

BIOL 0055 - GENERAL HUMAN ANATOMY AND PHYSIOLOGY

Catalog Description

Advisory: Eligibility for ENGL 11 strongly recommended

Hours: 108 (54 lecture, 54 laboratory)

Description: An overview of the basic anatomy and physiology of all body systems. Designed for non-science majors and those interested in human anatomy and physiology. Experiments and observations performed on models, nonliving systems, and oneself. (CSU, UC-with unit limitation)

Course Student Learning Outcomes

- CSLO #1: Describe and categorize the key structural features of different human cells, major tissue types and subtypes, and identify locations in the body where each is located.
- CSLO #2: Identify, describe and compare the anatomical location, histology and gross anatomical structure of all human body systems.
- CSLO #3: Describe and compare the physiology of all human body systems.
- CSLO #4: Compare structure and function of all human body systems from the cellular through system levels of organization.
- CSLO #5: Demonstrate proper lab safety, dissecting techniques, and handling of models and physiology lab equipment.

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

108

Outside of Class Hours

108

Total Student Learning Hours

216

Course Objectives

Lecture Objectives:

Introduction to A&P

1. define anatomy and physiology;
2. name, in order of complexity, the different levels of structural organization of the human body, and define each level;
3. list the organ systems of the body and briefly describe the major organs and functions of each system;
4. define homeostasis, list the components of a homeostatic feedback mechanism, and compare and contrast negative and positive feedback mechanisms;
5. list the body cavities, name the membranes and the organs located in each;

The Cell

6. list the 3 major regions of a generalized cell and describe the function of each region;
 7. relate plasma membrane structure to active and passive transport mechanisms;
 8. list the major organelles of the cell and explain their basic activities; Tissues
 9. define the term tissue, list the four major categories of tissues, and describe the subcategories of each, including their function, and location in the body;
- Integumentary System
10. discuss the functions of the integumentary system and describe the role it plays in protection, pathogen resistance, thermoregulation, excretion, and sensation;
 11. describe the structure and function of the epidermal and dermal layers of the skin and the integumentary accessory structures;
- Skeletal System
12. explain the functional role of skeletal tissue in body movement, protection, mineral storage, and hematopoiesis;
 13. compare and contrast spongy and compact bone, including the gross and microscopic anatomy of each;
 14. describe the physiology of bone, including the cells involved in growth, repair and resorption, and the process of bone development, growth, repair and remodeling;
 15. name and describe the characteristics, size, location, and features of the major bones and skeletal structures in the body;
- Muscular System
16. explain the functional role of muscle tissue in body movement, maintenance of posture, and thermoregulation;
 17. describe the types of muscle tissue as well as locations and attributes of each type;
 18. describe the process of excitation-contraction coupling via the neuromuscular junction;
 19. list the principal events associated with the sliding-filament theory;
 20. name the major muscles in the body;
- Articulations and Actions
21. explain the structural and functional types of joints and give examples of each, with a special emphasis on synovial joints;
 22. explain the different types of anatomical movements;
- Nervous System
23. list and explain the basic functions and divisions of the nervous system;
 24. explain the anatomy of a neuron and the role each structure in the propagation of action potentials;
 25. name and describe the functions of the different regions of the brain and spinal cord and the structures that protect them;
 26. describe a reflex arc and give examples of types of reflexes;
- General and Special Senses
27. explain the structure and function of the sensory receptors and organs;
- Cardiovascular System
28. name, describe, and explain the functions of the parts of the heart including the chambers, valves, and electrical conduction system;
 29. explain the cardiac cycle and related ECG events;
 30. describe the functions of the different types of blood vessels in the body and identify the major vessels;
 31. explain blood pressure and pulse rate, including how they are measured, factors that affect them, and their clinical significance;
 32. explain cardiac output;
- Blood
33. describe the composition of blood and the significance of each component and define hematocrit;
 34. list the formed elements of blood, and describe the life cycle of each;

35. explain blood types and determine compatibility between different types;

Lymphatic System

36. identify the major components of the lymphatic system and explain their functional role in fluid dynamics and immunity;

37. define immunity, and explain the nonspecific and specific defenses of the body that contribute to immunity;

38. explain the four types of immunity and give an example of each;

Respiratory System

39. trace an oxygen molecule through the respiratory system and across the respiratory membrane and explain the function of each structure it encounters;

40. explain the mechanisms of breathing and how breathing is regulated;

41. explain respiratory volumes and capacities, including how they are measured, and their clinical significance;

Endocrine System

42. describe the relationship between the endocrine system and the nervous system in maintaining homeostasis;

43. list the endocrine glands of the body, the hormones they produce, and their action;

44. compare and contrast exocrine and endocrine glands;

Digestive System

45. trace a morsel of food through the digestive system and explain the function of each of the GI tract and accessory organs along the way;

46. define metabolism, describe the roles of the major classes of biomolecules, and describe how and where they are digested and absorbed;

47. describe a typical section of the GI tract wall;

Urinary System

48. explain the process of urine formation including filtration, reabsorption, secretion, and excretion;

49. describe the homeostatic mechanisms that control fluid/electrolyte balance and acid/base balance in the body;

50. trace a drop of urine through the urinary system and explain the function of each of the organs and associated structures along the way;

Reproductive System

51. trace the sperm/ovum through the reproductive system and explain the function of each of the organs and associated structures along the way;

52. compare the principal events of the menstrual and ovarian cycles;

53. describe the regulation of reproductive functions including puberty, gametogenesis, fertilization, pregnancy, parturition, and lactation;

Laboratory Objectives:

1. identify and describe microscopic and gross anatomy using histological specimens, models, and organ dissections;

2. use of laboratory equipment to accurately measure human physiological processes;

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

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

• 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

• Classroom Discussions

• Example: Chronic Traumatic Encephalopathy (CTE) is a degenerative brain disease thought to be linked to repeated head trauma [1]. It has been widely discussed in scientific journals and media outlets (perhaps reaching its widest audience in the 2015 film "Concussion") due in part to its link to sports-related concussions. The most straightforward avenue of CTE research is done by performing autopsies on donated brains to look for evidence of CTE; an organization called the Brain Bank has examined over 600 brains, including those of athletes and military service members, and found significant links between head trauma and CTE [2]. They also found evidence that younger athletes are more susceptible to developing CTE, and that longer exposure to head impacts over a longer career increases the likelihood of CTE [2]. Building upon their research, other scientists recently identified that a protein called tau may play a major role in the development of CTE symptoms [3]. Importantly, this protein - which is also connected to dementia and is found in the cerebrospinal fluid (CSF) around the brain and spinal cord - can be analyzed in living subjects via a spinal tap, allowing clinicians to better monitor the progression of the disease. While research is still ongoing, CTE and its possible causes and symptoms will continue to be discussed, as further misfortunes like the suicide of Aaron Hernandez, the former New England Patriots tight end (and convicted murderer, and CTE sufferer [4]) are likely to continue. What feelings or questions did this topic evoke? Do some research and then post your thoughts about organ transplants. You may want to research or ponder the following areas: Have you or anyone you know been affected by this topic? How has it changed how you feel about brain injury? What do you think about the changes CTE research has caused in the NFL? Kids sports? What do former professional athletes say about CTE? If they are now experiencing symptoms that may have been caused by sports trauma, do they regret their past, or do they accept it? Would you risk CTE for the glory of professional athlete stardom? The military is also interested in the possible effect of CTE on soldiers. Have they made any changes to their policies and procedures based on the science? Do you think changes are appropriate, or might they put more lives at risk? How has this class helped you better understand the cells, bones, membranes, and fluids that help protect the brain from injury? Remember that in addition to your discussion post, you must converse with at least one other student by replying to their post with your own question or comment. Please visit this link to view our netiquette standards for appropriate online dialogue, the grading rubric for your posts and replies, and a sample post and reply to help you learn how to write a response that will earn you

General Education Information

- Approved College Associate Degree GE Applicability
 - AA/AS - Life Sciences
 - AS - Life Science Lab
- CSU GE Applicability (Recommended-requires CSU approval)

full credit. Students will be graded using the posted rubric which includes: Ideas, arguments, & analysis (5 pts); Connection to course materials (1 pt); Writing quality (1 pt); Timeliness (1 pt); and Reply & contribution to learning community (2 pts)

- Essay Examinations
 - Example: Some organs in the body are lined by double-layered membranes. Name these membranes and describe their structure and function using appropriate anatomical terminology. Students will be graded using a rubric that includes key terms and concepts that should be included in their answer.
- Objective Examinations
 - Example: Think about where you would find "thick skin" on your body. What cell type or structure is missing from thick skin? A. hair follicles B. keratinocytes C. sweat glands D. none of these are missing from thick skin Students will be graded based on whether they select the correct answer.
- Problem Solving Examinations
 - Example: Something is going wrong inside of your cells. Your cellular machinery is producing products at the normal rapid pace, but there are no organelles available to store or transport the goods. What organelle is missing from your cells? Students will be graded using a rubric on whether they can use the evidence to identify the correct structure.
- Skill Demonstrations
 - Example: Which of the following images shows the correct technique by which to take a patient's pulse? Students will be graded based on whether they identified the correct technique.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. The instructor will demonstrate dissection safety and technique for a sheep brain. Major landmarks and structures will be identified. Students will replicate the dissection in groups on their own brains.
2. The instructor will guide students through the use of sphygmomanometers to measure blood pressure. Students will take turns measuring each other's blood pressure, then work in groups to calculate their mean arterial blood pressure.

Lecture:

1. The instructor will identify and differentiate body tissues on lecture slides. Students will then work in small groups to match the location and function to a set of tissue unknowns.
2. The instructor will present a case study of a respiratory disease, including a list of clinical data and patient symptoms, and ask the class for ideas about how to diagnose the patient. Students will then work in small groups on their own case studies before presenting their findings to the class.

Distance Learning

1. The instructor will post background information on the four types of immunity using text, images, and captioned video. Students will

then be presented with a list of structures and processes that protect the body, and complete an activity matching each type of immunity with the list. This activity will be completed as part of a virtual lab assignment (formatted as an online quiz) where students practice applying concepts from lecture.

2. The instructor will post a captioned video that walks through the major bones in the human body. Students will identify bones by being presented with an image or 3D model of a bone; they will then be prompted to type the bone's name into a text box during an online quiz or lab practical.

Typical Out of Class Assignments Reading Assignments

1. Read the lecture slides on anatomical terminology in preparation for class discussion.
2. Read the chapter on muscle physiology and complete the worksheet on excitation-contraction coupling.

Writing, Problem Solving or Performance

1. Watch the video "How are muscles named? - Terminology" by Kenhub then use what you learned to complete the online activity matching muscle names with their meaning.
2. Complete the "Quiz Your Group" assignment by generating your own questions about cardiac muscle by following the 3-3-3 rule: write 3 multiple choice questions, write 3 fill-in-the-blank questions, and bring 3 copies of your questions to class to share with your group.

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

- Mader's Understanding Human Anatomy & Physiology
 - Author: Susannah Longenbaker
 - Publisher: Mc Graw Hill
 - Publication Date: 2020
 - Text Edition: 10th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Anatomy and Physiology
 - Author: J. Gordon Betts, et al.
 - Publisher: OpenStax
 - Publication Date: 2021
 - Text Edition: Web Version Last Upd
 - Classic Textbook?:
 - OER Link:
 - OER:
- Essential of Anatomy and Physiology
 - Author: Frederic H. Martini
 - Publisher: Pearson
 - Publication Date: 2020
 - Text Edition: 8th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Exploring Anatomy & Physiology in the Laboratory Core Concepts

- Author: Erin C. Amerman
- Publisher: Morton
- Publication Date: 2018
- Text Edition: 2nd
- Classic Textbook?:
- OER Link:
- OER:
- Hole's Essentials of Human Anatomy & Physiology
 - Author: David Shier
 - Publisher: McGraw Hill
 - Publication Date: 2018
 - Text Edition: 13th
 - Classic Textbook?:
 - OER Link:
 - OER:

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