COURSE NUMBER & TITLE: BIOL 2151: Human Physiology
CREDITS: 4 (Lecture 3 / Lab 1)
PREREQUISITES: Human Anatomy or Integrated Science recommended

CATALOG DESCRIPTION:
Human Physiology is the study of organ systems and tissues of the human body. Systems included are the cardiovascular, respiratory, lymphatic, digestive, urinary, and reproductive. The focus is on the endocrine, nervous, and integrated control mechanisms of physiology in these systems. This course is intended for practical nurses enrolled in the associate degree nursing program and students in health-related fields as well as liberal arts students.

OUTLINE OF MAJOR CONTENT AREAS:
1. Overview of physiology
   A. Functional characteristics
   B. Homeostasis
2. Basic chemistry and biochemistry
   A. Bonds and reactions
   B. Acids, bases, and salts
   C. Organic compounds
3. Cells and tissues
   A. Membranes
      1. Transport
      2. Electrical potential
      3. Cell interactions
      4. Metabolic functions
   B. Epithelium
      1. Type
      2. Location
      3. Function
   C. Connective tissue
   D. Blood
      1. Composition
      2. Formed elements including cells
      3. Plasma
      4. Hemostasis
4. Integumentary system
   A. Functions of skin
      1. Protection
      2. Temperature regulation
      3. Secretion
      4. Synthesis

5. Skeletal system
   A. Bone development and growth
   B. Calcium regulation
   C. Remodeling and repair

6. Muscular system
   A. Muscle and muscle fiber contraction
      1. Single fiber contraction
      2. Motor unit coordination
   B. Muscle metabolism
      1. Effects of exercise
      2. Comparison of smooth muscle
   C. Skeletal muscle physiology

7. Nervous system
   A. Organization of the nervous system
   B. Neurophysiology
      1. Synapse
      2. Neurotransmitters
   C. Functions of the brain and spinal cord
   D. Functions of the peripheral nervous system
      1. Receptors
      2. Motor endings
      3. Cranial nerves
      4. Spinal nerve reflexes
   E. Functions of the autonomic nervous system
      1. Sympathetic division
      2. Parasympathetic division
      3. Interactions and control
   F. Special senses
      1. Taste and smell
      2. Eye and vision
      3. Ear: hearing and balance

8. Endocrine system
   A. Hormones
      1. Target cell specificity
      2. Mechanisms of action
      3. Control of hormone release
   B. Endocrine organs
      1. Functions of the pituitary gland
      2. Hypothalamus interactions
      3. Other glands
      4. Integration and regulation
9. Cardiovascular system
   A. Heart physiology
      1. Electrical events
      2. Heart sounds and contraction
      3. Cardiac output
   B. Blood vessels
      1. Functions of the arteries, capillaries, and veins
      2. Blood flow, pressure, and resistance
      3. Circulatory pathways

10. Lymphatic system
    A. Functions of the lymphatic vessels
    B. Functions of the lymph nodes
    C. Functions of the spleen, thymus, and tonsils
    D. Immunity
        1. Nonspecific cell and chemical defense
        2. Phagocytes and inflammation
        3. Antigen-antibody response
        4. Cell-mediated immune response
        5. Immunological memory
        6. Imbalances of immunity

11. Respiratory system
    A. Functional anatomy
    B. Mechanics of breathing
    C. Gas exchanges
    D. Transport of gases by blood
    E. Control of respiration

12. Digestive system
    A. Functional anatomy
    B. Digestive physiology
       1. Chemical digestion
       2. Absorption
       3. Nutrition
       4. Metabolism and the role of the liver
       5. Energy balance

13. Urinary system
    A. Kidney physiology
       1. Filtration
       2. Reabsorption
       3. Secretion
    B. Urine
       1. Regulation
       2. Composition
       3. Voiding
C. Fluid and electrolyte balance
D. Acid-base balance
14. Reproductive system
A. Physiology of male system
B. Physiology of female system
   1. Hormonal regulation of ovarian cycles
   2. Hormonal regulation of uterine cycles
C. Physiology of pregnancy
   1. Placental function
   2. Responses of the mother
   3. Parturition and lactation
D. Embryonic development
   1. Through gastrulation
   2. Organogenesis
   3. Fetal physiology
15. Genetics and inheritance
A. Molecular genetics
   1. DNA replication
   2. Genetic code
B. Heritable traits
   1. Mendelian genetics
   2. Multiple alleles
   3. X-linked traits
16. Pathophysiology
A. General adaptation to stress
B. Diseases and conditions
   1. Burns
   2. Cancer
   3. Diabetes
   4. Heart disease
   5. Autoimmunity
17. Pharmacology
   Drug interactions
   1. Pharmacodynamics
   2. Pharmacokinetics
   3. Pharmaceutics

COURSE GOALS/OBJECTIVES/OUTCOMES:
1. Students will describe the structural organization and major functions of the human organ systems and tissues as they relate to maintaining homeostasis.
2. Students will demonstrate fundamental knowledge of chemical processes and how these processes help with cellular function and transport.
3. Students will state the accessory structures of the skin and how they assist with temperature regulation, sensation, and tissue repair.
4. Students will relate bone, muscle, and joint structure to movement, bone formation, and healing.
5. Students will compare the divisions of the nervous system and their roles in
electrochemical communication throughout the human body, including the special senses.

6. Students will demonstrate knowledge of hormone function and their role in maintaining homeostatic balance in the human body.

7. Students will trace the blood flow through major vessels of the circulatory system and relate circulation to mechanisms of heart contraction cycles with EKG technology.

8. Students will explain the mechanism of gas exchange in the respiratory system and the interrelatedness to circulation.

9. Students will list the processes of mechanical and chemical digestion and how food components are assimilated into the human body.

10. Students will explain the major roles of the urogenital systems, including urine formation, fluid and electrolyte balance, reproduction, and development.

MNTC GOALS AND COMPETENCIES MET:
Natural Sciences

HCC COMPETENCIES MET:
Working Productively and Cooperatively
Communicating Clearly and Effectively
Thinking Creatively and Critically
Practicing Cultural, Economic, and Environmental Sustainability

STUDENT CONTRIBUTIONS:
Students are expected to attend all lecture and laboratory sessions, participate in and contribute to class discussions, complete all assignments on time, and request assistance when needed. Attendance is critical for the successful completion of this course.

STUDENT ASSESSMENT SHALL TAKE PLACE USING INSTRUMENTS SELECTED/DEVELOPED BY THE COURSE INSTRUCTOR.

ADDITIONAL INFORMATION: Exposure to hazardous chemicals is minimal. Students may provide their own gloves (optional) which are available for purchase in the college bookstore. Students must observe all lab safety procedures.

Curriculum Committee Approval Date: February 5, 2018

AASC APPROVAL DATE: February 21, 2018
REVIEW DATE: February 2023