

BIOL 40C: HUMAN ANATOMY & PHYSIOLOGY III

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 digestive system structure and function, and the role of the digestive system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between urinary system structure and function, and the role of the urinary system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between lymphatic system structure and function, and the role of the lymphatic system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between endocrine system structure and function, and the role of the endocrine system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between reproductive system structure and function, and the role of the reproductive 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 digestive system, metabolism, urinary system, fluid, electrolyte and acid/base balance, lymphatic system, endocrine system, and reproductive system. This course is primarily intended for nursing, allied health, kinesiology, and other health-related majors.

Course Objectives

The student will be able to:

- Describe the structures and functions of chemicals, cells, tissues, and organs of the digestive system in health and disease.
- Discuss the fates of organic macromolecules in the body.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the urinary system in health and disease.
- Discuss the homeostatic mechanisms for balancing water and solutes in the body and disease-related deviations from fluid and solute homeostasis.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the lymphatic system in health and disease.

- Describe the structures and functions of chemicals, cells, tissues, and organs of the endocrine system in health and disease.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the reproductive system in health and disease.
- Evaluate intersections between anatomy and physiology and issues of diversity, equity, inclusion, and social justice.

Course Content

- Digestion:
 - Introduction
 - Mechanical vs. chemical digestion
 - Hydrolysis reviewed
 - General survey of the system; organs and general histology
 - Oral cavity
 - Mouth
 - Tongue
 - Salivary glands: types and locations
 - Mastication and salivation
 - Amylase and starch digestion
 - Anatomy and physiology of deglutition (swallowing)
 - Esophagus
 - Location, anatomy and histology
 - Physiology
 - Stomach
 - Location, anatomy and histology
 - Mechanical digestion and storage
 - Chemical digestion: roles of mucus, hydrochloric acid, enzymes
 - Regulation of secretion and motility
 - Pancreas
 - Location, anatomy and histology
 - Pancreatic juice: enzymes and their substrates
 - Regulation of secretion
 - Liver
 - Location, anatomy and histology
 - Blood supply
 - Bile
 - Physiology: neutralizing toxins, buffering, plasma proteins, storage, red blood cell destruction
 - Gallbladder: anatomy and physiology
 - Small intestine
 - Location, anatomy and histology
 - Peristalsis and segmentation
 - Enzymes and their substrates
 - Geographic and ethnic variation in digestive enzyme (e.g., lactase) production
 - Absorption: carbohydrates, lipids, proteins, water, and electrolytes
 - Large intestine
 - Location, anatomy and histology
 - Motility
 - Absorption and feces formation
 - Defecation
 - Health disparities in colon cancer
- Metabolism:

- a. Introduction
- b. Metabolism of:
 - i. Carbohydrates
 - ii. Lipids
 - iii. Proteins
- c. Absorptive and postabsorptive state
3. Urinary system:
 - a. Introduction to anatomy and physiology of system
 - b. Renal anatomy and histology
 - c. Renal physiology: nephron, collecting ducts, renal circulation
 - i. Glomerular filtration
 - ii. Regulation of the glomerular filtration rate (GFR)
 - iii. Tubular reabsorption
 - iv. Tubular secretion
 - d. Urinary tract function and urinalysis
 - e. Renal diseases and health disparities
4. Fluid, electrolyte and acid-base balance:
 - a. Fluid compartments and fluid balance
 - b. Water
 - i. Intake and regulation
 - ii. Output and regulation
 - c. Distribution of electrolytes in body fluids
 - d. Movement between fluids
 - i. Plasma and interstitial fluids
 - ii. Interstitial fluids and intracellular fluids
 - e. Acid-base balance
 - i. Buffers
 - ii. Respiratory acidosis and alkalosis
 - iii. Metabolic acidosis and alkalosis
5. Lymphatic system:
 - a. Introduction
 - i. Lymphatic vessels: structure and location
 - ii. Lymph nodes
 - iii. Lymph: composition, origin, flow pattern and fate
 - b. Resistance to disease
 - i. Nonspecific resistance
 1. Skin and mucus membranes
 2. Antimicrobial substances
 3. Phagocytosis
 4. Inflammation
 5. Fever
 - ii. Specific resistance: immunity
 1. Formation of T cells and B cells
 2. Antigens
 3. Cell-mediated immunity
 4. Antibody-mediated immunity
 5. Immunological memory
 6. Immune response to vaccines and sources of vaccine hesitancy
 7. Immune system disorders; allergies, autoimmunity, tissue transplants, cancer
6. Endocrine system:
 - a. Introduction to concept of hormonal control and regulation of homeostasis
 - b. Overview of hormone effects
- c. Hormones
 - i. Chemistry
 - ii. Classification
 - iii. Circulating and local hormones
 - iv. Hormone transport
 - v. Receptors
 - vi. Second messengers
- d. Survey of major endocrine glands; hormones produced and their actions and result of hyper and hypo secretions
 - i. Hypophysis
 1. Interactions with hypothalamus
 2. Anterior and posterior lobe
 - ii. Thyroid gland
 - iii. Parathyroid gland
 - iv. Adrenal gland
 1. Adrenal medulla
 2. Adrenal cortex
 - v. Pancreas
7. Reproduction:
 - a. Male anatomy and histology
 - b. Physiology
 - i. Spermatogenesis
 - ii. Sperm delivery
 - c. Female anatomy and histology
 - d. Physiology
 - i. Oogenesis
 - ii. Ovulation
 - iii. Menstrual cycle: menarche and menopause
 - iv. Hormonal regulation of female reproduction, pregnancy and physiology of birth control
 - v. Correlations between physician-patient race and childbirth mortality
 - e. Variations in the reproductive system based on sex and age
8. 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. Digestive system
 - b. Urinary system, including urinalysis
 - c. Endocrine system
 - d. Immune system
 - e. Reproductive system
 - f. Histology of systems covered
2. Laboratory skills:
 - a. Identification of tissues and structures on prepared histology slides of systems covered
 - b. Use of laboratory materials such as general laboratory equipment, models and microscopes
 - c. Dissection and identification of structures on preserved specimens

- d. Ability to follow a protocol, make experimental observations and draw conclusions for experiments involving topics, such as metabolism and urinalysis

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 regarding issues of equity and diversity in course topics, such as:

HHMI Biointeractive Lessons on Lactase Persistence: <https://www.biointeractive.org/classroom-resources/lactase-persistence-evidence-selection>

Greenwood, B.N., R.R. Hardeman, L. Huang, and A. Sojourner. "Physician-patient racial concordance and disparities in birthing mortality for newborns." Proceedings of the National Academy of Sciences. 117(35), 21194-21200. 2020.

Momplaisir, F., N. Haynes, H. Nkwihoreze, M. Nelson, R.M. Werner, and J. Jemmott. "Understanding Drivers of COVID-19 Vaccine Hesitancy Among Blacks." Clinical Infectious Diseases. 2021.

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