COMMON COURSE OUTLINE: Course discipline/number/title: BIOL 1217: Anatomy and Physiology I

A. CATALOG DESCRIPTION

1. Credits: 4
2. Hours/Week: 3 hours lecture and 2 hours lab
3. Prerequisites (Course discipline/number): High school Chemistry or CHEM 1101 or equivalent and high school Biology or BIOL 1101 or BIOL 1107 or BIOL 1110 or equivalent. College-level reading and writing skills, and MATH 0098 or equivalent.
4. Co-requisites (Course discipline/number): None
5. MnTC Goals (if any): Goal 2/Critical Thinking, Goal 3/Natural Sciences

This course is part one of the two-semester Anatomy and Physiology sequence. The course focuses on cell structure and function, tissues, chemistry as it relates to biological function, metabolism, and major organ systems including the integumentary system, muscular and skeletal systems, cardiovascular system and blood and lymphatic and immune systems.

B. DATE LAST REVISED (Month, year): April, 2010

C. OUTLINE OF MAJOR CONTENT AREAS:

Students will demonstrate basic knowledge, understanding and ability to apply and analyze concepts and solve problems in the relationship of anatomy and physiology of the following areas and body systems. The student will use information from the prerequisite courses in their process. Students will be introduced to microscope use in order to view and identify tissues. Students will follow experimental procedures to learn about cellular transport mechanisms, learn to identify and classify bones and their processes and become familiar with surface muscle anatomy. Students will dissect preserved specimens to explore heart anatomy and circulatory routes. Students will use computer hardware/software to run physiology simulations and to record, analyze, and interpret data.

1. Introduction to the Human Body:
   a) Anatomy and physiology defined
   b) Levels of structural organization
   c) Homeostasis: maintaining physiological limits
   d) Terminology
   e) Planes, sections and body cavities

2. Chemical Level of Organization:
   a) Matter and energy
   b) Chemical bonds and reactions
   c) Inorganic compounds
   d) Acids, bases, pH
   e) Organic compounds – carbohydrates, lipids, proteins, nucleic acids

3. Cellular Level of Organization:
   a) Plasma (cell) membrane
   b) Movement of materials across the plasma membrane
   c) Cytosol
   d) Organelles
   e) Gene action - protein synthesis
      i. Transcription and Translation
   f) Mitosis
   g) Meiosis
   h) Cellular Metabolism
      i. Anabolic and catabolic reactions
      ii. Aerobic and anaerobic pathways for ATP production
      iii. Metabolism of carbohydrates, lipids, and proteins
C. OUTLINE OF MAJOR CONTENT AREAS: Continued . .

4. The Tissue Level of Organization:
   a) Epithelial tissues
   b) Connective tissues
   c) Muscle tissues
   d) Nervous tissue
      i. Physiology of Neurons - Impulse Conduction, Synaptic Transmission
   e) Tissue repair and homeostasis

5. The Integumentary System:
   a) Functions of the Skin
   b) Epidermal derivatives
      i. Hair
      ii. Glands
      iii. Nails
   c) Homeostatic imbalances

6. Bone Tissue:
   a) Functions of bone tissue
   b) Histology of bone tissue
   c) Physiology of bone formation: ossification
   d) Physiology of bone growth
   e) Bone homeostasis
   f) Homeostatic imbalances

7. The Skeletal System:
   a) Classification of bones
   b) Surface markings
   c) Divisions of skeletal system
      i. Axial
      ii. Appendicular

8. Articulations:
   a) Classification of joints
   b) Movement at joints
   c) Homeostatic imbalances

9. Muscle Tissue:
   a) Types of muscle tissue
   b) Characteristics and functions of:
      i. Skeletal muscle
      ii. Smooth muscle
      iii. Cardiac muscle
   c) Anatomy of whole skeletal muscle
   d) Neuromuscular junction
   e) Skeletal muscle physiology
   f) Homeostatic imbalances

10. The Muscular System:
    a) Skeletal muscle naming
    b) Skeletal muscle actions
    c) Homeostatic imbalances
C. **OUTLINE OF MAJOR CONTENT AREAS: Continued**

11. Cardiovascular System:
   a. Heart Anatomy
   b. Coronary Circulation
   c. Heart Physiology
   d. Maintenance and Control of Blood Pressure
   e. Blood Vessel structure
      i. Arteries
      ii. Capillaries
      iii. Veins
   f. Pulmonary circulation
   g. Systemic circulation
      i. Blood flow to the brain
   h. Blood Composition and Histology
   i. Blood cell production and destruction/recycling
   j. Hemostasis
   k. Blood typing – Transfusion

12. Lymphatic System:
   a. Lymphatic organs, tissues, and vessels
   b. Flow of lymph
   c. Homeostatic imbalances

13. Immune System:
   a. Non-specific resistance mechanisms
   b. Humoral immune response – antibody mediated
   c. Cell-mediated immune response
   d. Homeostatic imbalances

D. **LEARNING OUTCOMES (GENERAL):** Upon completion of this course students will:
   1. Acquire vocabulary/terminology specific to anatomy and physiology.
   2. Use vocabulary/terminology appropriately both orally and in writing.
   3. Demonstrate proper use of the microscope.
   4. Identify tissues using a microscope and describe the function of each tissue.
   5. Relate the structure of major organs/glands with their function.
   6. Explain physiological principles specific to each body system.
   7. Identify major bones and joints of the body and their specific features.
   8. Identify major muscles of the body and muscle actions.
   9. Identify structures of the heart and major blood vessels of the body.
   10. Predict how homeostatic imbalance(s) can lead to disease.

E. **LEARNING OUTCOMES (MNTC):**
   Goal 2/Critical Thinking: The student will be able to:
   1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
   2. Imagine and seek out a variety of possible goals, assumptions, interpretations or perspectives which can give alternative meanings or solutions to given situations or problems.
   3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
   4. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses and evaluations made by ourselves and others.

   Goal 3/Natural Sciences: The student will be able to:
   1. Demonstrate understanding of scientific theories.
   2. Formulate and test hypotheses by performing laboratory experiments requiring the collection of data, its statistical and graphical analysis and an appreciation of its sources of error and uncertainty.
   3. Communicate their experimental findings, analysis and interpretations both orally and in writing.
E. LEARNING OUTCOMES (MNTC): Continued . .
   4. Evaluate society issues from a natural science perspective, ask questions about the evidence presented and make informed judgments about science-related topics and policies.

F. METHODS FOR EVALUATION OF STUDENT LEARNING:
   1. Lecture exams – objective and/or subjective
   2. Lecture and/or laboratory quizzes
   3. Laboratory practical exams
   4. Lecture and laboratory assignments and/or reports

G. SPECIAL INFORMATION (if any):
   The initial lab session explains and familiarizes the student with general safety hazards and safety equipment in the lab. During the pre-lab discussion, the hazardous characteristics of any materials used during the lab are discussed. In addition, if the lab involves any potentially infectious material, the students will be instructed on the proper use and disposal. The instructor will direct all students to wear necessary protective equipment while working with any hazardous chemicals. A copy of Material Safety Data Sheets for chemicals used is available in the lab.

   This course aligns with the following RCTC Core Outcomes:
   1. Communication
   2. Critical Thinking