Salem Community College Course Syllabus

Section I

Course Title: Fundamentals of Anatomy and Physiology

Course Code: BIO 150

Lecture Hours: 2
Lab Hours: 4
Credits: 4

Course Description:
Introduces students to the fundamental concepts of human anatomy and physiology. The course will cover the chemical and biochemical foundations involved in the study of anatomy and physiology. The major organ systems of thebody will be studied with a focus on structure and function. The importance of homeostasis will be emphasized throughout the course. Laboratory exercises and dissections will be utilized to reinforce the lecture material. This is a state approved General Education Science course.

Prerequisite:
Completion of ENG 098, if required

Co-requisite:
None

Place in College Curriculum:
This course is a required component of the Pharmacy Technician program. This course is the required prerequisite for BIO 220. It may also be used as a four-credit science elective or an open elective.

Date of Last Revisions:
February, 2014

Section II

Course Content Outline:

A. Introduction
1. Chapter 1: Exploring Life and Science

B. Human Organization
1. Chapter 2: Chemistry of Life
2. Chapter 3: Cell Structure and Function
3. Chapter 4: Organization and Regulation of Body Systems

C. Maintenance of the Human Body
1. Chapter 5: Cardiovascular System: Heart and Blood Vessels
2. Chapter 6: Cardiovascular System: Blood
3. Chapter 7: Lymphatic System and Immunity
4. Chapter 8: Digestive System and Nutrition
5. Chapter 9: Respiratory System
6. Chapter 10: Urinary System and Excretion

D. Movement and Support in Humans
1. Chapter 11: Skeletal System
2. Chapter 12: Muscular System

E. Integration and Coordination in Humans
1. Chapter 13: Nervous System
2. Chapter 14: Senses
3. Chapter 15: Endocrine System

F. Reproduction in Humans
1. Chapter 16: Reproductive System

Section III

Course Performance Objective 1: Introduction
The student will understand the fundamental concept of what science is. They will understand the process of the scientific method and apply it to laboratory exercises. They will learn the basic characteristics of life and the relationship of humans to other organisms.

Learning Outcomes: Chapter 1: Exploring Life and Science
The student will:

1. List the characteristics of living things.
2. Describe the organization of life from the simplest to the most complex levels.
3. Explain how human beings acquire materials and energy.
4. Define reproduction.
5. Outline the stages of human development.
6. Define homeostasis and know how various organ systems contribute to homeostasis.
7. Describe how animals respond to stimuli.
8. Explain how evolution is responsible for both the unity and the diversity of life.

9. Describe how humans fit into the world of living things.
10. Explain how the scientific process is used to gather information and to arrive at conclusions.
11. Discuss and apply the steps of the scientific method.
12. Explain why a control group is necessary for laboratory studies.
13. Design experiments using scientific methodology.
14. Apply the scientific method to complete laboratory exercises.
15. Analyze the type of information found in a scientific study.
16. Describe the difference between science and other ways in which human beings seek order in the natural world.
17. List the risks and benefits involved in science and technology.
18. Discuss how all people have a responsibility to the global community to decide how best to use scientific knowledge for the benefit of all living things, including humans.

Course Performance Objective 2: Organization
The student will learn how the human body is organized. They will understand the components of the body and the interrelationships between the body structures and systems.

Learning Outcomes: Chapter 2: Chemistry of Life
The student will:

1. Define matter.
2. Describe an element.
3. Describe the organization of an atom.
4. Explain the nature of isotopes and radioactive isotopes.
5. Define a molecule and a compound.
6. Compare the two basic types of bonds that occur between atoms.
7. Describe why water is considered a polar molecule.
8. Explain the importance of hydrogen bonding in water and other molecules.
9. List the important properties of water molecules.
10. Discuss the general chemical properties of acids and bases.
11. Explain and be able to apply the pH scale.
12. Describe the roles buffers play in living things.
13. Describe how molecules of life are built up and broken down.
14. Describe the structure and function of carbohydrates.
15. Describe the function and the structure of the various types of lipids.
16. Describe the functions and basic structure of proteins.
17. Explain how protein structure illustrates the idea that the shape of a molecule influences its function.
18. Discuss the structure of nucleic acids, and describe their functions in cells.
19. Explain how the function of RNA is related to the function of DNA.
20. Describe the structure and function of ATP.

Learning Outcomes: Chapter 3: Cell Structure and Function
The student will:

1. List the basic tenets of the cell theory.
2. Describe the size of most cells.
3. Explain why cells are limited in size.
4. Recognize that different features of the cell are best observed with different types of microscopes.
5. Outline the evolutionary history of the animal cell including how eukaryotic cells evolved, and how the endomembrane system and organelles evolved.
6. Describe the structure and functions of the plasma membrane.

7. Predict the results of placing a cell in solutions of various tonicity.
8. Describe the manner in which molecules other than water enter or leave a cell, both with and against a concentration gradient.
9. Describe the structure of the nucleus and its importance to the cell.
10. Discuss the features and importance of ribosomes.
11. Explain the relationship among the members of the endomembrane system.
12. Describe the three elements of the cytoskeleton.
13. Describe the relationship between cilia or flagella.
14. Describe the structure and function of the mitochondria within the cell.
15. Describe the functioning of a metabolic pathway and the importance of enzymes within it.
16. Describe a generalized equation for an enzymatic reaction.
17. Explain the function of coenzymes.
18. Explain the process of cellular respiration as an example of cellular metabolism.

Learning Outcomes: Chapter 4: Organization and Regulation of Body Systems
The student will:

1. Define tissue.
2. List four major types of tissues in the human body.
3. Discuss the different types of connective tissues and their functions and give examples of each type.
4. List the characteristics of each of the three types of muscle tissue, and describe the differences in location and function of each type.
5. State the characteristics and functions of nervous tissue and name the parts of a neuron.
6. Describe the features, functions, and locations of the different types of epithelial tissues.
7. Describe the types of junctions that occur between epithelial cells.
8. Describe the structure and function of the regions of the skin and its accessory structures.
9. List ways in which you can protect yourself from the damaging effects of ultraviolet radiation.
10. List each of the organ systems of the body and their general functions.
11. Describe the body cavities and the membranes that line and cover them.
12. Define homeostasis, discuss how it is maintained, and explain its importance.
13. Illustrate negative feedback control with the regulation of body temperature.

Course Performance Objective 3: Maintenance of the Human Body
The student will understand how organ systems help the body to maintain homeostasis. They will also learn the structures and functions of the organs within those systems.

Learning Outcomes: Chapter 5: Cardiovascular System: Heart and Blood Vessels
The student will:

1. List the exchanges that occur in the cardiovascular system.
2. List the functions of the cardiovascular system.
3. Describe how the lymphatic system assists the cardiovascular system.
4. Describe the structure and function of arteries, capillaries, and veins.
5. Explain how blood flow may bypass certain capillary beds.
6. Describe external heart anatomy.
7. Trace the path of blood flow through the heart.
8. Explain the stages in the cardiac cycle.
9. Explain how the conduction system of the heart controls the heartbeat.
10. Describe how impulses from the nervous system and hormones control the heart rate.
11. Describe the waves found in the electrocardiogram.

12. Identify the factors that influence pulse rate and blood pressure.
13. Describe the forces that drive blood flow in arteries and return blood to the heart through the veins.
14. Name and locate on a drawing the major arteries and veins.
15. Identify the major vessels of the pulmonary circuit.
16. Identify the major vessels of the systemic circuit.
17. Describe how exchange occurs at the capillaries and how capillary beds are shut off.
18. Explain how tissue fluid is returned to cardiovascular system.
19. List disorders of the cardiovascular system, their causes and prevention.

Learning Outcomes: Chapter 6: Cardiovascular System: Blood
The student will:

1. Describe the functions of blood.
2. Describe the formed elements of blood.
3. Explain the functions and composition of plasma.
4. List the characteristics of red blood cells (RBCs).
5. Explain how the structure of hemoglobin allows it to carry oxygen and carbon dioxide.
6. Describe the life cycle of red blood cells.
7. List several disorders of red blood cells.
8. Classify the types of white blood cells, and describe the structure and functions of each.
9. List several disorders of white blood cells.
10. Describe the origin of platelets.
11. Describe the steps in the blood clotting process.
12. List several disorders related to blood clotting.
13. Describe how antigens on RBCs determine ABO blood type and how a lab technician determines a person's blood type.
14. Describe the possible Rh-factor complications of pregnancy and its prevention.
15. Discuss the homeostatic functions of the cardiovascular system as it relates to other body systems.

Learning Outcomes: Chapter 7: Lymphatic System and Immunity
The student will:

1. Define a pathogen.
2. Outline the three lines of defense the body has against invasion.
3. Describe the anatomy and life cycle of bacteria.
4. Describe a virus.
5. Describe a prion.
6. Describe the functions of the lymphatic system.
7. Outline the pathway of the lymphatic vessels.
8. List the functions of the primary and secondary lymphatic organs.
9. Describe the nonspecific defenses of the body and label each as physical, chemical, or cellular.
10. List the characteristics of an inflammatory response.
11. Describe how specific defense works.
12. Compare and contrast B cells and T cells and their functions.
13. Define the clonal selection model.
14. Describe the structure and classes of antibodies.
15. Describe how active immunity provides protection against infectious diseases.

16. Describe how passive immunity provides protection against infectious diseases.
17. Define a monoclonal antibody.
18. Outline the steps in an allergic response.
19. Describe the process of tissue rejection.
20. List several disorders of the immune system and their causes.

Learning Outcomes: Chapter 8: Digestive System and Nutrition
The student will:

1. Outline the processes that are necessary to the digestive process.
2. Trace the path of food through the digestive system from the mouth to the anus.
3. List the four layers of the GI tract and a disease associated with each layer.
4. Describe the features and structures of the mouth that prepare food for swallowing.
5. Discuss the features of the pharynx and esophagus and how food moves through them.
6. Explain how the stomach is structurally adapted to its function.
7. Relate the function of the small intestine to its unique structure.
8. Describe the condition known as lactose intolerance.
9. Describe the relationship between food, obesity, diabetes type 2, and cardiovascular disease.
10. Name the major digestive enzymes, the type of nutrient they digest, the products of digestion, and the organ in which they are produced.
11. List the three accessory organs of the digestive system and their functions.
12. Explain how secretions of these accessory organs aid digestion.
13. Describe how digestive secretions are controlled, and list the hormones involved.
14. Name and list the functions of the sections of the large intestine.
15. Discuss the common disorders of the large intestine.
16. Explain why obesity is a major worldwide health problem.
17. Define obesity.
18. Discuss nutrition and carbohydrates, protein, and fat in the diet.
19. Describe ways to control dietary intake of sugar and lipids.
20. Discuss the vitamin and mineral requirements in the diet.
21. Describe ways to control dietary intake of salt.
22. Describe the principal eating disorders.

Learning Outcomes: Chapter 9: Respiratory System
The student will:

1. Define inspiration, expiration, and ventilation.
2. List the components of the respiratory system and their functions.
3. Describe the structure and functions of the upper respiratory tract.
4. Describe how food and drink are prevented from entering the lungs during swallowing and how to help a person with food caught in their respiratory tract.
5. Explain how speech depends on the respiratory system.
6. Describe the structure and functions of the lower respiratory tract.
7. Name and describe the structures in the lungs in which gas exchange occurs.
8. Explain how breathing is achieved, including inspiration and expiration.
9. Describe the respiratory volumes of the typical adult and how these volumes are measured.
10. Describe how the respiratory center controls rate and volume of breathing.
11. Describe how chemoreceptors control the rate and volume of breathing.
12. Describe the differences between external and internal respiration.
13. List the names, symptoms, and causes of various diseases of the respiratory tract.

Learning Outcomes: Chapter 10: Urinary System and Excretion
The student will:

1. Define excretion.
2. Trace the path of urine, and describe the general structure and function of each organ mentioned.
3. Describe how the nervous system controls urination.
4. List the functions of the urinary system.
5. Describe the macroscopic structure of the kidney.
6. Describe the anatomy of a nephron.
7. Describe the three steps in urine formation, and relate these to parts of a nephron.
8. Describe how the kidneys maintain the water-salt balance of the blood.
9. Name two major hormones involved in maintaining blood volume, and explain how they function.
10. Describe how the kidneys maintain the acid-base balance of the blood.
11. Describe a variety of kidney tract medical problems and solutions.
12. Explain how the kidneys maintain homeostasis of the body's internal environment.
13. Explain how the urinary system interacts with other body systems to maintain homeostasis.

Course Performance Objective 4: Movement and Support in Humans
The students will understand the systems that support the body and allow movement. They will learn the structure and function of the organs of the skeletal and muscular systems.

Learning Outcomes: Chapter 11: Skeletal System
The student will:

1. List the functions of the skeleton.
2. Sketch and label the structure of a typical long bone.
3. Describe the bone, cartilage, and fibrous connective tissues that comprise the skeleton.
4. List the different bone cell types and give their functions.
5. Differentiate between intramembranous and endochondral ossification.
6. Describe the function of the growth plates and hormones in the development of bones.
7. Explain the process of remodeling of bones.
8. List the sequence of events as a bone repairs a fracture.
9. Identify and state a function for the bones of the axial skeleton, including the cranium and face.
10. Identify and state a function for the bones of the appendicular skeleton.
11. Classify articulations (joints) according to their type.
12. List the different types of synovial joint movements.

Learning Outcomes: Chapter 12: Muscular System
The student will:

1. List the three types of muscle in the human body.
2. List the functions of skeletal muscle.
3. Describe the basic structure of skeletal muscles.
4. Describe how skeletal muscles work in pairs.
5. Explain how skeletal muscles are named.
6. Name the major muscles of the body, and know their actions.
7. Describe the anatomy of a muscle fiber.
8. Describe the neuromuscular junction, and explain how impulses are transferred to the muscle fiber.
9. Define "motor unit."
10. Explain how whole muscles contract.

11. List the energy sources available within a muscle fiber, and explain the circumstances in which each is used.
12. Explain the difference between fast-twitch and slow-twitch muscle fibers.
13. Describe how to avoid delayed onset muscle soreness.
14. List a number of muscular conditions and diseases.
15. Describe the role of the muscular and skeletal systems in homeostasis.

Course Performance Objective 5: Integration and Coordination in Humans
The student will learn how the nervous system and endocrine system help the body maintain homeostasis and react to stimuli. They will learn the structure and function of the sense organs and how the senses integrate with the nervous system.

Learning Outcomes: Chapter 13: Nervous System
The student will:

1. List the two divisions of the nervous system.
2. List the functions of the nervous system.
3. Describe the two types of cells in nervous tissue.
4. List the three types of neurons.
5. Draw a neuron and label the three parts.
6. Explain the function of the myelin sheath.
7. Explain a nerve impulse including the terms resting potential and action potential.
8. Describe the structure and function of a synapse, including transmission across a synapse and synaptic integration.
9. List the structures of the central nervous system.
10. Describe the structure and function of the spinal cord.
11. Describe the general anatomy of the brain, name the major parts, and give a function of each.
12. Give the location and functions of the limbic system.
13. Describe the higher mental functions of learning, memory, and language.
14. Distinguish between spinal and cranial nerves.
15. Describe the somatic system and list the features of a path of a spinal reflex.
16. Describe the autonomic nervous system.
17. Describe drug action at a synapse, and discuss the effects of alcohol, nicotine, cocaine, methamphetamine, heroin, and marijuana.

Learning Outcomes: Chapter 14: Senses
The student will:

1. Describe the function of exteroceptor and interoceptor sensory receptors.
2. Identify the various receptors and explain how they are classified according to the type of stimuli they receive.
3. Explain how a sensation occurs. Include the terms integration and sensory adaptation.
4. Describe the function of proprioceptors.
5. Discuss the general receptors of the skin, including pain receptors.
6. Describe the senses that rely on chemoreceptors.
7. Explain how chemoreceptors operate.
8. Describe the anatomy of the eye and the function of each part.
9. Describe the two receptors for sight, their mechanism of action, and the mechanism for stereoscopic vision.
10. Identify common abnormalities of the eye.
11. Describe the anatomy of the ear and the function of each part.
12. Discuss the receptors for hearing and their mechanism of action.
13. Discuss the receptors for rotational and gravitational equilibrium and their mechanisms of action.

Learning Outcomes: Chapter 15: Endocrine System
The student will:

1. Explain the similarities and differences between the nervous system and the endocrine system.
2. Describe the location of each of the major endocrine glands of the human body and what product they produce.
3. Describe what types of chemicals are produced by endocrine glands and how these are transported in the body.
4. Explain the nature of chemical signals.
5. Draw a diagram contrasting the mechanism of action of peptide hormones with that of steroid hormones.
6. List the hormones produced by the hypothalamus, anterior and posterior pituitary, and their effects.
7. List the hormones of the thyroid and parathyroid glands and state their functions.
8. Explain how blood calcium level is regulated through the action of hormones.
9. Describe the hormones of the adrenal medulla and explain how their release is controlled.
10. List the hormones of the adrenal cortex, their functions, and how their release is controlled.
11. Explain how Addison's disease and Cushing syndrome develop.
12. Discuss that the pancreas is both an exocrine and an endocrine tissue.
13. Describe the functions of insulin and glucagon.
14. Discuss the problems associated with diabetes.
15. List the functions of other endocrine glands and their hormones.
16. List the hormones derived from other tissues not considered endocrine glands.
17. Discuss how the endocrine system works with other body systems to maintain homeostasis.

Course Performance Objective 6: Reproduction in Humans
The student will learn the structure and function of the organs associated with the human reproductive system.

Learning Outcomes: Chapter 16: Reproductive System
The student will:

1. Outline the human life cycle.
2. List the functions of the reproductive organs in each of the sexes.
3. Describe the role of mitosis and meiosis in the human life cycle.
4. Describe the structure, location, and function of the organs of the male reproductive system.
5. Describe the path sperm take from the site of production until they exit the male.
6. Name the glands that add secretions to seminal fluid.
7. Discuss sperm production and its hormonal regulation.
8. Describe the actions of testosterone, including primary and secondary sex characteristics.
9. Describe the structure, location, and function of the organs of the female reproductive system.
10. Label a diagram of the external female genitalia.
11. Describe the ovarian and uterine cycles.
12. Discuss hormonal regulation in the female, including feedback control.
13. Describe the events surrounding fertilization and pregnancy.
14. Describe the actions of estrogen and progesterone and their influence on secondary sex characteristics.
15. Categorize birth-control measures by action and effectiveness.
16. List common causes of infertility, methods of overcoming these problems, and various alternative methods of reproduction.
17. Describe the sexually transmitted diseases caused by viruses.
18. Describe the sexually transmitted diseases caused by bacteria.
19. Know a protozoan and yeast that cause sexually transmitted diseases.

Section IV

General Education Requirements:
The general education goals covered in BIO 120 are critical thinking & problem solving, quantitative skills and science & technology.

Section V

Outcomes Assessment:

A college-wide outcomes assessment program has been put into place to enhance the quality and effectiveness of the curriculum and programs at Salem Community College. As part of this assessment program, the learning outcomes for this course will be assessed. Assessment methods may include tests, quizzes, papers, reports, projects and other instruments. Copies of all outcomes assessments are available in an electronic assessment bank maintained by the Institutional Research and Planning Office.

Section VI

Course Activities:
Lecture and class participation are the major means of instruction. PowerPoint lectures, videos, charts, models and microscopic views are incorporated into the lecture and laboratory portion of the course. The laboratory portion includes dissection, microscope work and drawings, and various exercises involving anatomic models, charts, and reference materials that correspond to the systems under study.

Course Requirements and Means of Evaluation:
Please refer to the instructor's syllabus addendum (to be distributed in class) for specific information regarding the course requirements and means of evaluation.

Attendance Policy:
Regular and prompt attendance in all classes is expected of students. Students absent from class for any reason are responsible for making up any missed work. Faculty members establish an attendance policy for each course and it is the student's responsibility to honor and comply with that policy.

Academic Honesty Policy:
Students found to have committed an act of academic dishonesty may be subject to failure of this course, academic probation, and / or suspension from the college. See the Student Handbook for additional details.

ADA Statement:
If you have a 504 Accommodation Plan, please discuss it with your instructor. If you have any disability but have not documented it with the Disability Support coordinator at Salem Community college, you must do so to be eligible for accommodations. To contact the Disability Support Coordinator, call 856-351-2773 or email disabilitysupport@salemcc.edu to set up an appointment. To find out more information about disability support services at Salem Community College, visit www.salemcc.edu/students/student-success-programs/disability-support.

Section VII

Materials / Supplies*:* None.

Additional Costs: None.