

BIO 144: Human Anatomy and Physiology I

Learning Objectives by Chapter

Chapter 1:

1. Define terms describing fields of study in human biology such as: anatomy, physiology, histology, gross anatomy, or pathophysiology.
2. Describe the major levels of organization in the human organism.
3. List the components and functions of the organ systems of the human body.
4. Describe the location of body structures, using appropriate directional terminology and the anatomical position as a frame of reference.
5. Identify the various planes in which a body might be dissected.
6. List and describe the location of the major anatomical regions of the body.
7. Describe the location of the body cavities and identify the major organs found in each cavity.
8. List the components of a feedback loop and explain the function of each.
9. Compare and contrast positive and negative feedback in terms of the relationship between stimulus and response.

Chapter 2:

10. Describe atomic structure.
11. Distinguish between different types of chemical bonds.
12. Explain the physiologic significance of pH, acids, bases or buffers.
13. Explain the relationship between monomers and polymers and the reactions that produce them.
14. Compare and contrast molecular structure of carbohydrates, proteins, lipids and nucleic acids.
15. Discuss physiologic roles of example carbohydrates, proteins, lipids and nucleic acids.

Chapter 3:

16. Describe the generalized reversible reaction for release of energy from ATP and explain the role of ATP in the cell.
17. Describe the general function of enzymes.
18. Summarize how various factors such as cofactors, coenzymes, temperature, pH, substrate concentration or inhibitors affect enzyme activity.
19. Compare and contrast the three stages of cellular respiration with respect to energy input, efficiency of energy production, oxygen use, by-products and cellular location.
20. Discuss the effect on ATP production if oxygen is absent.

Chapter 4:

21. Describe how lipids and proteins are distributed in the plasma membrane and explain the functions of each.
22. Compare and contrast different processes of membrane transport with respect to type of material transported, mechanism of transport, and energy requirements.
23. Explain the relationship between osmosis, osmotic pressure, and tonicity.
24. Describe the three general mechanisms of response following ligand binding to a receptor.
25. Describe the structure and function of human cell organelles.
26. Compare and contrast the three types of cell to cell junctions.
27. Describe the processes of transcription and translation.
28. Describe the major events of the cell cycle including Interphase (G1, S, G2) and M phase (Prophase, Metaphase, Anaphase, Telophase).

Chapter 5:

29. Contrast the general features of the four major tissue types.
30. Describe the structure, function, and location of different epithelial tissues.
31. Describe the structure, function, and location of different connective tissues.
32. Describe the structure, function, and location of different muscle tissues.
33. Describe the composition and function of nervous tissue.
34. Classify exocrine glands based on form or method of secretion.
35. Describe the structure, function, and location of different body membranes.

Chapter 6

36. Identify and describe (structure and function) the layers of the epidermis.
37. Identify and describe (structure and function) the layers of the dermis.
38. Describe the functions of the integumentary system.
39. Describe the location of various pigments involved in skin coloration.
40. Describe the structure of accessory structures in the skin including nails, hair, sweat glands or sebaceous glands.

Chapter 7:

41. Explain how the classification of bones by shape relates to their functions.
42. Identify the structural components of a long bone.
43. Explain the roles of other connective tissues (cartilage, dense regular and dense irregular connective tissue) in the skeletal system.
44. Compare and contrast the two types of bone marrow in terms of composition, function, and location.
45. Describe the four types of bone cells and their functions.
46. Describe the microscopic anatomy of compact and spongy bone.
47. Compare and contrast intramembranous and endochondral bone formation.
48. Describe the process of bone growth as it occurs at the epiphyseal plate.

Chapter 8:

49. Identify the individual bones of the axial and appendicular skeleton.
50. Identify bone markings (spines, processes, foramina, etc.) of the axial and appendicular bones.
51. Compare and contrast the male and female pelvis.

Chapter 9:

52. Describe the functional classification of joints based on degree of movement and provide examples of each type.
53. Describe the anatomic classification of joints and provide examples of each type.
54. Identify the structural components of the synovial joint, including accessory structures like bursae, tendon sheaths, and ligaments.
55. Give examples of the six types of synovial joints.
56. Describe and demonstrate the generalized movements of synovial joints.

Chapter 10:

57. Describe the major functions of muscle tissue.
58. Describe the organization of muscle tissue from cell to whole muscle to groups of muscles, including connective tissue coverings.
59. Describe the structure of a skeletal muscle fiber including the transverse (T) tubules, sarcoplasmic reticulum and myofibrils.

60. Explain the organization of a myofibril and sarcomere, including thick and thin filaments, light and dark bands, Z lines and H zones.
61. Explain the sliding filament theory of muscle contraction.
62. Describe, in order, the events that occur at the neuromuscular junction that elicit an action potential in the muscle fiber.
63. Summarize the events that occur during the recovery period of muscle contraction.
64. Compare and contrast the three muscle fiber types.
65. Describe the effects of changes in stimulus intensity or frequency on muscle contraction.
66. Distinguish between isotonic and isometric contraction.
67. Define muscle fatigue and explain some of its causes.

Chapter 11:

68. Identify the origin, insertion and action of the major skeletal muscles.
69. For a given movement, differentiate specific muscles that function as prime mover, antagonist, synergist or fixator.

Chapter 12:

70. Describe the functions of the nervous system.
71. Explain the structural and functional organization of the nervous system.
72. Identify and describe the parts of a multipolar neuron.
73. Describe the structural categories of neurons and their corresponding functions.
74. Describe the organization of nerves from axon to whole nerve, including connective tissue coverings.
75. Differentiate between a chemical synapse and an electrical synapse.
76. Describe the different types of glial cells and explain the function of each.
77. Define myelin and explain its function and how it is produced.
78. Discuss the sequence of events that must occur for an action potential to be generated.
79. Define resting membrane potential and explain how it is established and maintained in neurons.
80. Explain the difference between absolute refractory period and relative refractory period.
81. Compare and contrast graded potentials and action potentials.
82. Explain how diameter and myelination affect action potential propagation.
83. Classify neurotransmitters by chemical structure or function.
84. Compare and contrast excitatory postsynaptic potential (EPSP) and inhibitory postsynaptic potential (IPSP).

Chapter 13:

85. Identify and describe components of the cerebrum and their functions.
86. Identify and describe components of the brainstem and their functions.
87. Identify and describe components of the cerebellum and their functions.
88. Identify and describe components of the diencephalon and their functions.
89. Describe the three meninges and the spaces between them.
90. Describe the functions of CSF and explain the flow of CSF from its point of origin to point of exit.
91. Identify and describe the features and functional areas of each cerebral lobe.
92. Define tract and describe three different tracts of cerebral white matter.
93. Identify and describe the twelve cranial nerves and their functions.

Chapter 14:

94. Describe the five regions of the spinal cord and the associated nerve plexuses.
95. Identify the anatomical features seen in a cross sectional view of the spinal cord.
96. Define decussation and explain how this relates to sensory and motor pathways.
97. Describe the components of a reflex arc and their functions.

Chapter 15:

98. Contrast the structure and function of the autonomic nervous system with the other divisions of the nervous system.
99. Compare and contrast the structural and functional characteristics of the sympathetic and parasympathetic divisions of the ANS.
100. Compare and contrast cholinergic and adrenergic receptors in terms of neurotransmitters bound, location, and effect.

Chapter 16:

101. For different receptor modalities, indicate what sensation it detects and give an example of where it can be found in the body.
102. Compare and contrast tactile receptors.
103. Describe the components of the olfactory pathway.
104. Discuss the structure and location of gustatory receptors and the gustatory pathway.
105. Identify and describe the accessory structures of the eye and their functions.
106. Locate and describe the structural components of the eye.
107. Trace the path of light as it passes through the eye to the retina and the path of nerve impulses from the retina to various parts of the brain.
108. Identify structural components of the ear.
109. Explain how a sound wave stimulates the vestibulocochlear nerve.
110. Describe the role of the inner ear in equilibrium.