BIOL 40B: HUMAN ANATOMY & PHYSIOLOGY II

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	5
Hours:	4 lecture, 3 laboratory per week (84 total per quarter)
Prerequisite:	BIOL 40A or equivalent.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU/UC
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- The student can analyze and evaluate the relationship between nervous system structure and function, and the role of the nervous system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between cardiovascular system structure and function, and the role of the cardiovascular system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between respiratory system structure and function, and the role of the respiratory system in maintaining homeostasis in the human body.

Description

Human anatomy and physiology with an emphasis on integration of systems and homeostatic mechanisms for the nervous, cardiovascular, and respiratory systems. This course is primarily intended for nursing, allied health, kinesiology, and other health-related majors.

Course Objectives

The student will be able to:

1. Describe the structures and functions of chemicals, cells, tissues, and organs of the nervous system in health and disease.
2. Describe the structures and functions of chemicals, cells, tissues, and organs of the cardiovascular system in health and disease.
3. Describe the structures and functions of chemicals, cells, tissues, and organs of the respiratory system in health and disease.
4. Evaluate intersections between anatomy and physiology and issues of diversity, equity, inclusion, and social justice.

Course Content

1. Nervous system will include:
    a. Introduction of nervous system organization
        i. Central nervous system
        ii. Peripheral nervous system
            1. Somatic nervous system
            2. Autonomic nervous system
    b. Histology
        i. Neurons
            1. Typical neuron
            2. Classification by form
            3. Classification by function
        ii. Gray and white matter
        iii. Neuroglia
            1. Types within the central nervous system
            2. Types within the peripheral nervous system
            3. Myelination and the neurolemma
    c. Impulse transmission and membrane potentials
        i. Resting membrane potential
        ii. Ion channels
        iii. Action potential
            1. Depolarization - repolarization
            2. Propagation
    d. Synapse and neurotransmitters
    e. Neuronal transmission patterns
    f. Spinal cord
        i. Basic anatomy overview
        ii. Spinal tracts
        iii. Spinal meninges
    g. Spinal nerves
        i. Number, location and structure of spinal nerves
        ii. Plexuses and function of spinal nerves
    h. General pathway of reflexes
    i. The brain
        i. Introduction to brain structure and function
        ii. Coverings; skull and cranial meninges
        iii. Cerebrospinal fluid (CSF)
            1. Structures involved in production and function of CSF
            2. Clinical disorder involving CSF; hydrocephalus
        iv. Basic anatomy overview
        v. Cranial nerves
            1. Pathways, number, structure of cranial nerves
            2. Function of select cranial nerves
        vi. Electroencephalogram [EEG]
        vii. Neuroplasticity and learning
            1. Neuromyths and misconceptions around intelligence
    j. The autonomic nervous system
        i. General organization
        ii. Survey of activities
            1. Parasympathetic
            2. Sympathetic
    k. Special senses structure and functions
2. The cardiovascular system will include:
    a. Introduction
        i. Comparison of body fluids
        ii. Functions of blood
        iii. Blood plasma
        iv. Formed elements
    b. Blood
        i. Red blood cells
            1. Structure and function
            2. Hemoglobin
            3. Origin and development

4. Homeostasis
5. Life span and recycling

ii. White blood cells
1. Anatomy and types
2. Physiology

iii. Platelets

iv. Hemostasis
1. Vascular spasms
2. Platelet plugs
3. Coagulation
4. Clotting factors

v. Plasma
1. Components
2. Functions

vi. Blood diseases

c. Heart
i. Anatomy
1. Location and size
2. Pericardium
3. Heart wall, chambers, and valves
4. Blood supply to the heart

ii. Physiology
1. Blood flow
2. Valve action
3. Conduction system
4. Cardiac cycle, heart sounds and electrocardiogram (ECG)
5. Determining cardiac output
6. Regulation of heart rate
7. Heart disease

d. Blood vessels
i. Basic types of vessels, histology, functions
1. Arteries
2. Arterioles
3. Capillaries
4. Venules
5. Veins

ii. Hemodynamics
1. Velocity and volume of blood flow
2. Capillary filtration
3. Control of blood pressure and flow

iii. Pulmonary and systemic circulation

e. Regulation by the autonomic nervous system

f. Effects of sex, age and disease on the cardiovascular system

g. Health disparities in cardiovascular disease

3. Respiratory system will include:

a. Introduction of structure and function

b. External (pulmonary), internal (tissue), and cellular respiration

c. Survey of anatomy and histology: nares to alveoli

d. Physiology
i. Pulmonary ventilation

ii. Blood gas transport
1. Oxygen transport
2. Carbon dioxide transport
3. Oxygen-hemoglobin dissociation curve

iii. Tissue gas diffusion

iv. Regulation of respiration

e. Respiratory diseases

f. Health disparities in lung disease

4. Issues of diversity, equity, inclusion, and social justice

a. Examination of health disparities, social determinants of health, and health inequities as related to the above listed organ systems

b. Examination of the contributions of scientists from a diversity of backgrounds to the fields of anatomy and physiology

Lab Content

1. Laboratory topics (hands-on exploration of models, specimens, and/or digital renderings in the following areas):

a. Nervous system
i. Histology

ii. Gross anatomy

iii. Dissection

b. Special senses
i. Testing senses to explore mechanisms of sensation

c. Cardiovascular system:
i. Histology

ii. Gross anatomy

iii. Dissection

iv. Blood vessels

v. Blood flow

vi. Heart structure and function

vii. Adult and fetal circulation

viii. Blood pressure

ix. Electrocardiogram (ECG)

x. Heart sounds

d. Respiratory system
i. Histology

ii. Gross anatomy

iii. Measuring respiratory volumes

2. Laboratory skills:

a. Identification of tissues and structures on prepared histology slides of systems covered

b. Use of laboratory materials, such as general lab equipment, models and microscopes

c. Dissection and identification of structures on preserved specimens, such as cow eye, sheep brain, sheep heart

d. Use of stethoscope and blood pressure cuff

e. Generation and discussion of an ECG (electrocardiogram)

Special Facilities and/or Equipment

1. Lecture room and biology laboratory equipped with instructor's computer, internet access, ceiling projector, document camera (visualizer), DVD player.
2. Fully equipped biology laboratory with support of laboratory technician.
3. Materials and equipment to teach anatomy and physiology, including: instructor's microscope with attached camera for slide projection, anatomy models, student microscopes, histology slides, preserved specimens, dissection equipment, posters and videos.

4. Laboratory equipment and supplies, such as water-bath, glassware, and other chemical or biological reagents for studying the biochemical nature of cell and human physiology.
5. When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Lecture and laboratory exams consisting of subjective and objective items. Exams written to assess knowledge and critical thinking ability. Exams may include short answer/essay questions, discussion questions, diagramming, questions relevant to laboratory experiments, lab practical component, or questions generated from models, histology slides, dissection specimens or images of the same
Lab reports, pre-lab or post-lab assignments
Evaluation of case studies and clinical scenarios
Reading and analysis of scientific studies of anatomy and physiology

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Laboratory
Cooperative learning, including team-based learning and project-based learning
Demonstration of specimen dissection

Representative Text(s) and Other Materials

Openstax. Anatomy and Physiology. 2020.

Tortora and Derrickson. Principles of Anatomy and Physiology, 16th ed.. 2020.

Allen and Harper. Laboratory Manual for Anatomy and Physiology, 7th ed.. 2020.

Additional materials may include but are not limited to the following:
1. Scientist Spotlights: https://scientistspotlights.org/
2. Resources in neuromyths and misconceptions around intelligence, such as:

Betts, K., M. Miller, T. Tokuhama-Espinosa, P.A. Shewokis, A. Anderson, C. Borja, ... and S. Dekker. "International Report: Neuromyths and Evidence-Based Practices in Higher Education." Online Learning Consortium. 2019.
3. Resources on cardiovascular health disparities, such as:

Graham, G. "Disparities in cardiovascular disease risk in the United States." Current Cardiology Reviews. 11(3), 238-245. 2015.
4. Resources on respiratory health disparities, such as:

Pinkerton, K.E., M. Harbaugh, M.K. Han, C. Jourdan Le Saux, L.S. Van Winkle, W.J. Martin, ... and M. George. "Women and lung disease. Sex differences and global health disparities." American Journal of Respiratory and Critical Care Medicine. 192(1), 11-16. 2015.
Ryan, B.M. "Lung cancer health disparities." Carcinogenesis. 39(6), 741-751. 2018.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Review assigned textbook and lab manual pages and corresponding instructional materials
2. Completion of homework problems, practice questions, case study analyses, and written reflections
3. Analysis of the contributions to anatomy and physiology by scientists from a diversity of backgrounds

Discipline(s)

Biological Sciences