



School of Health Related
Professions

**Department of
Interdisciplinary Studies**

Anatomy and Physiology One

IDST 1221

Course Description

Anatomy and Physiology is the study of the structure and function of the human body. This course follows a sequential development of the major body systems in an organized and structured curriculum. The course is designed to give the students a selective overview of human anatomical structure and an analysis of human physiological principles. Labs will include slide work, dissection of various animals and studies of the human skeleton. The course will also use computer simulated dissection.

Credits/Modes of Instruction

This is a 4-credit undergraduate course in lecture format that relies on regular activities, assignments, laboratories, and completion of weekly topics.

Pre/Co requisites

Successful high school completion of Dynamics of Health Care in Society

Instructor

The instructor will be a Rutgers SHRP faculty (or adjunct) member.

Course Objectives

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

1. Utilize the language of anatomy to describe levels of structural organization and example of homeostasis
2. Apply basic concepts of chemistry and biochemistry.
3. Identify microscopic structures as presented in the lab.
4. Identify and explain the structure and function of the major body systems and explain their interrelationships with one another in maintaining homeostasis.
5. Identify and locate gross structures of the human anatomy.
6. Develop dissection and lab skills with awareness of infection control and safety.
7. Compare and contrast normal and abnormal characteristics and functions of the body.

Teaching Suggestions

1. Teacher lecture, followed by discussion.
2. Students read text, followed by discussion.
3. Students view audio-visual material, followed by discussion.
4. Students complete computer software program assignments, when available.
 - a. Body Illustrated, IBM
 - b. Body Works, IBM
 - c. Adam, IBM
 - d. Dr. Know-It-All, Body Works, MAC
 - e. VH Dissector Pro
5. Students read articles, pamphlets and case assignments followed by class discussion.
6. Students view and make posters, followed by class discussion.
7. Guest speakers when appropriate.
8. Related field trips when appropriate.
9. Individual discussion.
10. Written and photocopied notes.
11. Written and oral testing.

Methods of Student Evaluation

Student evaluation will be based on but not limited to the following factors:

1. Student proficiencies
2. Attendance
3. Class Preparation
4. Class Participation
5. Completion of assignments including class work, homework, tests and lab assignments.
6. Fulfillment of other responsibilities as stated by individual instructors.
i.e. Student contract, dated and signed.

Grade Determination

The minimum level of satisfactory performance in this course is a 'C' or better. To receive a 'C' or better, students must first complete ALL course requirements specified above, including meeting the minimum attendance expectation.

Upon successful completion of the course at the high school students will be eligible to take the Rutgers School of Health Related Professions, Health Science Careers standardized exam to determine college credit.

For Anatomy and Physiology 2 - 50% of standardized exam grade + 50% high school grade = Rutgers School of Health Related Professions grade as listed on Rutgers SHRP transcript.

All students must attain a C (74) or better to earn college credits. Minimum passing standardized exam grade must be at least **70** before calculations of college transcript grade can be determined.

Health Science Careers Program Grading System

Weighted Average of All Requirements	Final Letter Grade
94-100	A
90-93	A-
87-89	B+
84-86	B
80-83	B-
77-79	C+
74-76	C

Unsatisfactory Performance/Progress

Unsatisfactory performance which may include late assignments, failing grades, and/or attendance or progress problems will be discussed individually on an as needed basis.

Honor Code and Academic Integrity

(Refer to your SHRP Student Handbook at
http://shrp.rutgers.edu/current_students/handbook.pdf)

The faculties of Rutgers School of Health Related Professions believe that students must observe and support high standards of honesty and integrity. For this reason, all students in this course are expected to abide by the School's Honor Code and uphold its Code of Academic Integrity. As described in detail in your Student Handbook, violations of the Code of Academic Integrity include cheating, plagiarism, fabrication and/or academic misconduct. All such violations will be considered with gravest concern and may be punishable with sanctions as severe as suspension or dismissal. If you have not previously affirmed the School's Honor Code (either in writing or electronically), you must submit a signed and dated copy of the Honor Code to the instructor by the end of the first week of the semester. The Honor Code form is provided in the current SHRP Student Handbook.

General Learning Resources

Textbooks References

Hole's Human Anatomy and Physiology

David Shier

Jackie Butler

Ricki Lewis

Wm. C. Brown/McGraw Hill Publishers

Essentials of Human Anatomy and Physiology

Hole, J.W.

Wm. C. Brown Publishers

Principals of Anatomy and Physiology

Tortora, G.J. and Grabowski, S.R.

HarperCollins College Publishers, Inc.

Human Form, Human Function

Thomas H. McConnell

Kerry L. Hull

Wolters Kluwer, Lippincott Williams & Wilkins

Human Anatomy and Physiology

Marieb, E.N.

The Benjamin/Cummings Publishing Company, Inc.

Fundamentals of Anatomy and Physiology

Martini, F.

Prentice Hall

Anatomy and Physiology

The Unity of Form and Function

Kenneth S. Saladin

Wm. C. Brown/McGraw Hill Publishers

Essentials of Anatomy and Physiology

Valerie C. Scanlon

Tina Sanders

F.A. Davis

Requirements for Anatomy and Physiology One

The study of the structure and function of the human body is necessary as a basic science prerequisite. This will prepare the student for all other basic science and clinical courses. This introductory course includes lectures and lab components of Anatomy and Physiology One. It will also include basic chemistry and microbiology.

OUTLINE:

1. Introduction to Anatomy and Physiology
2. Characteristics of Life
3. Levels of Organization
4. Chemistry
5. Biochemistry
6. Cells
7. Integumentary System
8. Skeletal System
9. Muscular System
10. Nervous System
11. Special Senses

Anatomy and Physiology 1

Course Outline

- I. Anatomy and Physiology
 - A. Study of Structure
 - B. Study of Function

- II. Characteristics of Life
 - A. Maintenance of Life
 - B. Homeostasis

- III. Levels of Organization
 - A. Body Cavities
 - B. Planes
 - C. Directions
 - D. Body Regions
 - E. Organ Systems
 - F. Important terms related to Levels of Organization

- IV. Chemistry
 - A. Concepts and Composition of Matter
 - B. Anatomic Structure
 - C. Molecules and Compounds
 - D. Chemical Bonds and Chemical Reactions
 - E. Important terms related to Chemistry

- V. Biochemistry
 - A. Inorganic Compounds
 - B. Organic Compounds
 - C. Acid/Base Balance

- VI. Cells
 - A. Composition of the Cell
 - B. Membrane Transport (hypertonic/hypotonic)
 - C. Cell Division
 - D. Body Tissues
 - E. Abnormal Cell Division
 - F. Tissue Repair

- VII. Integumentary System
 - A. Skin and Tissues
 - B. Accessory Organs of the Skin
 - C. Homeostatic Balance of the Skin
 - D. Common Diseases and Skin Disorders

- E. Clinical Applications
- F. Related Hormonal Involvement
- G. Medical Terminology

VIII. Skeletal System

- A. Physiology: Functions of Bone
- B. Anatomy: Structure of Bone
- C. Characteristics of Bone
- D. Bone Growth and Development
- E. Intramembranous and Endochondral Ossification
- F. Clinical Applications
- G. Hormonal Involvement
- H. Common Diseases and Disorders
- I. Medical Terminology

IX. Muscular System

- A. Characteristics of Muscle Tissue Types
- B. Physiology of Muscle Tissue
- C. Anatomy and Innervation of Skeletal Muscle Tissue
- D. Hormonal Involvement
- E. Clinical Applications
- F. Anabolic Steroids
- G. Common Diseases and Disorders
- H. Medical Terminology

X. Nervous System

- A. Divisions of the Nervous System
 - 1. Central Nervous System
 - 2. Peripheral Nervous System
- B. Functional Classification
 - 1. Sensory
 - 2. Motor
 - a) Somatic
 - b) Autonomic
- C. Neurophysiology
- D. Anatomy of the Brain
- E. Cranial and Spinal Nerves
- F. Disorders: Homeostatic Imbalances
- G. Regeneration of Nervous Tissue
- H. Clinical Applications
- I. Medical Terminology

XI. Special Senses

- A. Eye and Vision
- B. Ear, Hearing and Equilibrium
- C. Somatic Senses
- D. Disorders: Homeostatic Imbalances
- E. Clinical Applications
- F. Medical Terminology

Objectives:

I. Introduction to Anatomy and Physiology

- A. Define the terms anatomy and physiology, and give three examples for each.

II. Characteristics of Life

- A. List the major characteristics of life and give examples of each.
- B. List and describe the survival needs of a human organism.
- C. Define homeostasis and discuss its importance.
- D. Give examples of negative and positive feedback.

III. Levels of Organization

- A. List and describe in order of increasing complexity the levels of organization of the human body.
- B. Demonstrate the term Anatomical position.
- C. List the major body cavities and their subdivisions.
- D. List and describe the main directional terms and planes used in describing the body.
- E. Use appropriate terms to describe relative positions, body sections, and body regions.
- F. List the eleven major organ systems of the body.
- G. Briefly describe the functions of the major organ systems.

IV. Chemistry

- A. Explain the importance of chemistry in the study of anatomy and physiology.
- B. Distinguish between matter and energy and classify each.
- C. Describe three energy forms.
- D. List the four most common elements in the human body.
- E. Differentiate between elements and atoms.
- F. Describe and diagram the structure of an atom.
- G. Distinguish between an isotope and a radioisotope.
- H. Describe radioisotopes and their role in the diagnosis and treatment of disease.
- I. Explain the importance of chemical reactions and the role of electrons in chemical

bonding.

- J. Explain the relationship between molecules and compounds.
- K. Differentiate between ionic, covalent, and hydrogen bonds and give two examples of each.
- L. Describe chemical reactions that occur in the body and give two examples of each.

V. Biochemistry

- A. Distinguish between organic and inorganic compounds.
- B. Differentiate between a salt, an acid, and a base and give one example of each.
- C. Explain the importance of water for maintaining homeostasis in the body.
- D. Three examples of the roles water plays in the body.
- E. Explain what is meant by the concept of pH and identify the pH value for blood and urine.
- F. Compare and contrast carbohydrates, lipids, proteins, nucleic acids and amino acids in terms of their functions in the body.
- G. Identify the differences between structural and functional proteins.
- H. State the differences between DNA and RNA in terms of their structure and function.
 - I. Define ATP and explain its importance in the body.
 - J. Define important terminology related to chemistry and biochemistry.

VI. Cells

- A. Identify the general characteristics of a typical animal cell.
- B. Explain how the structure of the cell membrane is related to its function.
- C. Identify each cytoplasmic organelle on a diagram or slide and discuss the functions of each.
- D. Describe the structures of a cell nucleus and its parts.
- E. Describe the processes that transport materials in and out of a cell.
- F. Predict whether cells will swell or shrink under various osmotic conditions.
- G. Explain the process of DNA replication and of mitosis.
- H. Describe and explain the importance of cell division.
 - I. Describe the stages of a cell's life, and summarize the significance of mitosis with respect to maintaining a constant chromosome number.
 - J. Describe the roles of DNA and RNA in relation to protein synthesis.
 - K. List and describe the three types of RNA.
 - L. List and identify on a diagram or slide, the four major body tissues and explain their structural differences.
- M. Identify the functions of the four major body tissues and identify their locations.
- N. Compare epithelial with connective tissue.
- O. Compare the three types of muscle tissue.
- P. Compare connective tissues with epithelial membranes and contrast the types of epithelial membranes.
- Q. Describe tissue repair.

- R. Describe abnormal cell division as it relates to genetic diseases and cancer.
- S. Define important terminology related to the cell.

VII. Integumentary System

- A. List and describe the functions of the Integumentary system.
- B. Describe the structure and function of the epidermis, dermis, and hypodermis.
- C. Describe the function and importance of melanin.
- D. Describe the structure of hair and nails and their growth processes.
- E. Name three glands of the skin and describe their function.
- F. List and describe the three classifications of burns.
- G. Explain the importance of the rule of nines.
- H. List and compare the structure of the major membrane types and locate each in the body.
- I. Name three types of skin cancer and their causes.
- J. Identify how aging affects the Integumentary system.
- K. List and describe diseases/disorders associated with the Integumentary system.
- L. Define important terminology of the Integumentary system.

VIII. Skeletal System

- A. Identify the subdivisions of the skeletal system.
- B. Differentiate between the axial and appendicular skeletal systems.
- C. List five functions of the skeletal system.
- D. Describe the structure of long bones and explain the functions of its parts.
- E. List and give an example of the five classifications of bones.
- F. Explain the role of bone salts and the organic matrix in making bone both hard and flexible.
- G. Describe the process of bone formation.
- H. Identify and name the bones of the skull.
 - I. Explain the function of the fontanel on a newborn skull.
 - J. Describe the differences between a newborn and an adult skull.
- K. Name the parts of the vertebral column and describe their differences.
- L. Identify and explain the three abnormal spinal curvatures.
- M. On a skeleton, identify the parts of the axial and the appendicular system.
- N. Differentiate between a male and a female pelvis and identify the reason for the differences.
- O. Identify the three major classifications of joints and give examples of each.
- P. Compare the main types of joints, and describe the structure and function of diarthrosis.
- Q. List and describe the disease/disorders associated with the skeletal system.
- R. Define important terminology of the skeletal system

IX. Muscular System

- A. Define the function of muscle.
- B. Compare each of the three muscle tissue types.
- C. Explain what is meant by the phrase muscles work in antagonistic pairs.
- D. Identify the major parts of a skeletal muscle fiber and describe the functions of each.
- E. Describe the major events that occur during muscle fiber contraction.
- F. Identify ATP as the source of energy for muscle contraction and identify the source of energy for making ATP.
- G. Differentiate between fast and slow muscles.
- H. List the three different types of exercise and give examples of each.
 - I. Describe how stretch receptors in muscles and tendons are important in the body.
 - J. Describe how posture is maintained.
- K. Explain how the location of muscles is adapted to their function.
- L. Describe how the actions of muscles are coordinated to produce body movement.
- M. Describe the location and action of major skeletal muscles throughout the body.
- N. List and describe the characteristics of diseases/disorders associated with the muscular system.
- O. Define important terminology of the muscular system.

X. Nervous System

- A. Explain the anatomical and functional classification of the nervous system.
- B. Identify the functions of neurons and neuroglia.
- C. Draw a neuron, label its parts, and give the functions of each.
- D. Classify three types of neurons in terms of their function.
- E. List the events that lead to the generation of a nerve impulse.
- F. Describe the four basic processes on which all neural responses depend.
- G. Describe a reflex arc and explain how it is carried out by the nervous system.
- H. List at least four types of sensory receptors and describe the functions of each.
 - I. Name the major parts of the brain and describe the functions of each.
 - J. Describe the coverings of the brain and spinal cord and describe how it is protected.
- K. Discuss the formation and function of cerebrospinal fluid.
- L. Describe the structure of the spinal cord and list two important functions.
- M. List the major parts of the peripheral nervous system.
- N. Name and describe the major plexuses.
- O. Name the cranial nerves and list their major functions.
- P. Explain how spinal nerves are named and describe their function.
- Q. Describe the structure of a typical spinal nerve.
- R. List and describe the subdivisions of the autonomic and limbic nervous systems.
- S. Compare and contrast the sympathetic with the parasympathetic.
- T. Contrast the somatic and autonomic divisions of the peripheral nervous system.
- U. Describe the sensory receptors associated with pressure, temperature, and pain.
- V. Explain how the sensation of pain is produced.
- W. List and describe disease/disorders associated with the nervous system.
- X. Define important terminology of the nervous system.

XI. Special Senses

- A. List five types of receptors and describe the function of each.
- B. Describe how sensors receptors stimulate sensory impulses.
- C. Describe how a sensation is produced.
- D. Differentiate between somatic and special senses.
- E. Describe the interrelationship between the sense of taste and the sense of smell.
- F. Identify the parts of the ear and state their function.
- G. Trace the transmission of sound through the ear.
- H. Identify the parts of the eye and state the function of each part.
- I. Describe how the body perceives depth and distance.
- J. Outline the visual pathway.
- K. List and describe diseases/disorders associated with special senses.
- L. Define important terminology of the special senses.