CENTRAL TEXAS COLLEGE
BIOL 2401
ANATOMY AND PHYSIOLOGY I

Semester Hours Credit: 4

INSTRUCTOR: ____________________________

OFFICE HOURS: ____________________________

I. INTRODUCTION

A. Anatomy and Physiology I is the study of the parts of the living organisms and the relationship and the interdependence of these parts to each other. Anatomy and Physiology I emphasizes anatomy and basic physiology.

B. This course is designed primarily for the career nursing and med-tech student but may satisfy requirements for other curricula in the allied health fields.

C. Anatomy and Physiology I is a technical course with heavy emphasis on vocabulary building. The course of study includes learning the structure of all major body systems. Basic functions of these systems will be discussed as they relate to structure.

D. Prerequisites: None

II. LEARNING OUTLINES

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

A. Use appropriate vocabulary and express ideas clearly and concisely.

B. Use the microscope to understand tissue structure and use models of human anatomy to explore the relationship between anatomical structures.

C. Describe the major components of every human organ system.

D. Explain the basic functions of each organ system and how each system enables the organism to survive in its environment.

May 5, 2013
III. INSTRUCTIONAL MATERIALS

The instructional materials identified for this course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS

A. This course is technical and the terminology involved requires a great deal of study time. Memorization is necessary, but UNDERSTANDING must result as the final product.

C. You are expected to read all assigned materials and to bring your textbook to class and the laboratory. Read ahead before ALL labs so you are familiar with the material when you arrive in lab.

D. You are expected to keep a good set of notes because the major part of all examinations will be taken from them. There is more information covered in your textbook than we covered in lecture or lab. You must use your class notes and lab manual to help you focus your studies on the required material. The vocabulary in this course is extensive and precise. Proper spelling is a requirement.

E. Instructor office hours are posted outside the instructor’s office door.

V. EXAMINATIONS AND SEMESTER GRADE COMPUTATIONS

A. Point distribution in the course:
   Lecture exams (4 @ 125 points each) 500 points
   Lab exams (5 @ 100 points each) 500 points
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   1000 points

B. No makeup exams will be given. A comprehensive final exam can substitute for a missed exam. If you have taken all exams, you may take the final and use it to substitute for your lowest exam grade. If you miss more than one exam, you will not be able to make up the points. Students must be on time for all exams. Students arriving more than 10 minutes past the scheduled exam time will not be permitted to take the exam and will receive a 0.

C. Percentage and points used to compute final semester grades.

   90%-100% (900-1000 points)  A
   80%-89%  (800-899 points)  B
   70%-79%  (700-799 points)  C
60%-69% (600-699 points) D
0%-59% (0-599 points) F

D. All lab exams will be fill-in-the-blank. You will lose ½ point for each spelling error. Lecture exams include fill-in-the-blank, multiple choice, and short essay questions. Spelling errors may be deducted.

E. Cell phones and other electronic devices must be turned off and placed **out of sight** during exams.

J. **CHEATING IS TAKEN VERY SERIOUSLY.** Cheating in any form will not be tolerated. The CTC catalog is clear regarding the consequences of cheating: “Students guilty of scholastic dishonesty will be administratively dropped from the course with a grade of ‘F’ and subject to disciplinary action, which may include suspension and expulsion.” A formal charge against the student may be made to the College Disciplinary Board.

**Cheating is defined as an act of:**

a. Giving, receiving, and/or aiding in either the giving or receiving of any unauthorized information during testing

b. Communicating the contents, general or specific, of any test or quiz to include the lending or borrowing of past tests or quizzes when the instructor has not specifically sanctioned this act

c. Using in the testing area any covert and unacceptable means of receiving or giving information

**VI. NOTES AND ADDITIONAL INSTRUCTIONS**

A. **Course Withdrawal:** (Consistent with CTC policy)

B. **Administrative Withdrawal:** (Consistent with CTC policy)

C. **Incomplete grade:** (Consistent with CTC policy)

D. **Americans with Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.
E. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

F. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

G. **Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

VII. **COURSE OUTLINE**

Note: Some units are much longer than others. Units do not correspond to a certain number of lectures.

A. **UNIT ONE:** The human organism—an overview

1. **Learning Outcomes:** Upon successful completion of this unit, the student will:

   a. List the levels of organization of living organisms.
   b. Explain the major life processes and the requirements of living organisms with examples.
   c. Identify the functions and major organs of the human systems.
   d. Identify the major body cavities and the abdominal regions.
   e. Apply directional terms and planes of reference to the human body.
   f. Define the anatomical position and identify regions of the body.
   g. Identify the major organs of the human body evident on models in the laboratory and in pictures.
   h. Identify symbols for important atoms and ions in biological systems.
   i. Identify the parts of the atom and explain what occurs when atoms become involved in covalent, ionic and hydrogen bonds.
   j. Use structural and molecular formulas and manipulate structural models to illustrate important inorganic and small organic molecules.

2. **Learning activities:**
a. Classroom lecture
b. Reading assignment: Chapters 1 and 2 in text.
c. Reading for labs 1 and 2 in lab manual.
d. Lecture review sheet.
e. Checking your understanding questions in lab manual.

B. UNIT TWO: Molecular and cellular structure of living things:
Water and solutions; Basic biochemistry; Cell structure, cell membranes and transport; Homeostasis; Metabolism; Using the Microscope; Tissues

1. **Learning outcomes**: Upon successful completion of this unit, the student will:

a. Describe the structure and properties of water molecules. Explain why water is important in living organisms.
b. Describe the pH scale and give examples of the pH of various body solutions. Describe and illustrate the behavior of acids, bases and salts in aqueous solutions.
c. Define osmosis, hypotonic, hypertonic and isotonic solutions, and explain the effects of these solution types on cells.
d. List the 4 major groups of macromolecules, their elements and examples of each.
e. Discriminate between anabolic (synthesis) and catabolic (decomposition), for each of the four major groups of macromolecules. Discriminate between exchange (double/single replacement) reactions and reversible reactions.
f. Describe major functions of the various macromolecules in living systems.
g. Describe the structure of a typical cell. Sketch and label the parts of the cell.
h. Describe the functions of the cell membrane and the molecules that control these functions.
i. Discuss the various transport processes used at the membrane level.
j. Describe the structure and function of the major organelles.
k. Discuss the purpose of meiosis and mitosis and the cell types that perform these processes.
l. Give the chemical reaction for cellular respiration and explain why production of ATP is necessary for cells.
m. Describe the major features of the 4 basic tissue types.
n. Compare and contrast the features of epithelial tissues, how they are classified and the position and importance of the basement membrane.

o. Compare and contrast each of the 5 common epithelial types identified in the lab manual.

p. Compare and contrast the characteristics of connective tissues including ground substance and fibers.

q. Identify the major types of connective tissues under the microscope including fiber types and features noted in the lab manual.

r. Define and give examples of homeostasis.

s. Proficiently operate a microscope and calculate specimen magnification.

2. **Learning Activities:**

   a. Classroom lecture.
   b. Read chapters 3 and 4 in text
   c. Reading and activities for labs 3-5 in lab manual.
   d. Laboratory practice in use of microscope.
   e. Lecture review sheet.
   f. Checking your understanding questions in lab manual.

C. **UNIT THREE:** The integument (skin)

1. **Learning outcomes:** Upon successful completion of this unit, the student will:

   a. Describe the three main layers of the integument.
   b. Describe the strata of the epidermis and relate their structure to the events that occur as cells of the epidermis mature.
   c. Describe the structure of the dermis and hypodermis.
   d. List the accessory structures (epidermal derivatives) and their functions.
   e. Compare and contrast the various types of glands and nerve endings in the integument. Sketch these structures in the lab manual.
   f. Recognize the epidermal strata in slides and models.
   g. Identify the regions of the dermis in slides and models.
   h. Identify specific nerve endings and glands as outlined in the lab manual.
   i. Identify the regions of the hair.

2. **Learning activities:**
D. UNIT FOUR: Bones and joints

1. **Learning outcomes:** Upon successful completion of this unit, the student will:

   a. Describe the functions of bone.
   b. Describe and give examples of the types of bones.
   c. Sketch, label and describe the structure of a long bone including the surrounding layers.
   d. Compare and contrast the structure of spongy and compact bone.
   e. Discuss the composition and maintenance of bone matrix.
   f. Describe the processes of intramembranous and endochondral ossification.
   g. Describe the function of the epiphyseal plate and sequence the timing of endochondral ossification.
   h. Define and give examples of the major joint types.
   i. Describe and give examples of the 6 types of synovial joints.
   j. Relate the angular and special movements to the joint type where they are produced.
   k. Discuss the composition and function of synovial fluid.
   l. Sketch and describe the structure of the joint capsule and associated features.
   m. Differentiate between the axial and appendicular skeleton.
   n. Identify the cranial sutures and fontanels.
   o. Identify the bones and features of the cranium.
   p. Identify the facial bones and features.
   q. Identify the major regions of the vertebral column, name the vertebrae according to their number and region and identify the features of a single vertebra.
   r. Identify the features of the thorax.
   s. Identify the bones and features of the upper extremity, lower extremity, pectoral girdle and pelvic girdle.

2. **Learning activities:**
   a. Classroom lecture.
   b. Read chapters 7 and 8 in text.
   c. Reading and lab exercises on skeletal system.
d. Checking your understanding questions for skeletal system in lab manual.
e. Lecture review sheet.

E. UNIT FIVE: Myology

1. **Learning outcomes**: Upon successful completion of this unit, the student will:
   a. Compare and contrast skeletal, smooth and cardiac muscle.
   b. Explain the functions of muscles and the terms origin, insertion, action.
   c. Describe the macroscopic and microscopic features of muscle tissue.
   d. Sequence the events that occur during muscle contraction and the changes that take place in the sarcomere.
   e. Distinguish between the various types of muscle fibers.
   f. Compare the microscopic structure of smooth, skeletal and cardiac muscle.
   g. Identify the muscles on the muscle models using the muscle tables in your lab manual as a guide.
   h. Complete the muscle tables and learn the origin, insertion and action for the required muscles.
   i. Identify the muscles, ligaments, joints and cartilage that stabilize the knee joint.

2. **Learning activities**:
   a. Classroom lecture.
   b. Read chapter 9 in text.
   c. Reading and lab exercises on muscles.
   d. Lecture review sheet.
   e. Checking your understanding questions on muscles in lab manual.

F. UNIT SIX: Cardiovascular system

1. **Learning outcomes**: Upon successful completion of this unit, the student will:
   a. Identify the surface features, chambers and valves of the heart.
   b. Trace the path of blood flow through the heart in pictures and on models and dissected specimens. Relate path of flow to pulmonary and systemic circulation.
c. Compare and contrast the two valve types of the heart with each other and with the valves in veins.
d. Describe coronary circulation.
e. Discuss the structure and function of the pericardium.
f. Describe the path of blood flow in pulmonary, systemic, cerebral, fetal, and hepatic portal circulation pathways.
g. Compare and contrast the structure of arteries, veins, and capillaries.
h. Locate the features of the heart identified in your lab manual on the dissected heart and heart models.
i. Locate the major blood vessels listed on page 43 of your lab manual on the torso models (where possible), on diagrams, and on the “vessel man” model.
j. Identify the layers of blood vessel walls and compare the layer structures in the three major types of blood vessels: arteries, veins and capillaries.
k. Identify the artery and vein under the microscope.

2. Learning activities:

a. Classroom lecture.
b. Read chapter 15 in text.
c. Reading and exercises in the lab manual on heart and blood vessels.
d. Lecture review sheet.
e. Checking your understanding questions in lab manual.

G. UNIT SEVEN: Lymphatic system and immune system

1. Learning outcomes: Upon successful completion of this unit, the student will:

a. List the functions of the lymphatic system.
b. Compare the structure of lymph vessels with circulatory vessels.
c. List and explain the function of primary and secondary lymphatic organs.
d. Describe the connections between the circulatory and lymphatic systems.
e. Distinguish between specific and nonspecific defenses and give examples of each.
f. Explain how the two major types of lymphocytes form and are activated. Explain their functions in the immune system.
g. Distinguish between primary and secondary immune responses.
h. Distinguish between active and passive immunity.

i. Explain how allergic reactions and autoimmune disorders arise.

2. **Learning activities**

   a. Read chapter 16.
   
   b. No lab activities are related to this topic.

H. **UNIT EIGHT**: Nervous System

1. **Learning Outcomes**: Upon successful completion of this unit, the student will:

   a. Describe the functions of the major branches of the nervous system.
   
   b. Draw and label a neuron.
   
   c. List the neuroglia and their functions.
   
   d. Describe the structure and function of various types of neurons.
   
   e. Identify the major regions of the brain and spinal cord.
   
   f. Identify the structure and function of the meninges.
   
   g. Describe the components of the autonomic nervous system.
   
   h. List and locate the 12 pairs of cranial nerves on a diagram.
   
   i. List the major spinal plexuses, the spinal nerves that form them and major structures enervated by them.
   
   j. Identify neuron structures under the microscope.
   
   k. Identify spinal cord regions under the microscope.
   
   l. Identify major brain regions and features on the dissected brain and brain models.
   
   m. Identify the structures of the eye on models and on the dissected eye.
   
   n. Identify the extrinsic and intrinsic eye muscles on models. Explain how they control eye movements and vision.

2. **Learning activities**:

   a. Classroom lecture.
   
   b. Read chapters 10, 11 in text.
   
   c. Read parts of chapter 12 relating to lab.
   
   d. Lab exercises 13-20
   
   e. Lecture review sheet.
   
   f. Checking your understanding questions in lab manual.
I. UNIT NINE: Endocrine system

1. **Learning outcomes**: Upon successful completion of this unit, the student will:

   a. Locate and name the major endocrine glands on a diagram and on laboratory models.
   b. Explain the difference between tropic and direct acting hormones. Give examples of each.
   c. Discuss the role of the hypothalamus in relation to nervous system and endocrine system control.
   d. Name some hormones produced by major endocrine glands and explain the function of each.

2. **Learning activities**:

   a. Classroom lecture.
   b. Lecture review sheet
   c. Read chapter 13.

J. UNIT TEN: Digestive System and Respiratory system

1. **Learning outcomes**: Upon successful completion of this unit, the student will:

   a. Name the digestive organs of the alimentary canal and the accessory organs. Explain their main functions.
   b. Describe the major events of digestion and explain where they occur.
   c. Discuss the enzymatic breakdown of the major groups of food molecules.
   d. Describe the histology of the gastrointestinal tract and the variation in the mucosa and muscularis between different organs of the alimentary canal.
   e. Which digestive events occur in each organ of the alimentary canal?
   f. Describe liver and pancreas functions in detail.
   g. Differentiate between physical and chemical digestion and give examples.
   h. Describe and name the processes and structures involved in moving and mixing materials in the digestive system.
i. Clearly explain the difference between sphincters and valves. Give examples of sphincters in the digestive system.

j. Discuss the composition and function of the secretions of glands of the digestive system.

k. Locate major digestive system features and organs on models and diagrams.

l. Identify pancreatic tissue types and the layers of a cross section of the small intestine under the microscope.

m. Describe the major organs of the upper respiratory system.

n. Describe the gross anatomy of the lungs.

o. Explain the gas exchange process that occurs in the lung alveoli.

p. Identify digestive system organs and major organs of the respiratory system on pictures and models in lab.

q. Identify digestive system tissue samples in lab.

r. List the major structures of the respiratory pathway.

s. Explain how the specific epithelial linings of the respiratory tract prepare air for gas exchange.

t. Sketch and describe the layers of the trachea. Explain how these layers change as branching occurs in the respiratory tree.

2. Learning activities:

   a. Classroom lecture.
   b. Lecture review.
   c. Read chapter 17 and 19 in text.
   d. Lab manual reading and exercises on respiratory and digestive system.
   e. Checking your understanding questions in lab manual.

K. UNIT ELEVEN: Urinary System

1. Learning outcomes: Upon successful completion of this unit, the student will:

   a. Describe the organs and functions of organs of the urinary system.
   b. Describe the macroscopic and microscopic structure of the kidney.
   c. Discuss the processes that occur in various parts of the nephron.
   d. Identify the macroscopic structures of the kidney on models.
   e. Identify the organs of the urinary system on models.
f. Identify the parts of the Bowman’s capsule under the microscope.
g. Identify urinary system organs on pictures and models in lab.
h. Identify urinary system tissue samples in lab.

2. Learning activities:

a. Classroom lecture.
b. Lecture review.
c. Read chapter 20 in text.
d. Lab manual reading and exercises on urinary system.

I. UNIT TWELVE: Reproductive System

1. Learning outcomes: Upon successful completion of this unit, the student will:

a. Name the organs of the male and female reproductive system and give their functions.
b. Describe the process by which gametes are produced in the male and the female.
c. Sequence the events that sperm and egg move along through the male and female bodies.
d. Describe the structure of the sperm and how it relates to the process of fertilization.
e. Name and describe the location of the glands of the male reproductive system. Explain the components of semen produced by each.
f. Discuss hormonal control of the male and female reproductive systems.
g. Discuss the structure of the uterus including the cervix in relation to its function.
h. Discuss the events that occur after fertilization including the basic developmental sequence, development of the membranes around the fetus, the placenta and twinning.
i. Identify the microscopic structures of the ovary and testes.
j. Identify the organs and ducts of the male and female reproductive systems in pictures and on models.

2. Learning activities:

a. Classroom lecture.
b. Lecture review.
c. Read chapters 22 and 23 in text.
d. Reading and exercises in lab manual on reproductive systems.

e. Checking your understanding questions in lab manual.