

Prepared by the Department of Natural Sciences &amp; Applied Technology

Date of Departmental Approval: February 28, 2014

Date Approved by Curriculum and Programs: March 12, 2014

Effective: Fall 2014

1. **Course Number: BIO251 and BIO251L**  
**Course Title: Human Anatomy and Physiology I and Laboratory**
2. **Description:** A comprehensive systematic study of the human body emphasizing the structure and function of the systems. Part I topics include: cells and tissues, chemistry review, metabolism, the integumentary, skeletal, muscular, and reproductive systems and metabolism with correlated laboratory work. (3 class hours/ 2 laboratory hours).
3. **Student Learning Outcomes:**  
Upon successful completion of the course, students are able to do the following.
  - Use anatomical terms to describe body sections, parts, and regions
  - Explain the concept of homeostasis and describe homeostatic control mechanisms
  - Discuss the structure and function of carbohydrates, lipids, proteins, nucleic acids, and ATP as these compounds relate to the human body
  - Describe the structure of the plasma membrane and describe passive and active transport mechanisms that enable substances to cross the plasma membrane.
  - Describe, compare, and contrast the structure and function of the following cellular organelles: ribosomes, endoplasmic reticulum, Golgi apparatus, lysosomes, peroxisomes, mitochondrion, and the cytoskeleton.
  - Describe the events of cell division and be able to differentiate between the mitotic phases.
  - Explain and summarize the major events of protein synthesis.
  - Name and identify the four principle tissue types; name the subdivisions within each primary tissue type and state a location and function for each subdivision
  - Describe the structural components of the Integumentary System and explain how the structural components relate to the major functions of the Integumentary System.
  - Describe and name the components of the male and female reproductive systems
  - Compare and contrast the hormonal mechanisms that regulate the functions of the male and female reproductive systems.
  - Describe the affects of pregnancy on the body of a woman and describe the interactions of hormones that control parturition and lactation
  - Describe the major events of embryonic and fetal development
  - Using basic principles of genetics and given the genotypes of the parents construct a Punnett Square and predict the genotypes and phenotypes of the offspring.
  - Describe the metabolic pathways involved with glucose catabolism and estimate the energy yield from glycolysis and aerobic respiration.
  - Compare and contrast protein and neutral fat catabolism to glucose catabolism.
  - Identify the bones and major parts of the bones of the human skeleton
  - Compare, and contrast the different cell types of bone and explain how these cells relate to the physiology of bone.
  - Describe the types of movements that may occur at synovial joints
  - Identify major muscles of the human body
  - Explain the key steps involved in the contraction of skeletal muscle fibers.
  - Compare the net yield of ATP from the complete oxidation of glucose with the net yield from Glycolysis.
  - Analyze and describe the roles of the muscles, bones, and joints during body movement.
  - Measure, calculate, and compare the rates of diffusion in a gas, liquid, and solid.
  - Calculate the maximum number of ATP molecules that could be produced during the complete oxidation of a molecule of glucose with during aerobic respiration.
  - Calculate the maximum number of ATP molecules that could be produced during the complete oxidation of a 20 carbon fatty acid chain.

- Calculate the total magnification power of a microscope when using different objective lenses.
- Identify the parts of a microscope and describe the function of each part.
- Utilize basic microscopic skills to observe protozoa, cells, and tissues.
- Utilize electronic media for practice, review, and self-assessment.
- Utilize website links for extra help in understanding and visualizing complex physiological concepts.
- Work cooperatively in a small group setting to complete various laboratory exercises, following the oral and written instructions provided.

**4. Credits:** Four credits

**5. Satisfies a General Education Requirement:** Natural or Physical Science

**6. Prerequisite:** A grade of C or higher in CHM109 or (BIO101 or BIO151) or (CHM101 or CHM151)

**7. Semesters Offered:** Fall, Spring, Summer

**8. Suggested General Guidelines for Evaluation:** Course grading procedures and make-up policies are detailed in a student handout. In summary, 75% of the course grade evaluation is based on achievement on ten minute quizzes, hour exams, and the final exam, while 25% is based on laboratory work as evaluated by practical examination, or lab reports, or written quizzes.

**9. General Topical Outline (Optional):**

ORGANIZATION OF THE HUMAN BODY

1. Introduction to the Human Body: levels of organization, anatomical positions, regions, directional terms, body cavities, homeostasis
2. The Chemical Level of Organization
3. The Cellular Level of Organization
4. The Tissue Level of Organization
5. The Integumentary System

CONTINUITY

6. The Reproductive System
7. Development and Inheritance

MAINTENANCE

8. Metabolism

SUPPORT AND MOVEMENT

9. Skeletal Tissue
10. The Skeletal System
  - Axial skeleton
  - Appendicular skeleton
11. Articulations
12. Muscular Tissue
13. Muscular System