

Anatomy and Physiology Curriculum Outline (~2001)

Unit 1: Science Skills and The Scientific Method

Topics: Hierarchical Organization of Life
Representation of Data
Laboratory Safety
Laboratory Techniques
 Use of Compound and Dissecting Microscopes
 Plant and Animal Dissection
Computer Technologies

Performance Standards:

After completing this unit the student will be able to:

1. Define anatomy and physiology.
2. Demonstrate the ability to seek and find relevant information about careers in anatomy and physiology.
3. Demonstrate competency using tools of measurement, microscopes, and computers.
4. Demonstrate proficiency in presenting results using measurable data, technology and mathematics.
5. Show complete familiarity with and observation of established safety practices.
6. Identify the hierarchical levels of organization of life dealt with in the study of anatomy and physiology, including molecules, cells, tissues, organs, organ systems, and organisms.
7. Identify and explain cell structures and functions.
8. Explain physical processes that occur during molecular movement.
9. Describe the different metabolic processes for organisms.
10. Distinguish between mitosis and meiosis.
11. Classify primary tissues based on their physical characteristics.
12. Use the correct directional and anatomic position terms to label an organism by diagram and dissection.
13. Use compound and dissecting microscopes in the examination of prepared and wet mount slides.
14. Demonstrate proficiency in the use of computer technologies.

Activities:

1. Written report and oral presentation of selected careers in anatomy and physiology.
2. Conduct a simple experiment with a cracker to demonstrate the enzymatic breakdown of starch to sugars.

3. Patient simulations Learning Modules (MACY Program).

Demonstrations:

1. Location and proper use of safety equipment.

Laboratory Experiments:

1. Using scientific tools of measurement.
2. Use the scientific method to plan and carry out experiments.
3. Microscopic observation of the asexual reproduction of yeast cells.
4. Observe different structures of various cells (cheek, plant, onion, bacteria, algae, etc.).
5. Experiment with potato cells under a range of osmotic conditions.

Unit 2: Musculoskeletal System

Performance Standards:

After completing this unit the student will be able to:

1. Identify the various structures of bone tissue and describe the functions of bone tissue.
2. Classify body joints or articulations according to their permitted degree of movement, including gliding, condyloid, saddle, pivot, hinge, and ball-and-socket joints.
3. Describe common sports injuries to bones and joints.
4. Label the bones of the human skeleton on a diagram.
5. Use medical reference sources to research the origins, pathogenesis, and symptoms of a selected skeletal disorder.
6. Identify major muscles of the human body, and describe the functions of these muscles.
7. Describe muscular contraction in terms of muscle structure and chemical reactions.
8. Research an issue relating to careers in the study of the musculoskeletal system, and present research results in oral and written form.

Activities:

1. Research and write a report on a skeletal disorder.
2. Research and write a report on a career related to the musculoskeletal system.
3. Study and debate the relative merits of traditional orthopedic medicine versus chiropractic medicine.
4. Patient Simulation Learning Module.

Demonstrations:

Interpretation of x-rays of a variety of skeletal conditions and injuries.

Laboratory Experiments:

1. Laboratory dissection (shark, frog, bird, fetal pig, cat).
2. Examination of prepared slides of muscle tissues.

Unit 3: Nervous System

Performance Standards:

After completing this unit the student will be able to:

1. Identify the structures and functions of nerve cells.
2. Describe the structures and features of the central nervous system and the peripheral nervous system (somatic and autonomic).
3. Distinguish the different types of neurons.
4. Describe the structures and functions of the outer, middle and inner ear.
5. Describe the main structures and functions of the eye.
6. Discuss techniques to improve reflex/reaction/response times.
7. Research and discuss various eye disorders.

Activities:

1. Use benign examples of sensory stimuli to distinguish among neural responses to such stimuli.
2. Research and present information on a variety of eye disorders.
3. Test peripheral vision of each student.
4. Determine the range of one's own peripheral vision and the location of one's blindspot.
5. Patient Simulation Learning Module.

Demonstrations:

Examination of x-rays of various neurological conditions and injuries.

Laboratory Experiments:

1. Dissection of sheep eye.
2. Testing one's sense of equilibrium.

Unit 4: Digestive System

Performance Standards:

After completing this unit the student will be able to:

1. Name and describe the action of enzymes in the human mouth.
2. Use a diagram to locate the positions of the salivary glands.
3. Use sample mammalian skulls to determine dental formulas, and state the functions of teeth (incisors, canines, premolars, and molars).
4. Distinguish between the pharynx and the esophagus in terms of their positions, structures, and functions.
5. Describe the structure of the stomach and its role in processing food.
6. Identify the three main regions of the small intestine and state their biological function.
7. Describe the appearance, the functions, and the products of the pancreas, liver, and gall bladder.
8. Describe the structure and function of the large intestine.
9. Distinguish among various digestive disorders and diseases by their causes, symptoms, and recommended treatments.
10. Describe the metabolic processes involved in the digestion of carbohydrates, lipids, and proteins.

Activities:

1. Draw the digestive system from anterior (mouth) to posterior (anus), and label all major structures.
2. Trace the journey of a bite of food through the digestive tract, listing each structure through which the food matter must pass and describing the processing of food along the way.
3. A study of food products in terms of cholesterol, fat, salt, and sugar.
4. Patient Simulation Learning Module.

Laboratory Experiments:

1. Dissection of the shark, frog, bird, fetal pig, and cat, with emphasis on the digestive system.
2. Testing the nutrient content of foods using chemical indicators.
3. Testing the pH of a variety of foods and of hydrochloric (stomach) acid.

Unit 5: Respiratory System

Performance Standards:

After completing this unit the student will be able to:

1. Describe the structures and functions of nasal cavities, pharynx, larynx, trachea, the lungs, their bronchi and alveoli.
2. Summarize the process of oxygen and carbon dioxide exchange in the lungs and in the tissues.
3. Demonstrate the actions of inhaling and exhaling air, the movement of the diaphragm and ribs, and explain the function of pressure in the movement of air into and out of the lungs and air passages.
4. Describe the physiological effects of: (a) hyperventilation; (b) surfacing too quickly from a deep-sea dive; and (c) sport-related difficulties.
5. Describe a variety of respiratory disorders and diseases according to causes, symptoms, and recommended treatments.

Activities:

1. Draw and label the structures of the respiratory system.
2. Trace the path of a breath of air from mouth and nasal openings to lung alveoli.
3. Research and write a report on the physiological effects of smoking.
4. Participate in a debate on tobacco use, the tobacco industry, and currently proposed regulatory measures.
5. Learn and demonstrate such emergency health procedures as clearing an obstructed airway and rescue breathing.
6. Patient Simulation Learning Module.

Demonstrations:

The effects of a burning candle floating on water in a closed container (carbon dioxide/oxygen exchange).

Laboratory Experiments:

1. Determination of breathing rates under differing levels of activity and different body positions.
2. Determination of lung volume capacity using a lung bag.
3. Qualitative or quantitative analyses of carbon dioxide with chemical indicators.

Unit 6: Circulatory System

Performance Standards:

After completing this unit the student will be able to:

1. Describe the fluid and cellular composition of blood and the functions of the various components of blood.
2. Identify and describe the antigens and antibodies associated with each ABO blood type and explain why blood types must be carefully matched in transfusion therapy.
3. Identify the role of Rh factor in blood compatibility.
4. Describe the characteristics of blood vessels of the pulmonary and systemic circuits.
5. Describe the changes undergone by the circulatory system during the lifespan of a person.
6. Discuss 'athlete's heart'.
7. Distinguish among various circulatory disorders and diseases based on their causes, symptoms, and recommended treatments.

Activities:

1. Draw and label the chambers of the heart and principal veins and arteries.
2. Trace the path of blood from the heart through the circulatory system during a complete cardiac cycle.
3. Locate and monitor heart sounds using a stethoscope.
4. Demonstrate familiarity with and the ability to apply emergency health procedures such as cardiopulmonary resuscitation and the control of bleeding.
5. Research and write a report on a disease or disorder of the circulatory system.
6. Patient Simulation Learning Module.

Demonstrations:

Examination of various electrocardiogram (EKG) results.

Laboratory Experiments:

1. Measure pulse rate at different locations on the body.
2. Measure blood pressure with clinical instruments.
3. Examine prepared microscope slides of blood cells, and compare and contrast cell size and shape.
4. Sheep heart dissection.

Unit 7: Skin, Temperature, Metabolism, and Excretion

Performance Standards:

After completing this unit the student will be able to:

1. Describe the structure and function of the skin.
2. Discuss the role of the skin in maintaining body temperature and as a sense receptor.
3. State the differences between signs and symptoms of first, second, and third degree burns and discuss their recommended treatments.
4. Describe the structures of the excretory system and state their functions.
5. Identify the principal metabolic waste products of the human body and the organs responsible for the excretory process.
6. Describe the microscopic units of the kidneys known as nephrons by identifying their renal corpuscle and renal tubule makeup.
7. Describe the process of urine formation and identify the chemical composition of urine.
8. Distinguish among various diseases and disorders of the excretory system based on their causes, symptoms, and recommended treatments.
9. Describe a range of homeostatic balances that maintain the life of an organism, including such vital signs as body temperature, blood pressure, nutrient and ionic balance, and body weight.
10. Describe dehydration, water intoxication, and edema and relate to fluid and electrolyte imbalance.

Activities:

1. Draw and label the structures of the excretory system.
2. Describe the procedure of urinalysis and the significance of data derived from urinalysis.
3. Patient Simulation Learning Module.
4. Demonstrate familiarity with and an ability to perform emergency health procedures such as first aid for burns and the treatment of shock.

Laboratory Experiments:

1. Dissection of the sheep kidney.

Unit 8: Endocrine Control

Performance Standards:

After completing this unit the student will be able to:

1. Identify and describe the functions of major hormones of the body.
2. Identify the principal endocrine glands and locate them on a diagram of the human body.
3. Describe how endocrine glands are regulated by feedback mechanisms.
4. Distinguish among various endocrine disorders and diseases according to their causes, symptoms, and recommended treatments.
5. Use written materials and sources to discuss the use and effects of steroids in medicine and in athletics.

Activities:

1. Research and write a report on diabetes.
2. Patient Simulation Learning Module.

Laboratory Experiments:

1. Investigate the response of plants to treatment with plant growth hormones.

Unit 9: Reproduction and Heredity

Performance Standards:

After completing this unit the student will be able to:

1. Identify and label a diagram of the structures of the male and female reproductive systems, and discuss the functions of reproductive structures.
2. Describe the process of egg fertilization.
3. Characterize the various phases of the female menstrual cycle, and summarize the interaction of hormones that regulate the menstrual cycle.
4. Outline the basic aspects of Mendelian genetics including segregation and independent assortment, development of reproductive cells, the passing of traits from generation to generation, and the significance of variation to a species.
5. Distinguish among a variety of genetic disorders according to their causes, symptoms, and recommended treatments, if any.

Activities:

1. Research and write a report on pregnancy and birth.
2. Research and write a report on a genetic disorder or disease.
3. Patient Simulation Learning Module.

Laboratory Experiments:

1. Dissection of the shark, frog, bird, fetal pig, and cat, with emphasis on the reproductive system.
2. Examination of prepared slides of reproductive tissues and of chromosomes.

Unit 10: Immunology

Performance Standards:

After completing this unit the student will be able to:

1. Identify structures of the lymphatic system on the human body, and describe their functions.
2. Identify and describe several nonspecific defense mechanisms.
3. Distinguish between antigens and antibodies.
4. Describe how T cells and B cells participate in the processes of cell-mediated and antibody-mediated immunity.
5. Contrast the processes of active and passive immunity and provide examples of each.
6. Distinguish among a variety of immunological disorders and diseases according to their causes, symptoms, and recommended treatments.

Activities:

1. Diagram the steps of cell-mediated and antibody-mediated immunity.
2. Research and write a report on an immunological disorder or disease.
3. Patient Simulation Learning Module.

Unit 11: Acquired Immunodeficiency Syndrome (AIDS) and Sexually Transmitted Diseases (STDs)

Performance Standards:

After completing this unit the student will be able to:

1. Identify signs and symptoms of a given sexually transmitted disease (including AIDS), and discuss present methods of treatment.
2. Describe the methods of transmission of AIDS and sexually transmitted diseases.
3. Describe behaviors and methods of prevention of the spread of AIDS and sexually transmitted diseases.

Activities:

1. Guest speakers and programs, community outreach efforts.
2. Patient Simulation Learning Module.

Laboratory Experiments:

1. AIDS Simitest.

Teacher Strategies

1. Lecture/Discussion
2. Small-group work/Cooperative Learning/Laboratory activities
3. Manipulatives
4. Independent study/projects
5. Technology/Scientific Advancements
6. Questioning teacher/student dialogue, developing critical thinking skills
7. Facilitating active scientific inquiry

Assessment

1. Performance based assessment of laboratory reports, projects, written work - including research papers, essays, oral presentations/communication. Rubrics - holistic and analytical.
2. Traditional - chapter/unit exams, quizzes, homework, mid-term exam, and final exam.
3. Lab practicals
4. Direct observation of group work
5. Patient simulation research
6. Grading - Mid-term and final exams are each 10% of the final grade for the course. Each marking period grade is 20% of the final grade. Each marking period grade varies according to the needs of the group, generally 30-60% written work, 20-40% tests/quizzes, 20-50% lab activities, and 10-20% class participation/presentations.

Resources

Blake, Jeanne. Risky Times: How to be AIDS Smart and Stay Healthy, Workman Publishing, 1990.

Solomon. Introduction to Human Anatomy and Physiology, W.B. Saunders Co, 1992.

Cornett and Gratz. Modern Human Physiology, Holt, Rinehart and Winston, 1982,1987.

Scott. Family Living and Sex Education, Globe, 1988.

Scott. Drugs: Uses and Abuses, Globe, 1987.

Rich. Alcohol and Tobacco, Globe, 1987.

Abelson, Barlett and Winchester. AIDS Update, Globe, 1988.

American Red Cross. Emergency Response, Mosby Lifeline, 1997.

Odling. Laboratory Anatomy of the Fetal Pig, Wm. C. Brown, 1984.

Chiasson and Booth. Laboratory Anatomy of the Cat, Wm. C. Brown, 1989.

Bohensky. Photo Manual and Dissection Guide of the Cat, Avery Publishing Group, 1979.

Barrow's Situational Learning Model

The American Medical Association Family Medical Guide

Grant's Atlas of the Human Body

Merck Manual

Dorland's Illustrated Medical Dictionary

Physician's Desk Reference-PDR- Charles Baker, Jr.

Pathophysiology. C. Proth

Human Genetics. Edward Notitski