

**I. CATALOG DESCRIPTION:**

A. Division: Science  
Department: Biology  
Course ID: BIOL 251  
Course Title: Human Anatomy and Physiology II  
Units: 4  
Lecture: 3 hours  
Laboratory: 3 hours  
Prerequisite: BIOL 250

B. Course Description:

Second semester of a two-semester course in human anatomy and physiology. Focus is on metabolism and homeostasis in the nervous, muscular, endocrine, urinary, digestive, and reproductive systems. Includes cat dissection.

Schedule Description:

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**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One**

**III. EXPECTED OUTCOMES FOR STUDENTS:**

Upon completion of the course, the student should be able to:

- A. Build a conceptual framework that allows logical integration of information about the human body.
- B. Identify the inter-relationships between the organs and bodily processes studied.
- C. Relate new material to previously learned material in BIOL 250.
- D. Collect and evaluate laboratory data in written reports.
- E. Apply vocabulary and concepts of anatomy and physiology to discussions of clinical situations.
- F. Urinary system:
  1. Describe and identify the function of the external and internal anatomical features of the kidney, including microscopic components.
  2. Compare the processes of the nephron in filtration, reabsorption and secretion.
  3. Evaluate inter-relationships among water, electrolyte, and acid-base balances.
- G. Nervous system:
  1. Relate the structure and physiology of nerve cells to their functions, and describe neurotransmitter function at the synaptic level.
  2. Compare and contrast the anatomy of the brain and spinal cord and the functions of each central nervous system region.
  3. Identify the cranial nerves and their actions, and construct an outline of the pattern and distribution of spinal nerve plexuses.
  4. Compare and contrast the divisions of the autonomic nervous system.
  5. Discuss the chemistry of secreted neurotransmitters in relation to receptors.
  6. Recognize the key components of the anatomy and physiology of the eye, ear, and other special and somatic senses.

- H. Muscular system:
  - 1. Dissect the muscular system of the cat and compare the cat's musculature to human musculature.
  - 2. Interrelate the structure and physiology of the components involved in muscle contraction
  - 3. Identify the names and actions of the organs of the human muscular system and relate to origins and insertions of specified muscles.
- I. Explain the role of the body's chemical messengers, the mechanisms of action of hormones on target tissues and cells, and the interrelationship of the endocrine system with nervous system functions.
- J. Draw inferences from the general concepts of nutrition, digestion, and metabolism to common human health disorders.
- K. Compare and contrast the male and female reproductive systems.
- L. Dissect the body cavity of the cat and identify the major internal organs; compare and contrast the cat's internal organization to human gross anatomy.

**IV. CONTENT:**

- A. Anatomy and Physiology of the Urinary System
  - 1. Gross Anatomy of the Kidney
  - 2. Anatomy of the Nephron
    - a. Renal corpuscle
    - b. Renal tubule
  - 3. Urine Production
    - a. Filtration
    - b. Reabsorption
    - c. Secretion
  - 4. Regulation of Urine Concentration and Volume
  - 5. Micturition
  - 6. Water, Electrolyte and Acid-Base Balance
    - a. Water intake and output
    - b. Electrolytes and disorders
    - c. Acid-base regulation
      - 1) Buffers
      - 2) Kidneys
      - 3) Lungs
      - 4) Acidosis vs. alkalosis
- B. Electrically Active Tissues
  - 1. Anatomy and Physiology of Nerve Cells
  - 2. Resting Membrane Potential
  - 3. Local Graded Potentials
  - 4. Action Potentials
  - 5. Continuous and Saltatory Conduction
  - 6. Synapses and Neurotransmission
  - 7. Neurotransmitters
  - 8. Anatomy and Physiology of Muscular Tissue
- C. The Nervous System
  - 1. Brain and Spinal Cord
    - a. Cerebral cortex and medulla
    - b. Diencephalon
    - c. Brain stem
    - d. Spinal cord
  - 2. Peripheral Nervous System
    - a. Cranial Nerves
    - b. Spinal Nerves
    - c. Nerve Plexuses

3. Autonomic Nervous System
  - a. Parasympathetic
  - b. Sympathetic
4. Autonomic Chemistry
  - a. pre-ganglionic neurons
  - b. post-ganglionic neurons
5. Special Senses
- D. The Endocrine System
  1. Variety of Chemical Messengers
  2. Mechanisms of Hormone Action
  3. Anatomy & Physiology of Endocrine Organs
    - a. Pituitary and Hypothalamus
    - b. Thyroid and Parathyroid
    - c. Adrenal Cortex and Medulla
    - d. Pancreas
    - e. Other Organs
  4. Disorders of the Endocrine Glands
- E. The Gastrointestinal Tract and Digestion
  1. Anatomy of the Alimentary Tract & Accessory Organs
  2. Enzymes and their Digestive Actions
  3. Control & Regulation of Secretions and Movements
  4. Basic Nutrition
    - a. Vitamins
    - b. Minerals
  5. Basic metabolism
    - a. Aerobic metabolism
    - b. Anaerobic metabolism
- F. Reproductive Systems
  1. Male
    - a. Anatomy
    - b. Spermatogenesis
    - c. Physiological Processes
  2. Female
    - a. Anatomy
    - b. Oogenesis
    - c. Physiological Processes
      - 1) Hormonal cycles
      - 2) Ovarian cycles
      - 3) Uterine cycles

**V. METHODS OF INSTRUCTION:**

- A. Lecture
- B. Demonstration
- C. Multi-media, including video, overheads, PowerPoint presentations
- D. Laboratory
  1. Cat dissection
  2. Experiments
  3. Microscopic examination of tissues
  4. Written lab reports
- E. Student Study Guide

**VI. TYPICAL ASSIGNMENTS:**

- A. Read the assigned chapter in the textbook to learn the names and locations of musculature as listed on the handout on human muscles. Assess the functions of individual muscles and groups of muscles. Locate listed origins, insertions, and innervations.

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- B. Read the chapter on human reproduction. Prepare a chapter outline and a 20-minute lecture outline on a student-selected topic related to the chapter reading.
- C. Complete the coloring, labeling, and diagramming exercise from the student study guide that relates to the scheduled lecture.
- D. Upon completing the lab exercise on urinary output, analyze the collected class data, construct a summary of results, and turn in a written report that includes a discussion of the outcomes.
- E. Search on-line for web sites related to cardiovascular health.

**VII. EVALUATION:**

- A. Methods of Evaluation
  - 1. Objective lecture examinations
    - Sample questions:
      - a. A patient's lab results show a pH of 7.38, an arterial carbon dioxide level above 48, and a bicarbonate level of 24 mEq/L. Name the condition.
      - b. The nerve poisons saxitoxin (STX) and tetrodotoxin (TTX) selectively inhibit what region of the neuron?
      - c. From the diagram, identify each listed para-sympathetic ganglion.
  - 2. Short answer lab quizzes
    - Sample questions:
      - a. Assess points a, b, c, and d on the provided graph (illustrating an oscilloscope reading of a nerve potential.)
      - b. Discuss the formation of negative color afterimages by cells of the retina.
      - c. What is the effect of drinking a hypertonic salt solution on blood ADH levels and urine production?
  - 3. Lab Reports
  - 4. Homework Assignments
  - 5. Cat Practical Examination
  - 6. Human Muscle Quizzes
- B. Frequency of Evaluation
  - 1. 4 major exams (lecture)
  - 2. 1 take home exam (lecture)
  - 3. 2-3 quizzes (lecture)
  - 4. lab quizzes (weekly)
  - 5. 1 dissection project

**VIII. TYPICAL TEXT(S):**

- A. Tortora, Gerald J. and Sandra Reynolds Grabowski, Principles of Anatomy and Physiology, 8th edition, Harper Collins College Publishers, 1996.
- B. Seeley, Rod R., et al., Anatomy and Physiology, 4th edition. Mosby Yearbook. 1998.
- C. Van de Graaff, et al., Concepts of Human Anatomy and Physiology, 4th edition. Wm. C. Brown Publishers, 1998.

**IX. OTHER SUPPLIES REQUIRED OF STUDENTS:**

None