

BIOL 40A: HUMAN ANATOMY & PHYSIOLOGY I

Foothill College Course Outline of Record

Heading	Value
Units:	5
Hours:	4 lecture, 3 laboratory per week (84 total per quarter)
Prerequisite:	One of the following: CHEM 1A, 1AH, 25, 30A, 30B or equivalent.
Advisory:	BIOL 14 or equivalent; one of the following: ENGL 1A, 1AH, 1S & 1T or equivalent.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- The student can analyze and evaluate the relationship between cell structure and function, and the mechanisms in place to maintain homeostasis at the cellular level.
- The student can analyze and evaluate the relationship between integumentary system structure and function, and the role of the integumentary system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between skeletal system structure and function, and the role of the skeletal system in maintaining homeostasis in the human body.
- The student can analyze and evaluate the relationship between muscular system structure and function, and the role of the muscular system in maintaining homeostasis in the human body.

Description

Basic human anatomy and physiology. Emphasis on integration of systems and homeostatic mechanisms. Physical and chemical basis of life, histology and integumentary, skeletal and muscular systems. Designed for majors that require fundamental background in human anatomy and physiology.

Course Objectives

The student will be able to:

- Use appropriate concepts and vocabulary from the chemical, cellular, and tissue levels to describe the organization and functioning of the human body.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the integumentary system in health and disease.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the skeletal system in health and disease.
- Describe the structures and functions of chemicals, cells, tissues, and organs of the muscular system in health and disease.

Course Content

- The introductory unit will include:
 - Introduction to anatomy and physiology
 - Overview of structural organization
 - Introduction to the systems
 - Homeostasis
 - Control by feedback mechanism
 - Role in maintaining good health
 - Homeostatic imbalance and role in disease
 - Terminology of anatomy and physiology
 - Brief review of chemistry
 - The atom, molecules
 - Chemical reactions
 - Compounds of life
 - Water
 - Acids, bases, and salts
 - Carbohydrates
 - Lipids
 - Proteins
 - Enzymes
 - Nucleic acids
 - Brief review of cellular organization
 - Introduction to the cell
 - Structure and function of the cell membrane
 - Cell membrane permeability
 - Cell membrane gradients
 - Cell membrane transport
 - Active transport
 - Primary active transport: Na⁺/K⁺ pump
 - Secondary active transport: symport, antiport
 - Passive transport
 - Simple diffusion
 - Osmosis
 - Filtration
 - Facilitated diffusion
 - Transport in vesicles
 - Endocytosis
 - Exocytosis
 - Function of cell division
 - Definition and function of mitosis
 - Definition and function of meiosis
 - Histology
 - Four basic tissues
 - Surveys of:
 - Epithelial tissue
 - Connective tissue
 - Nervous tissue
 - Muscle tissue
 - Glands and their classification
 - Specialized membrane
 - Mucous
 - Serous
 - Synovial
 - Integumentary system will include:
 - Introduction to skin
 - Structure of skin
 - Functions of skin
 - Protection
 - Wound healing
 - Synthesis of Vitamin D
 - Regulate body temperature

2. Components of skin color
3. Effects of aging on skin
4. Skin clinical disorders
 - a. Albinism
 - b. Depigmentation
 - c. Psoriasis
 - d. Skin cancer
- C. Skeletal system will include:
 1. Introduction to bone
 - a. Structure and function of the skeletal system
 - b. Parts of a typical long bone
 - c. Bone cell types
 - d. Composition of bone matrix
 - e. Role in homeostasis
 2. Bone tissue
 - a. Compact (dense)
 - b. Spongy (cancellous)
 3. Ossification processes
 - a. Intramembranous
 - b. Endochondral
 4. Bone repair
 5. Effects of sex and age on the skeletal system
 6. Skeletal system clinical disorders
 - a. Osteoporosis
 - b. Bone fractures
 - c. Bone growth abnormalities
- D. Muscular system will include:
 1. Introduction to muscle
 - a. Muscle tissue (three types)
 - b. Functions of muscle tissue
 - c. Characteristics of muscle tissue
 - d. Associated connective tissue
 2. General muscle anatomy and relationships with bones and joints
 3. Microanatomy of the muscle cell (fiber)
 - a. Muscle fibers, myofibrils, and myofilaments
 - b. Sarcomere, sarcoplasmic reticulum and transverse tubules
 4. Contraction
 - a. The sliding filament mechanism
 - b. Role of Ca²⁺
 - c. ATP and the power stroke
 5. Motor unit, all-or-none principle
 6. Energy for contraction
 - a. Phosphagen system
 - b. Glycogen-lactic acid system
 - c. Aerobic system
 7. Effects of sex and age on the muscle system
 8. Muscle system clinical disorders
 - a. Paralysis
 - b. Muscular dystrophy
 - c. Muscular hypertrophy
 - d. Muscular atrophy

Lab Content

- A. Laboratory topics (hands-on exploration of models, specimens, and/or digital renderings in the following areas):
 1. Anatomical terminology
 2. Homeostasis
 3. Cell and tissue identification
 4. Integumentary anatomy; examination of skin layers, tissues, and cells
 5. Bone taxonomy; survey of axial bones, appendicular bones and markings

6. Muscle taxonomy; survey of major muscles, origins, insertions and actions
7. Arthrology; Survey of joint classification and actions
- B. Laboratory skills:
 1. Identification of major cell and tissue types on prepared histology slides of systems covered
 2. Use of laboratory materials such as general laboratory equipment, models and microscopes
 3. Ability to follow a protocol, make experimental observations and draw conclusions for experiments involving topics, such as homeostasis of cells

Special Facilities and/or Equipment

- A. Lecture room and biology laboratory equipped with instructor's computer, internet access, ceiling projector, document camera (visualizer), VCR and DVD player.
- B. Fully equipped biology laboratory with support of laboratory technician.
- C. 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, Anatomage table, posters and videos.
- D. 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.
- E. Students need internet access.

Method(s) of Evaluation

Methods may include but are not limited to the following:

- A. 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.
- B. Lab reports, pre-lab or post-lab assignments.
- C. Evaluation of case studies and clinical scenarios.

Method(s) of Instruction

Methods may include but are not limited to the following:

- A. Lecture
- B. Laboratory
- C. Cooperative learning
- D. Lab demonstration utilizing models, slides or other lab materials

Representative Text(s) and Other Materials

Tortora and Derrickson. [Principles of Anatomy and Physiology](#). 14th ed. New Jersey: John Wiley and Sons Publishers, 2014. ISBN:9781118345009

Openstax. [Anatomy and Physiology](#). 17th ed. Openstax, 2017. ISBN: 9781938168130

Allen and Harper. [Laboratory Manual for Anatomy and Physiology](#). 5th ed. New Jersey: John Wiley and Sons Publishers, 2014. ISBN:9781118344408

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

A. Read assigned lecture textbook chapters (approximately 20-30 pages per week) and corresponding instructional materials (such as lecture notes, chapter readings, study guides, online quizzes, and online resources) in preparation for in-class exams.

B. Read assigned lab textbook chapters (approximately 10-20 pages per week) and corresponding instructional materials (such as lecture notes, study guides, online quizzes, and online resources) in preparation for in-class exams.

C. In-class laboratory exercises.

Discipline(s)

Biological Sciences