

NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: Human Biology

Course #: BIO* 115

Course Description: This one semester laboratory science course covers principles of cell biology, including basic biological chemistry, cell structure and function, human genetics, cell division, cellular respiration, and protein synthesis. These concepts are applied to a study of the structure and function of the major organ systems human body. Aspects of health and disease are presented including basic elements of nutrition, exercise, cancer, and chemical addictions. The course can be used as a prerequisite for BIO 211 or BIO 235.
(3 hours of lecture, 2 hours of laboratory)

Pre-requisite/Co-requisite: Prerequisite: SCI* 099 or equivalent

Goals: To provide the student with an understanding of the biological principles of animal cell physiology as it applies to the structure and function of the human body. To provide students with a basic understanding of the structure and function of the human body and how the systems work together to promote life. To develop a basic understanding of the conditions necessary for good health and examples of major causes of human disease.

Outcomes: At the end of this course students should be able to:

- Recognize the process of scientific method
- Identify the characteristics of life
- Recognize the basic structure of atoms, ions, and molecules
- Define pH and identify the importance of pH in living organisms
- Describe the role of buffers
- Recognize basic functional groups such as amino, carboxyl, hydroxyl and phosphorylation
- Explain the importance of homeostasis and give examples of how the body maintains homeostasis
- Identify the building blocks of carbohydrates, lipids, protein, and nucleic acids and roles of each in the body and major reaction categories important in physiology such as hydrolysis, dehydration synthesis, decarboxylation, and deamination
- Identify the basic structure and function of the plasma membranes, nucleus, organelles and cytosol of an animal cell
- Describe the sequence of events involved in protein synthesis – transcription and translation including initiation, elongation and termination

- Identify the steps in DNA replication and recognize the significance of mutations
- Identify the stages, events and significance of mitosis and meiosis
- Define inheritance and explain the inheritance of dominant, codominant and recessive alleles and predict inheritance patterns such as X-linked, autosomal dominant and recessive
- Recognize specific examples of the four basic types of body tissues, recognize specific subtypes in each category, and identify the function of each type
- Identify and recognize the anatomy and physiology on an organ and cellular level for the:
 1. **integumentary system** including: layers of the skin, structural and functional elements such as hair and hair follicles, sebaceous glands, sweat glands, and arrector pili
 2. **skeletal system** including comparison and contrast of compact bone versus spongy bone, structure of a long bone, endochondral ossification and growth of a long bone, significance of bone remodeling and the role of osteoclasts and osteoblasts in remodeling and the importance of diet in maintaining healthy bones
 3. **muscular system** including the organization of an entire muscle beginning with an individual fiber and its cellular components, to fascicles, and to the entire muscle including role of connective tissue in holding the muscle together. Identification and discussion of the structure and functional role of contractile elements of myofibers including myofibrils, sarcomeres and myofilaments. Students should be able to discuss the sliding filament model of muscle contraction and explain how this leads to movement of a bone.
 4. **nervous system** including division of the nervous system, types of neurons, anatomy of a neuron and events that occur at a synapse. Students should be able to explain the difference between an excitatory postsynaptic potential and an inhibitory post-synaptic potential and how graded potentials relate to an action potential. They should be able to give examples of excitatory and inhibitory neurotransmitters and Students should be able to recognize the regions of the brain and spinal cord and identify their functions. They should be able to recognize the components of a withdrawal reflex.
 5. **digestive system** including the role of the accessory organs and where each of the major categories of nutrients is digested. Students can identify the order in which the food passes through the digestive system and the contribution of each specific organ in digestion and should be able to recognize specific digestive enzymes and where they are produced.

6. **cardiovascular system**, including the composition and role of each of the blood cells, the composition of plasma and the role of hemostasis. Students should be able to recognize the final common pathway in hemostasis. Students should be able to identify the structure and function of the heart, veins, arteries, capillaries and explain the movement of blood through the heart and circulation through blood vessels back to the heart. Students should be able to recognize the major components of an EKG and understand basic pathology including an MI.
7. **respiratory system** including flow of air into the lungs and the structure and function of each component, the dynamics of breathing, and the process of internal and external respiration and the forces that drive gas exchange during each. Students should be able identify how both CO₂ and O₂ are carried in the blood.
8. **urinary system** including the kidneys, ureters, urinary bladder and urethra. Students should be able to identify the role of each component of the nephron and how it contributes to the formation of urine and maintenance of homeostasis. Students should be able to explain how the kidneys maintain the volume, composition and oxygen carrying capacity of blood.
9. **endocrine system** including the major endocrine glands such as the hypothalamus and its role in regulating the pituitary and producing oxytocin and antidiuretic hormone. Students should be able to discuss the anatomy, histology and function of the anterior and posterior pituitary, thyroid gland, pancreas, parathyroid, adrenal gland, ovaries, and testes
10. **lymphatic system** including major lymphoid organs such as lymph nodes and the spleen and specific versus nonspecific immunity. Students should be able to discuss the role of B lymphocytes and antibody production as well as the role of T lymphocytes and the role of helper T cells and cytotoxic T cells.
11. **reproductive system** including the structure and function of female and male reproductive systems including recognizing and identifying the ovarian and uterine cycles, the, the pathway that sperm travel in the male, how erection occurs and where fertilization of the oocyte occurs.
 - Discuss basic principles in nutrition
 - Identify the major steps in cellular respiration including glycolysis, Krebs cycle and the ETC and oxidative phosphorylation and recognize specific important reaction categories such as phosphorylation, isomerization and decarboxylation
 - Identify examples of pathologies for each of the above systems including but not limited to:

Decubitus ulcers, fractures, sprains, carcinoma, basic principles of chemical addiction, depression, gastroesophageal reflux, , myocardial infarction, anemia, asthma, pneumonia, emphysema, kidney damage, diabetes type I and type II,

- Recognize basic diagnostic tests including x-ray, MRI and CT Scans
- Write an essay to show ways in which the body systems work together to support an activity

College Policies

Plagiarism: Plagiarism and Academic Dishonesty are not tolerated at Northwestern Connecticut Community College. Violators of this policy will be subject to sanction. Please refer to your “Student Handbook” under “Policy on Student Rights,” the Section entitled “Student Discipline,” or the College catalog for additional information.

Americans with Disabilities Act (ADA): The College will make reasonable accommodations for persons with documented learning, physical, or psychiatric disabilities. Students should notify Roseann Dennerlein, the Counselor for Students with Disabilities. She is located at Green Woods Hall, in the Center for Student Development. Her phone number is 860-738-6307 (V/TTY) and her email is rdennerlein@nwcc.comnet.edu.

School Cancellations: If snowy or icy driving conditions cause the postponement or cancellation of classes, announcements will be made on local radio and television stations. Students may also log onto the College’s website at www.nwcc.comnet.edu or call the College directly at (860) 738-6464 to hear a recorded message concerning any inclement weather closings. Students are urged to exercise their own judgment if road conditions in their localities are hazardous.