

COURSE SYLLABUS

- 1.0 **INSTRUCTOR** -- Miss Cynthia Castle
Pilot Grove C-4 High School
- 2.0 **COURSE** -- Anatomy/Physiology
- 3.0 **DESCRIPTION OF COURSE** -- This course introduces concepts and principles important to an understanding of the human body. It has two primary goals: 1) Building a foundation for later courses dealing with specific topics in human anatomy or physiology; and 2) Providing a framework for the organization, interpretation, and application of related information obtained outside the classroom. (1 unit)
- 4.0 **MATERIALS NEEDED FOR COURSE** -- Loose-leaf notebook and paper, 2 pencils, 1 blue or black ink pen, small set of colored pencils, ruler, basic calculator
- 5.0 **NAME OF TEXT** -- THE HUMAN BODY
Bruce D. Wingerd, Author
Saunders College Publishing, Publishers
1994
- 6.0 **SEQUENTIAL COURSE OUTLINE**
- UNIT 1 -- Organization of the Body
 - Introduction to the Human Body
 - The Chemical Basis of the Body
 - Cells: The Basis of Life
 - Tissues
 - Organs and Systems: Overview of the Human Body
 - UNIT 2 -- Systems that Cover, Support, and Move the Body
 - The Integumentary System
 - The Skeletal System
 - The Muscular System
 - UNIT 3 -- Systems That Control by Communication
 - Organization of the Nervous System
 - The Special Senses and Functional Aspects of the Nervous System
 - The Endocrine System
 - UNIT 4 -- Systems That Transport and Protect
 - The Blood
 - The Cardiovascular System
 - The Lymphatic System
 - UNIT 5 -- Metabolic Processing Systems
 - The Respiratory System
 - The Digestive System
 - Nutrition and Metabolism
 - The Urinary System

UNIT 6 -- The Cycle of Life
The Reproductive System
Human Development and Inheritance

7.0 INSTRUCTIONAL OBJECTIVES

Having completed Anatomy/Physiology, the student will be able to:

- 1.0 Distinguish between anatomy and physiology, and describe the divisions of anatomy
- 1.1 Identify the directional terms and body planes by using examples.
- 1.2 Describe the six levels of structural organization.
- 1.3 Identify the primary regions of the body.
- 1.4 Identify the locations of the major body cavities and list the organs they contain.
- 1.5 Describe the five characteristics of life.
- 1.6 Define homeostasis and describe its importance to survival.
- 1.7 Distinguish between health and disease.
- 1.8 Describe the four categories of human disease.
- 2.0 Define *element*, *atom*, *molecule*, and *compound*, and distinguish between them.
- 2.1 Describe how chemical bonds are formed.
- 2.2 Distinguish between ionic and covalent bonds.
- 2.3 Describe a chemical reaction that results in the formation of new products.
- 2.4 Distinguish between organic and inorganic compounds.
- 2.5 Identify the important features of water.
- 2.6 Describe salts, acids and bases and define *pH*.
- 2.7 Distinguish between carbohydrates, lipids, proteins, and nucleic acids on the basis of their chemical structure and the roles they play in the body.
- 3.0 Describe the compartments within and surrounding the cell.
- 3.1 Describe the structure of the plasma membrane, and indicate how it may be modified to accommodate special functions.
- 3.2 Identify the functional roles of the plasma membrane.
- 3.3 Describe the ways in which materials move across the plasma membrane.
- 3.4 Distinguish between the cellular organelles on the basis of their structure and function.
- 3.5 Explain why the nucleus is regarded as the control center of the cell.
- 3.6 Identify the structural components of the nucleus.
- 3.7 Describe the process of protein synthesis and the importance of the genetic code.
- 3.8 Distinguish between the two types of nuclear division, mitosis and meiosis.
- 3.9 Describe the sequential process of mitosis.
- 3.10 Explain the current theories that attempt to explain why aging occurs.
- 4.0 Define the term *tissue*, and indicate the four primary types found in the body.
- 4.1 Describe the structural characteristics of epithelial tissue and indicate its common functions.
- 4.2 Distinguish between the various types of epithelial tissue and provide an example of where each is found in the body.
- 4.3 Describe the structural characteristics of connective tissue that distinguishes it from other tissues.

- 4.4 Distinguish between the types of connective tissue on the basis of their structure and function.
- 4.5 Describe the characteristics of muscle tissue and indicate the three types.
- 4.6 Describe the organization of nerve tissue and indicate its primary function.
- 4.7 Define the term *membrane*, and distinguish between the types found in the body.
- 4.8 Identify the roles membranes play in the body.
- 5.0 Distinguish between the structural levels of organization.
- 5.1 Explain the structural relationships that exist between tissues, organs, and systems.
- 5.2 Identify the basic functions of each of the 11 systems of the body.
- 5.3 Identify the primary organs that form a part of each system.
- 5.4 Discuss the structural organization of each system.
- 6.0 Identify the basic functions of the integumentary system.
- 6.1 Distinguish between the two layers of skin on the basis of structure and function.
- 6.2 Identify the layers of the epidermis, and describe the changes that occur in the cells as they are pushed toward the surface.
- 6.3 Describe the structure and function of the hypodermis.
- 6.4 Discuss the role of the integumentary system in regulating body temperature.
- 7.0 Identify and describe the five functions of the skeletal system.
- 7.1 Distinguish between long bones, short bones, flat bones, and irregular bones, and provide examples of each.
- 7.2 Identify the parts of a typical long bone.
- 7.3 Describe the inorganic and organic components of bone tissue, and distinguish between the three types of bone cells on the basis of their functions.
- 7.4 Describe the microscopic structure of compact bone, and compare it with that of spongy bone.
- 7.5 Explain the process by which intramembranous bones are formed.
- 7.6 Describe how endochondral bones are formed from cartilage.
- 7.7 Describe the process of bone growth in length and width.
- 7.8 Define the role of bone remodeling in maintaining homeostasis.
- 7.9 Identify the 206 bones of the skeleton and their major features.
- 7.10 Distinguish between the three types of joints in the body and provide examples of each.
- 7.11 Describe the structure of a synovial joint and indicate the types of synovial joints.
- 7.12 Define the movements that are possible at synovial joints.
- 8.0 Indicate the primary functions of muscles.
- 8.1 Describe the connective tissues associated with muscle.
- 8.2 Identify and describe the microscopic components of skeletal muscle tissue.
- 8.3 Identify the components of the neuromuscular junction.
- 8.4 Explain the sliding-filament mechanism of muscle contraction.
- 8.5 Describe, in their proper order of occurrence, the events leading to muscle contraction.
- 8.6 Indicate the roles of ATP in muscle contraction, and how this energy is supplied.
- 8.7 Describe the phenomenon of oxygen debt and how it may lead to fatigue and cramping.

- 8.8 Define threshold stimulus, and relate it to the concept of the all-or-none response.
- 8.9 Using a myogram, compare and contrast the different types of muscle contractions.
- 8.10 Define *origin* and *insertion*, and describe how muscle contraction produces movement by way of group actions.
- 8.11 Identify the major muscles on the basis of their locations, origins, insertions, and actions.
- 9.0 Identify the divisions of the nervous system.
- 9.1 Distinguish both structurally and functionally between the neuroglia and neurons.
- 9.2 Describe the structure of a neuron, and distinguish between myelinated and unmyelinated fibers.
- 9.3 Identify the different types of neurons.
- 9.4 Describe the events involved in maintaining a resting potential, and in initiating an action potential.
- 9.5 Describe the structure of a synapse, and explain how an impulse is transmitted from cell to cell.
- 9.6 Identify the protective coverings of the brain and spinal cord.
- 9.7 Describe the structure of the spinal cord, and distinguish between gray and white matter.
- 9.8 Describe the conduction pathways of the spinal cord and the reflex arc.
- 9.9 Identify the ventricles of the brain, and explain how cerebrospinal fluid is produced and circulated.
- 9.10 Distinguish between parts of the brain on the basis of structural and functional differences.
- 9.11 Identify the organs of the PNS.
- 9.12 Distinguish between cranial nerves and spinal nerves, and describe how spinal nerves branch.
- 9.13 Distinguish between the somatic and autonomic nervous systems on the basis of their effectors and pathways.
- 9.14 Distinguish between the sympathetic and parasympathetic autonomic divisions.
- 10.0 Define the term *sensation*, and describe the features that characterize receptors.
- 10.1 Identify the components in a general and in a special sensory pathway.
- 10.2 Describe the structure and function of the general sensory receptors.
- 10.3 Identify the four special senses.
- 10.4 Describe the special sensory organs of smell and the olfactory pathway.
- 10.5 Describe the special sensory organs of taste and the gustatory pathway.
- 10.6 Identify the accessory structures and components of the eye.
- 10.7 Explain how the eye accommodates to near and far vision, and how light is converted to a nerve impulse.
- 10.8 Describe the visual pathway.
- 10.9 Identify the components of the ear.
- 10.10 Trace the path of sound waves through the ear to the generation of nerve impulses that reach the brain.
- 10.11 Identify the functional areas of the cerebral cortex.

- 10.12 Describe how thought, memory, and emotions are formed in the brain.
- 10.13 Identify the origins of motor impulses.
- 10.14 Distinguish between the major motor pathways.
- 11.0 Distinguish between exocrine glands and endocrine glands.
- 11.1 Define a *hormone*, and describe why it affects only target cells.
- 11.2 Describe the second-messenger system used by water-soluble hormones.
- 11.3 Describe how genes are activated by lipid-soluble hormones.
- 11.4 Explain how prostaglandins affect the body and how they differ from hormones.
- 11.5 Distinguish between negative and positive feedback control mechanisms.
- 11.6 Describe the location and structure of each of the primary endocrine glands.
- 11.7 Identify the hormones produced by each primary endocrine gland and describe their effects.
- 12.0 Identify the three primary functions of blood.
- 12.1 Describe the properties of blood.
- 12.2 Distinguish between plasma and formed elements.
- 12.3 Identify the substances dissolved in plasma.
- 12.4 Describe two ways in which blood can be analyzed.
- 12.5 Distinguish between the formed elements on the basis of their concentrations in blood, their structure, and their major function.
- 12.6 Indicate the function of hemoglobin.
- 12.7 Distinguish between the types of white blood cells on the basis of their structural and functional differences.
- 12.8 Identify the role of platelets in blood clot formation.
- 12.9 Describe the processes of blood vessel spasm, platelet plug formation, and coagulation, and relate each to the prevention of excessive blood loss.
- 12.10 Identify the importance of blood typing in performing blood transfusions.
- 13.0 Identify the location and general features of the heart.
- 13.1 Describe the layers of the pericardium.
- 13.2 Identify the layers of the heart wall.
- 13.3 Describe the structure of the atria and ventricles.
- 13.4 Describe the structure and function of heart valves.
- 13.5 Trace the flow of blood through the chambers of the heart.
- 13.6 Identify the sounds of the heart, and relate them to the cardiac cycle.
- 13.7 Describe the components and function of the heart conduction system.
- 13.8 Identify the electrical events measured in a normal electrocardiogram.
- 13.9 Define *cardiac output*, and describe how it is regulated.
- 13.10 Distinguish between the types of blood vessels on the basis of their structure.
- 13.11 Describe the factors influencing blood pressure and how it is regulated.
- 13.12 Distinguish between the pulmonary and systemic pathways in terms of function.
- 13.13 Identify the major arteries and veins in the pulmonary and systemic pathways.
- 14.0 Identify the function of the lymphatic network.
- 14.1 Distinguish between plasma, interstitial fluid, and lymph.
- 14.2 Describe the pathway of lymph by identifying the structures it passes through.
- 14.3 Describe the structure and function of lymph nodes.
- 14.4 Identify the organs of the lymphatic system by their locations and structures.

- 14.5 Distinguish between nonspecific defense mechanisms and specific defense mechanisms.
- 14.6 Identify and describe the defense mechanisms that are nonspecific.
- 14.7 Distinguish between cell-mediated immunity and antibody-mediated immunity.
- 14.8 Define the terms *antibody* and *antigen*.
- 14.9 Explain the concept of self versus nonself.
- 14.10 Describe the types of T cells that arise following sensitization.
- 14.11 Describe the types of B cells that arise following sensitization.
- 14.12 Describe the processes of cell-mediated immunity and humoral immunity.
- 14.13 Describe the types of acquired immunity.
- 14.14 Explain the nature of AIDS transmission, and ways to prevent the spread of AIDS.
- 15.0 Identify the main function of the respiratory system.
- 15.1 Distinguish between pulmonary ventilation, external respiration, and internal respiration.
- 15.2 Identify the organs of the respiratory system on the basis of their location, structure, and functions.
- 15.3 Describe the structure and function of alveoli and the respiratory membranes.
- 15.4 Describe the structural features of the lungs.
- 15.5 Describe the events involved in inspiration and expiration.
- 15.6 Identify the measures of respiratory volume.
- 15.7 Describe the events involved in external respiration.
- 15.8 Describe the events involved in internal respiration.
- 15.9 Identify the main source of respiratory control and describe how it works.
- 15.10 Describe the factors that affect breathing other than the respiratory center.
- 16.0 Identify the two divisions of the digestive system.
- 16.1 Define the six processes of digestion.
- 16.2 Describe the components of the peritoneum and the organs they are associated with.
- 16.3 Describe the structures associated with the mouth.
- 16.4 Identify the tongue and pharynx, and describe their role in swallowing.
- 16.5 Describe primary and permanent dentition, and the structure of a tooth.
- 16.6 Identify the salivary glands, and describe the function of saliva.
- 16.7 Describe the structural features of the stomach, and identify its functions.
- 16.8 Describe the structure of the pancreas, and identify the function of pancreatic juice.
- 16.9 Identify the regulatory mechanisms of pancreatic secretions.
- 16.10 Describe the structure and functions of the liver and gallbladder.
- 16.11 Describe the structure and functions of the small intestine and large intestine.
- 17.0 Describe carbohydrates, fats, and proteins and explain how the body utilizes them.
- 17.1 Identify the dietary requirements of carbohydrates, fats, and proteins.
- 17.2 Explain why vitamins and minerals are needed for a balanced diet.
- 17.3 Describe the benefits of eating a variety of foods.
- 17.4 Describe nutrient transport in the body.
- 17.5 Define *metabolism*, *anabolism*, and *catabolism*.

- 17.6 Describe the processes of glycolysis, anaerobic respiration, and aerobic respiration.
- 17.7 Discuss how metabolic rate is measured and how body temperature is regulated.
- 18.0 Identify the functions of the urinary system.
- 18.1 Identify the structural features of the kidneys.
- 18.2 Describe the blood vessels associated with the kidneys.
- 18.3 Identify the components of a nephron.
- 18.4 Describe the flow of fluid through a nephron.
- 18.5 Identify the juxtaglomerular apparatus.
- 18.6 Describe the processes of filtration, reabsorption, and secretion and state where they occur.
- 18.7 Describe how urea and uric acid are formed and how they are excreted.
- 18.8 Describe the processes that regulate kidney function.
- 18.9 Identify the role of the kidneys in maintaining body fluid composition and pH.
- 18.10 Identify the structure and function of the ureters, urinary bladder, and urethra.
- 19.0 Identify the organs of the male system, on the basis of their structures and functions.
- 19.1 Describe the process of spermatogenesis and its results.
- 19.2 Describe the tubes that carry sperm through the male system.
- 19.3 Identify the male accessory glands, and discuss the nature of their secretions.
- 19.4 Describe the external genitalia of the male.
- 19.5 Explain the processes of erection, emission, and ejaculation and describe the neural mechanisms that influence male reproduction.
- 19.6 Describe the effects of GnRH, LH, and FSH on male reproduction.
- 19.7 Identify the effects of testosterone on male reproduction.
- 19.8 Identify the organs of the female system on the basis of their structure and functions.
- 19.9 Describe the processes of oogenesis, follicle development, and ovulation.
- 19.10 Describe the neural mechanisms that influence female reproduction.
- 19.11 Identify the roles of GnRH, LH, and FSH in the development of female puberty.
- 19.12 Describe the effects of estrogen on female reproduction.
- 19.13 Define the terms *menses* and *menopause*.
- 20.0 Distinguish between the prenatal and postnatal periods of development.
- 20.1 Describe the process of fertilization, and the changes it induces.
- 20.2 Describe the formation of the morula and blastocyst.
- 20.3 Describe the processes of implantation, germ layer formation, and organogenesis.
- 20.4 Explain how the placenta develops and what its roles are in maintaining pregnancy.
- 20.5 Identify the main events during the fetal period of development.
- 20.6 Describe the events during birth, and the process of lactation.
- 20.7 Identify the circulatory changes that occur immediately after birth.
- 20.8 Describe the five stages of life.
- 20.9 Describe the nature of genetic inheritance and the importance of genetic screening.

8.0 GRADING PROCEDURES

I. TESTS

- A. approximately 4 per quarter
- B. tests constitute 60% of 1st and 3rd quarter grades; 50% of 1st and 2nd semester grades
- C. USUALLY Tuesday – Friday; ALWAYS with advance notice
- D. **must be taken prior to a known absence**

II. POP QUIZZES

- A. scores will be added to homework scores
- B. given with NO advance notice
- C. cannot be made up

III. HOMEWORK

- A. next chapter is assigned reading as soon as test over preceding chapter is given
- B. much is done in class
- C. consists of text assignments, worksheets, laboratory reports, etc.
- D. homework constitutes 40% of quarter and semester grades
- E. **must be turned in prior to a known absence**

IV. NOTEBOOK

- A. every student is required to have a loose-leaf notebook for Anatomy/Physiology
- B. it will include:
 - 1. notes from class lectures, discussions, and demonstrations
 - 2. summaries of all videos
 - 3. class handouts
 - 4. homework
 - 5. laboratory reports
 - 6. computer activities
- C. graded once each quarter (twice each semester)
- D. counts the same as one test grade

V. REPORTS

- A. Scientific Research Project (additional information to follow)
- B. Scientific Research Project Paper (additional information to follow)

VI. COMPREHENSIVE SEMESTER FINAL EXAM

- A. given during the last week of each semester
- B. tests all information covered during the semester
- C. counts as 10% of 1st and 2nd semester grades

VII. EXTRA CREDIT

Science newspaper or magazine articles (other than the 2 required for "WATCHDOG REPORT") -- 5 homework points each -- maximum of 10 articles

VIII. MAKE-UP WORK

- A. within 24 hours of due date and time for $\frac{1}{2}$ of original credit
- B. after 24 hours -- NO CREDIT
- C. IT IS YOUR RESPONSIBILITY TO SEE ME FOR MISSED WORK

IX. GRADING SCALE

- A. 90% - 100 % A
- B. 80% - 89% B
- C. 70% - 79% C
- D. 60% - 69% D
- E. BELOW 60% F