corresponding chapter in their textbook. Students will then participate in the weekly discussion board assignment by answering the discussion prompt and responding to a minimum of two other student's posts. An example discussion prompt for this topic is: "Pick a hormone you learned about this week and discuss what happens if there is hypersecretion (too much) or hyposecretion (too little) of this hormone produced. Include what causes this hormone imbalance and what are some of the problems it can cause?"

## Typical Out of Class Assignments Reading Assignments

1. Read the textbook chapter covering the topic "Neurophysiological Principles" and answer the review questions at the end of the chapter.
2. Read the handout "How Cancer Arises" and be prepared to discuss in class.
3. Read the background information and instructions for the next lab on metabolism. Reading comprehension will be assessed through short answer quiz questions or pre-lab reports students prepare prior to the lab session.

## Writing, Problem Solving or Performance

1. List the major hormones of the endocrine system and describe to your lab partners the major actions and target tissues of these hormones.
2. List the major events of synaptic transmission and describe to your lab partners how this sequence of events leads to axonal transmission.
3. After reading the assigned lab in your lab manual write a pre-lab report summarizing the background information, significance of the lab, and the lab procedures.
4. Perform laboratory investigations through observation, completing required data recording, and analysis of data. Complete your laboratory report by answering the short answer questions, measurements and labeling of graphs, and completing calculations.

## Other (Term projects, research papers, portfolios, etc.) Required Materials

- Human Physiology: From Cells to Systems
  - Author: Lauralee Sherwood
  - Publisher: Cengage Learning
  - Publication Date: 2015
  - Text Edition: 9th

- Classic Textbook?:
- OER Link:
- OER:
- Huma Anatomy & Physiology
  - Author: Marieb and Hoehn
  - Publisher: Pearson
  - Publication Date: 2019
  - Text Edition: 11th
  - Classic Textbook?:
  - OER Link:
  - OER:

**Other materials and-or supplies required of students that contribute to the cost of the course.**