



BAKER COLLEGE
STUDENT LEARNING OUTCOMES

BIO1220 Human Anatomy and Physiology II
3 Semester Credit Hours

Student Learning Outcomes and Enabling Objectives

1. Analyze anabolic and catabolic metabolic pathways.
 - a. Describe how proteins and DNA are made.
 - b. Describe how ATP is generated by glycolysis, the Citric Acid Cycle, and the Electron Transport Chain.
2. Examine the physiology of the endocrine system.
 - a. Differentiate between steroid and non-steroid hormones.
 - b. Describe the role of the hypothalamus and anterior pituitary gland in regulating the endocrine system.
 - c. Describe how insulin and glucagon work to maintain homeostasis of blood sugar.
 - d. Describe the role of the thyroid gland in regulating metabolic rate.
 - e. Describe the role of the adrenal gland during a sympathetic response.
3. Examine the physiology of the skeletal system.
 - a. Describe the homeostasis of bone tissue including the role of hormones, nutrients, and minerals.
 - b. Explain embryonic bone formation.
 - i. Endochondral ossification
4. Examine the physiology of the muscular system.
 - a. Describe the major events that occur during muscle fiber contraction and relaxation.
 - b. Examine the structure and function of the neuromuscular junction.
 - c. Explain excitation-contraction coupling.
 - d. Examine the structure of the sarcomere.
 - e. Explain the Sliding filament model of contraction.
 - f. Describe the relaxation of a muscle fiber.
 - g. Describe anaerobic vs. aerobic metabolism and its implications to muscle physiology.
 - i. Oxygen debt and accumulation of lactic acid
 - ii. Role of creatine and its relationship to ATP
 - iii. Role of myoglobin intramembranous ossification

5. Examine the physiology of the nervous system.
 - a. Describe the events that lead to the generation of a nerve impulse.
 - i. Resting potential
 - ii. Threshold potential
 - iii. Action potential
 - iv. Impulse conduction
 - v. Reflex arc physiology
 - b. Describe synaptic transmission.
 - i. Neurotransmitters and receptors
 1. Neurotransmitters: types and function
 2. Receptors: types, signaling
 - c. Describe the physiology of the special senses.
 - i. Sight
 - ii. Hearing
 - iii. Taste
 - iv. Smell
 - v. Equilibrium
6. Describe the structure and function of blood.
 - a. Describe the process of hematopoiesis and its hormonal regulation.
 - b. Describe the processes of hemostasis.
 - i. Initiation and maintenance of the vascular spasm
 - ii. Platelet plug formation
 - iii. Initiation of the intrinsic clotting cascade
 - iv. Initiation of the extrinsic clotting cascade
 - v. Common steps in the clotting cascades
 - c. Describe the destruction of erythrocytes and recycling of hemoglobin.
 - d. Explain the significance of ABO and Rh blood types.
7. Describe the physiology of the heart.
 - a. Examine the cardiac conduction system and cardiac cycle.
 - i. Describe how the cardiac cycle is regulated by the conduction system.
 - ii. Correlate the events on an ECG with the activity of the conduction system.
 - iii. Explain how the heart sounds are produced and when they occur within the cardiac cycle.
 - iv. Explain the role of nervous and endocrine systems in regulating heart rate.
 - b. Explain the significance and regulation of cardiac output.
8. Describe the physiology of the vascular system.
 - a. Explain the regulation of peripheral resistance.
 - i. Describe how the nervous system affects blood vessels.

- ii. Describe how local tissue needs influence arterioles and the precapillary sphincters.
 - b. Explain how blood pressure homeostasis is maintained.
 - i. Describe how the nervous system affects blood vessels
 - ii. Describe how local tissue needs influence arterioles and the precapillary
 - c. Explain how the structure of capillaries allows for the exchange of materials between capillaries and body tissues.
 - i. Explain the concepts of hydrostatic and osmotic pressure
 - ii. Explain filtration, osmosis, and diffusion
 - d. Describe factors contributing to venous return.
- 9. Explain the physiology of the immune system.
 - a. Describe the factors that contribute to innate immunity.
 - b. Describe the development of T lymphocytes and B lymphocytes.
 - c. Describe the factors that contribute to adaptive immunity.
 - i. Describe the roles of antigen presenting cells and T cells in cell mediated immunity
 - ii. Describe the roles of antigen presenting cells, helper T cells and B cells in humoral (antibody mediated) immunity
 - iii. Describe classes of immunoglobulins and their functions
 - iv. Differentiate between primary and secondary immune responses
 - d. Differentiate between active and passive immunity.
- 10. Describe the physiology of the digestive system.
 - a. Describe the processes of mechanical and chemical digestion of the macromolecules.
 - i. Carbohydrates
 - ii. Lipids
 - iii. Proteins
 - iv. Nucleic acids
 - b. Describe the coordination of digestion.
 - i. Explain how the autonomic nervous system affects the activity of the digestive system.
 - ii. Describe the hormones and major secretions that are released by the digestive system.
 - c. Describe the mechanism of motility throughout the G.I. tract.
 - i. Swallowing
 - ii. Peristalsis
 - iii. Segmentation
 - iv. Mass movements
 - v. Defecation
 - d. Explain how macromolecules are absorbed
 - i. Monosaccharides

- ii. Glycerol and fatty acids
 - iii. Amino acids
 - e. Explain how water is absorbed.
 - f. Explain how electrolytes are absorbed.
- 11. Describe the physiology of the respiratory system.
 - a. Describe the process of pulmonary ventilation.
 - i. Describe the process of inhalation
 - ii. Describe the process of exhalation
 - b. Explain how the respiratory system maintains homeostasis of oxygen, carbon dioxide, and pH.
 - i. Describe the function of peripheral and central chemoreceptors
 - ii. Describe the location and role of respiratory control centers
 - c. Describe the exchange of gases at the respiratory membrane.
 - d. Describe how the blood transports oxygen and carbon dioxide.
 - e. Describe the exchange of gases between the blood and body tissues.
- 12. Describe the physiology of the urinary system.
 - a. Describe the role of the nephron in the production of urine.
 - b. Describe the neuronal and hormonal regulation of urine formation.
 - c. Describe micturition.
- 13. Describe the process of fluid, electrolyte, and potential hydrogen (pH) regulation.
 - a. Describe mechanisms of water balance.
 - b. Describe the various fluid compartments of the body.
 - c. Explain how homeostasis of electrolytes is maintained.
 - d. Describe how homeostasis of pH is maintained.
 - i. Explain the role of chemical buffers
 - ii. Explain the role of physiological buffers
- 14. Explore the processes of meiosis.
 - a. Differentiate between oogenesis and spermatogenesis.
 - b. Describe the phases in the first and second meiotic divisions.
 - c. Describe crossing-over during meiosis.
 - d. Describe simple inheritance.
- 15. Describe the physiology of the male reproductive system.
 - a. Describe how hormones influence the male reproductive system and secondary sexual characteristics.
 - b. Describe the male sexual response including erection, orgasm, and ejaculation.
 - c. Describe fetal development and maturation of the testis.
 - d. Describe hypothalamic control of male sex hormones.
- 16. Describe the physiology of the female reproductive system.
 - a. Describe how hormones influence the female reproductive system and secondary sexual characteristics.

- b. Describe the stages of the female reproductive cycle and explain how they are regulated by hormones.
 - c. Describe milk production and explain how it is regulated by hormones.
 - d. Describe the female sexual response including erection, lubrication, and orgasm.
Describe fetal development and maturation of the ovaries.
17. Describe the physiology of pregnancy.
- a. Describe gestational development of the fetus.
 - i. Explain the stages of fetal development
 - ii. Explain the hormonal regulation of pregnancy
 - iii. Describe the adaptations observed during fetal development
 - 1. Ductus venosus
 - 2. Ductus arteriosus
 - 3. Foramen ovale
 - b. Describe the parturition process.
 - c. Describe lactation as it pertains to infant nutritional needs.
 - i. Explain breast development after the onset of pregnancy
 - ii. Explain the hormonal feedback for production and let down of milk

Big Ideas and Essential Questions

Big Ideas

- ATP
- Hormone action
- Bones and muscle physiology
- Action potential generation
- Heart and blood physiology
- Nutrient digestion and gas exchange
- Urinary system, body fluids, and pH hormones
- Meiosis and mitosis
- Male and female hormones
- Pregnancy, parturition, and fetal development

Essential Questions

1. How does the body generate energy?
2. What roles do hormones play in homeostasis?
3. How do bones and muscles work together to move and support the body?
4. What does action potential initiation and propagation refer to?
5. How does the cardiac cycle correlate with heart sounds and ECG events?

6. What is the importance of digestion and respiration to body cells?
7. How do the kidneys contribute to body pH homeostasis?
8. What is the difference between meiosis and mitosis?
9. What are the male and female sex hormones and how are they regulated?
10. Describe the changes that happen to the female during pregnancy and after parturition during infant feeding?

These SLOs are not approved for experiential credit.

Effective: Fall 2021