

BIO-105L: HUMAN BIOLOGY LABORATORY

Cuyahoga Community College

Viewing: BIO-105L : Human Biology Laboratory

Board of Trustees:

9/28/2023

Academic Term:

Fall 2024

Subject Code

BIO - Biology

Course Number:

105L

Title:

Human Biology Laboratory

Catalog Description:

Laboratory course designed for non-science majors that examines the microscopic and gross structure and function of the human body. Includes microscope work, models, animal dissections, and various experiments designed to illustrate concepts related to basic human biology and to complement topics covered in BIO-1050 Lecture course.

Credit Hour(s):

1

Lecture Hour(s):

0

Lab Hour(s):

3

Other Hour(s):

0

Requisites

Prerequisite and Corequisite

ENG-0995 Applied College Literacies, or appropriate score on English Placement Test. Concurrent enrollment in BIO-1050 Human Biology is strongly recommended.

Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.

Outcomes

Course Outcome(s):

Apply the process of scientific inquiry to develop and explore questions about human anatomy and physiology, and effectively communicate the findings.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

- a. State the steps of the scientific method and distinguish between scientific and nonscientific evidence.
- b. Distinguish between an observation, hypothesis, experiment, conclusion, and theory.
- c. Differentiate between an observation and an inference.
- d. Use scientific inquiry to develop a hypothesis, design an experiment, analyze data, and draw conclusions.
- e. Document experimental results in a written format.

Course Outcome(s):

Use laboratory equipment to make observations and take precise metric measurements of mass, length, volume, and temperature.

Objective(s):

- a. Use a variety of tools to record linear measurements.
 - b. Use common laboratory equipment to measure volume.
 - c. Record mass using electronic balances.
 - d. Use a thermometer to accurately record temperature.
 - e. List, describe, and identify the functional components of a compound light and stereomicroscope.
 - f. Demonstrate the ability to use compound light and stereomicroscopes to visualize human cells and tissues.
 - g. Apply appropriate lab safety and techniques while using laboratory instruments and equipment during observations and experimentation, and respond appropriately to instructor feedback as it is given.
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Course Outcome(s):

Analyze the chemical building blocks that make up human cells, food, and urine.

Objective(s):

- a. Describe the chemical makeup of proteins, carbohydrates, lipids, and nucleic acids.
 - b. Describe the reactions that occur in cells to build and break down macromolecules.
 - c. Conduct lab experiments that test for the presence of specific biomolecules in solutions and draw evidence-based conclusions.
 - d. Analyze the effects of pH, temperature, emulsification, and time on the digestion of proteins, fat, and starch.
 - e. Conduct experiments to analyze the chemical composition of urine and draw evidence-based conclusions that relate the results to urine formation and diseases.
 - f. Communicate the results of experimental procedures pertaining to cellular processes with others to demonstrate that scientific data is reproducible but can have limitations.
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Course Outcome(s):

Observe specific biophysical processes that occur in cells and explain their roles in the functions of human cells.

Objective(s):

- a. Perform laboratory experiments to explain diffusion, osmosis, concentration, concentration gradient, and tonicity, and draw evidence-based conclusions.
 - b. Differentiate between passive diffusion, facilitated transport, active transport, osmosis, and dialysis.
 - c. Describe the general structure and function of an enzyme.
 - d. Investigate factors that influence enzyme activity by conducting experiments using enzymes from cell homogenates, and draw evidence-based conclusions.
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Course Outcome(s):

Describe the structure and functions of human cells and relate how the structure of a cell determines its function.

Objective(s):

- a. Prepare wet mount samples of living cells and view them under a compound light microscope while responding appropriately to instructor feedback.
 - b. Use photomicrographs, models, and drawings of an animal cell to identify major organelles and relate their structure to their functions.
 - c. List and describe the characteristics all cells have in common.
 - d. Analyze how the structural variations of specialized human cells allows for specialized functions, such as in a skeletal muscle cell or a neuron.
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Course Outcome(s):

Describe the structure and function of human tissues and relate how the structure of a tissue determines its function.

Objective(s):

- a. Use photomicrographs, models, drawings, and microscopic observations of histological slides to identify and describe the structures of epithelial, connective, muscular, and nervous tissues.
- b. Use photomicrographs, models, and drawings to state the locations of epithelial, connective, muscular, and nervous tissues in the body.
- c. Use photomicrographs, models, and drawings of epithelial, connective, muscular, and nervous tissues to state their functions in the body.
- d. Use photomicrographs, models, drawings, and microscopic observations to identify variations in human populations that can cause diseases and disorders, such as sickle-cell anemia.

Course Outcome(s):

List the 11 body systems, identify body cavities, and describe the location, structure, and function of major organs in each body system.

Objective(s):

- a. Use photomicrographs, models, drawings, and animal dissections to identify and describe major body cavities.
- b. Use photomicrographs, models, drawings, and animal dissections of animals to describe the location of organs of the 11 body systems of humans.
- c. Use photomicrographs, models, drawings, and dissections of animals to state the function of major organs.
- d. Use photomicrographs, models, drawings, and dissections of animals to describe the structure of individual organs.
- e. Use photomicrographs, models, drawings, and dissections of animals to describe the path of food, blood, air, gametes, and urine through humans.

Course Outcome(s):

Measure physiological variables, state how these variables change in response to disturbances in homeostasis, and explain why the variables changed.

Objective(s):

- a. Measure heart rate, blood pressure, reflex time, and respiratory volume at rest in after disturbances in homeostasis.
- b. Listen to heart and lung sounds and relate the sounds to function of the organs and homeostasis.

Course Outcome(s):

Define homeostasis and explain how different organs and organ systems work together to maintain homeostasis.

Objective(s):

- a. Explain how the anatomy of the lungs, liver, and kidneys contributes to homeostasis.
- b. Perform experiments analyzing carbon dioxide transport and release and relate the results to homeostasis.
- c. Conduct experiments analyzing glucose levels in mock solutions of blood from different blood vessels and relate the results to eating and homeostasis.
- d. Perform experiments analyzing the chemical composition of bones and relate the findings to homeostasis.

Methods of Evaluation:

- a. Quizzes
- b. Laboratory practical examinations
- c. Written reports
- d. Participation in laboratory activities

Course Content Outline:

- a. Scientific method
 - i. Steps of the scientific method
 - ii. Observations
 - iii. Hypotheses
 - iv. Inferences

- v. Experimental variables
- vi. Controls
- vii. Indicators
- b. Homeostasis
 - i. Definition
 - ii. Negative feedback
 - iii. Results when disrupted
- c. Measurements
 - i. Length
 - ii. Volume
 - iii. Mass
 - iv. Temperature
 - v. Accuracy
 - vi. Precision
- d. Microscopy
 - i. Parts of a compound light microscope
 - ii. Parts of a stereomicroscope
 - iii. Safety, use, and cleaning of microscopes
 - iv. Preparing microscopic slides
 - v. Measuring field of view
 - vi. Measuring depth of field
- e. Biological Molecules
 - i. Monomers and polymers
 - ii. Proteins
 - 1. Enzymes
 - a. Structure and function
 - b. Measuring activity
 - c. Factors that affect enzyme activity
 - iii. Carbohydrates
 - iv. Lipids
 - v. Nucleic acids
 - vi. Dehydration and hydrolysis reactions
- f. Cells
 - i. Definition
 - ii. Microscopic identification of cells
 - iii. Organelles' structures and functions
 - iv. Cell membrane structures and functions
 - v. Cytosol structures and functions
 - vi. Movement across plasma membranes
 - 1. Diffusion
 - 2. Osmosis
 - 3. Facilitated transport
 - 4. Active transport
 - vii. Structure determines function
- g. Tissues' Structures, Functions, and Locations
 - i. Connective
 - 1. Bone
 - 2. Cartilage
 - 3. Ligaments
 - 4. Tendons
 - 5. Adipose
 - 6. Blood
 - ii. Muscular
 - 1. Skeletal
 - 2. Smooth
 - 3. Cardiac
 - iii. Epithelial
 - 1. Simple
 - 2. Stratified

3. Apical layer
 - a. Squamous
 - b. Cuboidal
 - c. Columnar
- iv. Nervous
- h. Body Systems and Major Organs
 - i. Integumentary
 1. Skin
 2. Hair
 3. Nails
 - ii. Skeletal
 1. Bones
 2. Ligaments
 3. Tendons
 4. Cartilage
 - iii. Muscular
 1. Major muscle groups
 2. Sliding filament model
 - iv. Respiratory
 1. Upper respiratory tract
 2. Lower respiratory tract
 3. Lungs
 - v. Reproductive
 1. Male reproductive tract
 2. Female reproductive tract
 - vi. Nervous
 1. Central nervous system
 - a. Brain
 - b. Spinal cord
 - c. Special senses
 2. Peripheral nervous system
 - a. Cranial nerves
 - b. Spinal nerves
 - c. General senses
 - vii. Cardiovascular
 1. Heart
 2. Blood vessels
 3. Fetal versus adult circulation
 - viii. Lymphatic/Immune
 1. Primary immune organs
 2. Secondary immune organs
 3. Lymphatics
 - ix. Urinary
 1. Kidneys
 2. Ureters
 3. Urinary bladder
 4. Urethra
 - x. Digestive
 1. Gastrointestinal tract
 2. Accessory organs
 - xi. Endocrine
 1. Glands
 2. Hormones

Resources

Mader, Sylvia. (2020) *Laboratory Manual for Human Biology*, McGraw-Hill.

Mader, Sylvia and Michael Windelspecht. (2020) *Human Biology (Looseleaf)*, McGraw-Hill.

Johnson, Judith and Betty A. McGuire. (2017) *Biology of Humans: Concepts, Applications, and Issues*, Pearson.

Openstax. *Concepts of Biology*. Openstax, 2013.

OpenStax. (2021) *Anatomy and Physiology 2e*, Ann Arbor: XanEdu.

Instructional Services

OAN Number:

Ohio Transfer 36 TMNS

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