

Lassen Community College Course Outline

BIOL 22 -Human Physiology with Lab

4.0 Units

I. Catalog Description

One semester of a two semester sequence covering structure and function, integration and homeostasis of the human body at the cellular, tissue organ, organ system and organism level. This semester includes the functions of the integumentary, skeletal, muscular, nervous and sensory systems, cardiovascular, lymphatic, immune, respiratory, urinary, digestive, endocrine and reproductive systems. This course has been approved for online and hybrid delivery.

Recommended Preparation: English 105 or equivalent multiple measures placement and Math 60 - Intermediate Algebra or the equivalent multiple measures placement Biology 1 and Chemistry 1A

Transfers to CSU/UC

C-ID BIOL 120B

51 Hours Lecture, 102 Expected Outside Class Hours, 51 Hours Lab, 204 Total Student Learning Hours

Scheduled: Fall, Spring

II. Coding Information

Repeatability: Not Repeatable, Take 1 Time

Grading Option: Graded

Credit Type: Credit - Degree Applicable

TOP Code: 041000

III. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:

1. Describe the functions and interactions between various body systems
2. Perform biological laboratory skills and display a habit of good laboratory practices.
3. Exhibit oral and written communication competency

B. Course Objectives

Upon completion of this course the student will be able to:

1. Describe and distinguish various roles of major classes of biomolecules in living cells.
2. Describe key functional features of different types of human cells and how they communicate.
3. Identify key functions of major organ systems and the physiological mechanisms underlying their operation.
4. Demonstrate an understanding of how organ systems of the body are integrated and regulated.
5. Demonstrate an understanding of how homeostasis is maintained in the body.
6. Demonstrate knowledge of metabolic and physiological disorders of the major organ systems.
7. Analyze experimental data to demonstrate physiological principles.
8. Demonstrate an understanding of the scientific method, experimental design, and the philosophy of science. Apply the scientific method and philosophy of science by designing components of and carrying out physiological experiments.

IV. Course Content

The following topics may be included; however, the order of presentation, relative emphasis and the depth of treatment will depend on the preferences of the instructor.

- A. Molecular and Cellular Biology
 - 1. Membrane Function
 - 2. Cellular Organelle Function
 - 3. Diffusion and Other Transport Mechanisms
 - 4. Biomolecules
- B. Homeostasis and feedback systems
- C. Integumentary System
 - 1. Function in relation to structure
 - 2. Thermoregulation
 - 3. Sensory functions
 - 4. Normal versus diseased, injured or age-related structural changes
- D. Skeletal System
 - 1. Function of the skeletal system
 - 2. Osteogenesis
 - 3. Calcium Metabolism
 - 4. Normal versus diseased, injured or age-related structural changes
- E. Muscular System
 - 1. Membrane Potentials
 - 2. Muscle Physiology
 - 3. Myoneural Junctions
 - 4. Characteristics of Whole Muscle Contraction
 - 5. Normal versus diseased, injured or age-related structural changes
- F. Nervous System
 - 1. Organization, Development, and Functions of the Nervous System
 - 2. Higher Order Functions
 - 3. Senses - Functions
 - a. Receptors
 - b. Tactile Senses
 - c. Chemical Senses
 - d. Vision
 - e. Senses of the Ear
 - 4. Normal versus diseased, injured or age-related structural changes
- G. Circulatory System
 - 1. Functions of the system
 - 2. Blood components and functions
 - 3. Lymphatic system - Functions
 - 4. Immunity
 - a. Non-specific Immunity
 - b. Specific Immunity
 - 5. Normal versus diseased, injured or age-related structural changes
- H. Respiratory System
 - 1. Types of respiration
 - 2. Respiratory physiology
 - 3. Normal versus diseased, injured or age-related structural changes
- I. Digestive System
 - 1. Functions of the system
 - a. Partial pressures
 - b. pH regulation and buffers

- c. Oxygen and carbon dioxide transport
 - 2. Aerobic cellular respiration
 - 3. Nutrition
 - 4. Normal versus diseased, injured or age-related structural changes
- J. Excretory System
 - 1. Function of the kidney
 - a. Glomerular filtration
 - b. Water balance
 - 2. Acid-base fluid balance
 - 3. Normal versus diseased, injured or age-related structural changes
- K. Endocrine System
 - 1. Role of system
 - 2. Mechanisms of action
 - 3. Types of hormones and receptors
 - 4. Homeostasis and feedback control
 - 5. Normal versus diseased, injured or age-related structural changes
- L. Reproductive System
 - 1. Spermatogenesis and oogenesis
 - 2. Hormonal regulation of reproduction
 - 3. Normal versus diseased, injured or age-related structural changes
- M. Development
 - 1. Conception and development
 - 2. Neurulation
 - 3. Gestation and birth

Laboratory Content

- A. Introduction to the Microscope - Eukaryotic Cell Structure
- B. Scientific Inquiry and Experimental Design
- C. Exploration of Macromolecules/Biomolecules
 - 1. Enzyme functions and activity
- D. Skeletal System
 - 1. Bone Development
- E. Skeletal Muscular System
 - 1. Muscle contraction
 - 2. Muscle Physiology
- F. Nervous System
 - 1. Nerve Physiology
- G. Sensory Structures
 - 1. Sensory Perception Laboratory
- H. Circulatory System
 - 1. Cardiovascular Physiology including Blood
 - 2. Immunity
- I. Respiratory System
 - 2. Respiratory Physiology
- J. Digestive System
 - 1. Enzyme Function Laboratory
- K. Excretory System
 - 1. Urinalysis
 - 2. Acid-Base Balance (buffering systems)
- L. Endocrine System
 - 1. Hormone Functions
- M. Development
 - 1. Early Development Exercise

V. Assignments

A. Appropriate Readings

Reading assignments which will be used to enhance the learning process may include, but are not limited to:

1. Standard college level lecture and laboratory texts
2. Monthly scientific journals such as Scientific American and Science
3. Electronic and other archival research on a variety of topics in human anatomy and physiology
4. Newspaper articles relevant to current topics in human anatomy and physiology

B. Writing Assignments

In order to successfully complete this course, students must demonstrate understanding of course content through writing assignments which may include, but are not limited to:

1. Essay answers to questions on mixed format examinations
2. Research paper on a topic of interest pertinent to human anatomy and physiology

C. Expected Outside Assignments

Examples of outside assignments may include, but are not limited to:

1. Reading assignments as specified in the course syllabus
2. Library and Learning Center: electronic and other archival research on a variety of topics in the field of human anatomy and physiology
3. Research paper on a topic of interest pertinent to the human body
4. Read and summarize newspaper articles relevant to current topics in human anatomy and physiology
5. Drawings of histology slides in preparation of a histology notebook

Students will be required to complete two hours of outside-of-class homework for each hour of lecture.

D. Specific Assignments that Demonstrate Critical Thinking

Examples of assignments that demonstrate critical thinking may include, but are not limited to:

1. Review of periodicals and newspapers
2. Analysis and synthesis of information presented in the text and during lecture to formulate answers to essay questions on mixed format exams

VI. Methods of Evaluation

The formulation of a student grade will be based upon:

Traditional Classroom Evaluation

- A. Performance on mixed-format exams including essay questions asking students to critically analyze topics discussed in class.
- B. Performance on unit laboratory practical exams
- C. Performance on a term paper based on research
- D. Performance of a laboratory notebook

Hybrid Evaluation

A combination of traditional classroom and online evaluations will be used, such as (1) Traditional Classroom: objective examinations and essay examinations, laboratory practical examinations, laboratory notebook and (2) Online delivery: online quizzes, essay forum postings, chat rooms and email communications.

Online Evaluation

Identical to face-to-face instruction including a variety of evaluation methods such as: research papers, asynchronous and synchronous discussions (chat/forum), exercises/assignments, online quizzes and exams, and postings to online website.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery Correspondence Delivery

Hybrid Delivery Online Delivery

Traditional Classroom Instruction

1. Lecture and computer assisted presentations
2. Computer generated tutorials
3. Laboratory
4. Discussion and problem solving performed in and outside class
5. Homework and extended projects
6. Collaborative projects

Hybrid Delivery

Hybrid modality may involve face to face instruction mixed with online instruction. A minimum of 1/3 of instruction including 100 % of labs will be face to face. The remaining hours will be taught online through a technology platform as adopted by the district.

Online Delivery

Online instruction will be utilized through the technology platform adopted by the District. A mixture of asynchronous and synchronous methods will be utilized. Online delivery will consist of participation in live video meetings, forum-based discussions and posts, web links, email communications, lecture posts, exams and online lectures. Adding extra resources and other media sources as appropriate.

VIII. Representative Texts and Supplies

Required:

Silverthorn, D. U. "*Human Physiology: An Integrated Approach*", 2019, 8th edition, Pearson. This textbook may be purchased in a cloth/paper bound version, ISBN: 9780134605197 or in a loose-leaf version, ISBN: 9780134704203, or as an eText version, ISBN 0780135212905, all without the online assignment system.

When a BIOL 22 section requires the use of an online assignment system, the eText and Mastering can be purchased as a bundle (ISBN 9780134714851, 18-month eText and Mastering access) **OR** Learning Catalytic may be purchased separately in addition to the eText (ISBN 9780134433271, 6-month Learning Catalytic Access without eText). Please consult the instructor of record prior to making any purchases.

A laboratory manual resources will be prepared and provided by instructor.

Recommended:

"*Atlas of Histology*", Eroschenko, 8th edition, Williams.

Reynolds, M., Pelzer, E., Gregory, L., Shariff, M., Richardson, N., & Battle, A. "*Anatomy & Physiology [CC BY4.0]*" 2020, Queensland University of Technology. <https://qut.pressbooks.pub/anatomyandphysiology/>

IX. Discipline/s Assignment

Biological Sciences

X. Course Status

Current Status: Active

Original Approval Date: 01/21/2020

Course Originator: Crystal Tobola

Board Approval Date: 02/11/2020

Chancellor's Office Approval Date: 02/20/2020

Revised By: Kelly Kissane, Tiffany Baiocchi

Curriculum/Academic Standards Committee Revision Date: 03/07/2023