OBJECTIVES: BIOL 1010  Survey of Life

Unit 1. Homeostasis and Integument
1. Define what is meant by homeostasis in living systems.
2. Describe how homeostasis is maintained.
3. Describe the relationship between cells, tissues, organs, and organ systems.
4. Identify the four major tissues found in the human body.
5. Be able to draw from memory the portions of the skin identified as, epidermis, dermis, and subcutaneous layer.
6. Identify those tissues and structures that are found in those portions of the skin identified in objective #5.
7. Identify the major functions of the integument.

Unit 2. Skeletal System
1. Identify the major functions of the skeletal system.
2. Be able to identify from memory the names and locations of the following bones:
   - skull
   - humerus
   - tarsals
   - cervical vertebrae
   - sacrum
   - sternum
   - clavicle
   - metacarpals
   - phalanges
   - coccyx
   - femur
   - patella
   - tibia
   - fibula
   - metatarsals
   - maxilla
   - mandible
   - axis
   - atlas
   - ilium
   - ischium
   - pubis
3. Illustrate and label microscopic views of bone and cartilage.
4. Describe and illustrate the mechanism of bone and cartilage growth.
5. Identify and characterize the following types of joints:
   - ball and socket joint
   - hinge joint
   - pivot joint
   - immovable joint
   - gliding joint
   - partially movable joint

Unit 3. Muscular System
1. Identify the major functions of muscles, tendons, and ligaments.
2. Illustrate and label the three main types of muscle cells.
3. Illustrate and label a single sarcomere. Identify how the various bands change during the contraction of a muscle.
4. Describe how the “all or none” law of muscle contraction applies to a single muscle cell, motor unit, and sarcomere.
5. Define what is meant by muscle tone.
6. Illustrate a single muscle twitch and identify latent, contraction, and relaxation phases. Define what is meant by refractory period.

Unit 4. Digestive System
1. Distinguish among ingestion, digestion, and absorption.
2. List the four major macromolecules and identify their building blocks.
3. Illustrate the organs of the digestive tract and locate and label the following structures and organs:
   - parotid glands
   - submandibular glands
   - sublingual glands
   - oral cavity
   - pharynx
   - esophagus
   - cardiac sphincter
   - pyloric sphincter
   - rugae
   - duodenum
   - jejunum
   - ileum
   - ileocecal valve
   - pancreas
   - gall bladder
   - bile duct
   - pancreatic duct
   - appendix
   - intestinal glands
   - ascending colon
   - transverse colon
   - descending colon
   - sigmoid colon
   - anal sphincters
4. Identify the organs, and enzymes responsible for the digestion of carbohydrates, proteins, lipids, and nucleic acids.
5. Identify the sites where absorption of the building blocks of carbohydrates, proteins, lipids, and nucleic acids takes place.
6. Describe the following digestive system disorders: heartburn, constipation, diarrhea, gall stones.

**Unit 5. Circulatory System**
1. Illustrate and describe the structures and functions of the following vessels: arteries, arterioles, veins, venules, capillaries, lymphatics, and lymph capillaries.
2. Describe how blood is pushed through veins, venules, and lymphatics.
3. Illustrate the chambers and structures associated with the heart and be able to trace a drop of blood as it enters and leaves the heart.
4. Describe the mechanism by which the valves found within the circulatory system open and close.
5. Identify and illustrate the nodal tissues responsible for the rhythmic contractions of the heart.
6. Illustrate a typical ECG tracing and identify those waves that represent depolarization and repolarization of the atria and ventricles.
7. Distinguish between the cellular and plasma portions of whole blood. How is plasma different from tissue fluid, lymph, or serum.
8. Illustrate and describe the structures and functions of the three types of blood cells.
9. Illustrate the process of blood clotting and identify the roles played by calcium and vitamin K.
10. Identify the 4 blood types found in the human population and list those antigens and antibodies found present for each type. Describe the alleles associated with the inheritance of each blood type.
11. What is meant by the Rh factor. Describe the conditions resulting in erythroblastosis fetalis.

**Unit 6. Respiratory System**
1. Distinguish among external respiration, internal respiration and ventilation.
2. Trace one complete respiratory cycle illustrating and naming all passages, structures, and organs associated with inhalation and exhalation.
3. Define the following terms: tidal volume, inspiratory reserve volume, expiratory reserve volume, vital capacity, residual volume, and total lung capacity.
4. Describe the mechanism of gas exchange at the alveolar surfaces. Identify the means by which the alveoli are prevented from collapsing and sticking together.
5. Describe the composition of the air we inhale and exhale.
6. Describe the means by which oxygen and carbon dioxide are transported by the blood.

**Unit 7. Excretory System**
1. Define what is meant by excretion and identify the major organs and structures responsible for the removal of metabolic wastes from the body.
2. Illustrate the organs and structures associated with the human urinary system. Identify the mechanisms responsible for micturition in a child less than 2 years old & older than 3
3. Illustrate and label a single nephron.
4. Distinguish among the following processes: filtration, reabsorption, and secretion. Identify where each occurs and how each process contributes to the formation of urine.
5. Identify the role played by vasopressin in the formation of urine.

**Unit 8. Endocrine System**
1. Distinguish between exocrine and endocrine glands. Identify the means by which hormones are transported throughout the body.
2. Describe the mechanisms of hormone function.
3. Illustrate the locations and identify the functions of the following endocrine glands: pituitary, thyroid, parathyroid, thymus, pancreas, adrenals, ovaries, testes, and placenta.
4. Describe the results of hyper and hypo production of thyroxine, insulin, and somatotropin.

Unit 9. Reproductive System
1. Illustrate and label the steps associated with spermatogenesis and oogenesis. Identify how the two processes differ.
2. Illustrate and label the following cells and structures found on microscopic preparations of testicular and ovarian tissues: seminiferous tubules, interstitial tissue, spermatogonia, primary spermatocytes, secondary spermatocytes, spermatids, sperm, primary follicles, primary oocytes, mature follicles, secondary oocytes, nurse cells, and lumen of the follicle.
3. Illustrate and label the internal organs associated with the female reproductive system.
4. Describe in a stepwise fashion, a 28-day menstrual cycle and the hormones that regulate it. Describe how the typical cycle is altered as the result of pregnancy.
5. What is meant by having an “ectopic pregnancy?”
6. Describe how pregnancy tests work.
7. Illustrate the following organs and structures associated with the male reproductive system: testes, epididymis, vas deferens, seminal vesicles, prostate gland, bulbourethral glands, and urethra.
8. Describe the major birth control methods and identify how they prevent conception.

Unit 10. Nervous System
1. Identify and describe the functions of the sense organs of the skin.
2. Illustrate and label a typical taste bud and the olfactory epithelium found in the nasopharynx. Describe how the senses of taste and smell are related.
3. Illustrate and label the structures associated with the human eye. Identify the functions of rods and cones and their locations within the eye. Identify the origins of myopia, hypermetropia, and presbyopia and how they can be corrected.
4. Illustrate and label the structures of the external, middle and inner ear. Illustrate and identify the structures responsible for static and dynamic balance

Unit 11. Classification and Biodiversity
1. Describe the 7 major taxa used in modern classification systems.
2. Describe John Ray’s and Carolus Linnaeus’ contributions to the sciences of taxonomy and nomenclature.
3. Distinguish between the terms, specific epithet and species.
4. Describe what is meant by the term, diagnostic characteristic.
5. Define the term, biodiversity.
6. Define the terms, weather and climate and describe the major factors that affect each.
7. Identify the earth’s major biomes and describe how climate determines where each is found.
8. Describe how human activities affect desert, grassland, forest, mountain and aquatic ecosystems?

Unit 12. Ecosystems
1. Describe the relationship that exists among populations, communities, and ecosystems. Identify the living and non-living portions of an ecosystem.
2. Identify the major trophic levels found in ecosystems. Identify the trophic levels that are essential to the operation of ecosystems.
3. Distinguish between a food chain and a food web.
4. Describe the fates of energy and matter in an ecosystem.
5. Illustrate pyramids of numbers, biomass, and energy.
6. Describe the process of biomagnification.

Unit 13. Resource Use and Abuse
1. Describe the tenants of the 1872 mining law and discuss how this law represents not only a license to steal but to abuse the land as well. Describe how this law might be reformed to better serve the interests of taxpayers and to reduce environmental impact.
2. Describe and list our mineral resources. Are these resources renewable?
3. Distinguish between the processes of surface and subsurface mining. Describe the environmental impacts of each of the techniques.
4. List and characterize the major soil horizons in mature soils.
5. List the two major causes of soil erosion and describe how erosion can be reduced.

Unit 14. Solid Wastes
1. Describe what is meant by the terms, solid waste and hazardous waste.
2. Define the terms: input, output, and throughput, precycle, recyclable, nonrecyclable, primary recycling, secondary recycling.
3. Describe the advantages and disadvantages of incorporating a strategy of pollution prevention and waste reduction instead of one of pollution control and waste management.
4. Describe the principle means by which solid and hazardous wastes can be disposed of.
5. Characterize the “Superfund” act.

Unit 15. Water Pollution
1. Describe the hydrologic cycle and distinguish between surface water and ground water.
2. Identify the percentages of our planet’s supplies of total water, freshwater, and readily accessible freshwater. List the causes of freshwater shortages.
3. Describe the pros and cons of: reservoirs and dams, watershed transfers, tapping groundwater supplies, and desalination.
4. Define what is meant by water pollution and list the major classes of water pollutants.
5. Distinguish between point and nonpoint sources of water pollution. Describe the affect chemical pollution has had on water quality in the great lakes.
6. Describe the impacts point and nonpoint sources of pollution have had on the quality of water in the Chesapeake Bay.
7. Describe the means by which we can prevent/reduce water pollution.

Unit 16. Air Pollution
1. Identify the layers; troposphere, stratosphere, mesosphere, and thermosphere. Identify which layer contains atmospheric ozone and describe the importance of ozone.
2. Describe the causes of stratospheric ozone depletion.
3. Describe what is meant by the greenhouse effect, list the major greenhouse gases, and describe the possible consequences of global warming.
4. Distinguish between primary and secondary air pollutants.
5. Describe the nature and causes of gray-air smog and photochemical smog.
6. Describe the causes and effects of acid rain and how emissions which result in acid rain production can be reduced.

**Unit 17. Energy**
1. Describe the renewable and nonrenewable forms of energy used globally.
2. Identify the portion of our nonrenewable energy consumption that comes from the burning of fossil fuels.
3. List the advantages and disadvantages of obtaining energy from the burning of oil, natural gas, and coal, and from nuclear fission reactions and nuclear fusion.
4. Describe the means by which we can improve the energy efficiency of our houses and cars.

**Unit 18. Population Explosion**
1. Describe the factors that determine the size of a population. List the factors that affect birth rates and death rates.
2. Describe the conditions that result in the exponential or logistic growth of a population and diagram “J” and “S” shaped curves to represent these patterns.
3. Identify the consequences of a population exceeding its carrying capacity.
4. Why is it logical to think of population control as the solution to all of our environmental problems?