

# **Academy for Allied Health and Sciences at Plainfield High School**



**Plainfield High School  
in partnership with  
JFK-Muhlenberg-Snyder Schools  
Union County College  
Lincoln Technical Institute  
Rutgers University**

## **Anatomy and Physiology I Curriculum**

IDST 1221

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### **Course Philosophy**

Anatomy and Physiology I is the study of the structure and function of the human body. This course follows a sequential development of the major body systems in an organized and structured curriculum. The course is designed to give the students a selective overview of human anatomical structure and an analysis of human physiological principles. Labs will include slide work, dissection of various animals and studies of the human skeleton. The course may also use computer simulated dissection.

Anatomy and Physiology I is also designed to provide an in depth study of the human body with an emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. The essential principles that will be presented include: basic anatomical and directional terminology, principles of cell biology and a survey of all body systems. Given the breadth of knowledge available on this topic, it is common to get overwhelmed by details. However, as the course progresses, students should integrate all parts into the whole, reflecting on the unifying themes of homeostasis, structure relating to functions, and evolution.

To facilitate learning and depict relevance of the information, pathophysiology and clinical aspects will be discussed with each system so that students can apply their learning. To encourage a view of the human body as a dynamic and continually changing organism, developmental aspects of youth, adulthood, and old age are included.

There is no better way to study the human body than with a human subject. Where applicable, the students will be their own source of laboratory exploration and information. In other cases, animals that most closely represent the human anatomy will be utilized, such as in dissecting. Where necessary, video and computer images will also be implemented.

*\*\*Refer to Appendix A for description of learning styles that are addressed in the activities listed in the curriculum (e.g., AR, AS, CR, CS)*

## Course Goals

### *The Students will be able to:*

1. Identify systems of interacting components and understand how their interactions combine to produce the overall behavior of the system.
2. Explore the ways in which the study of anatomy and physiology may serve as a foundation for many career opportunities.
3. Develop an understanding of how people of various cultures and genders have contributed to major biological discoveries and the advancement of science and technology.
4. Evaluate the impact of new biological discoveries on current health and medical issues and society.
5. Describe the structures and levels of organization of the human body and how the parts interact determining how the whole acts.
6. Understand the dynamic interrelationship and control mechanisms involved in homeostasis.
7. Explain the structure and function of each body system.
8. Distinguish abnormal structure and function of each body system.
9. Discuss the ethics that arise with new technology in reference to the humans.
10. Demonstrate proficient use of the microscope and dissecting tools.

**Outline of Content Area**

- I. The Human Body: An Orientation
- II. Tissue Level of Organization
- III. The Integumentary System
- IV. The Skeletal System
- V. The Muscular System The
- VI. Nervous System
- VII. The Senses
- VIII. The Endocrine System
- IX. X. The Cardiovascular System
- XI. The Respiratory System
- XII. The Digestive System  
The Urinary System

## **I. The Human Body: An Orientation**

### ***A. Objectives: The Student Will Be Able To:***

1. Define anatomy and physiology and their subdivisions.
2. Identify the major levels of organization in organisms, from the simplest to the most complex.
3. Identify the principal systems of the human body, list representative organs of each system, and describe the function of each system.
4. Explain the concept of homeostasis and how it is regulated in the human body. (5.3.12.A.6)
5. Identify the causes of homeostatic failure. (5.3.12.A.6)
6. Describe the steps involved in the process of diagnosing a medical problem. 7. Define the anatomical position.
8. Use anatomical terms to describe various regions and relative positions of the human body.
9. Define and use anatomical directional terms.
10. Identify and distinguish between the common anatomical planes that may be passed through the human body.
11. List by name and location the principal body cavities and the organs contained within them.
12. Describe how the abdominopelvic cavity is divided into nine regions and four quadrants and identify the location of organs within them.

### ***B. Activities***

1. Teacher demonstration and lecture using PowerPoint on topics such as: Microscopic vs. Gross Anatomy, the relationship between Anatomy and Physiology, Homeostasis, Disease, Anatomical frames of reference. (AS, CS).
2. Students will work in small groups to brainstorm a list of major body organ systems and their functions. Using the jigsaw method, new groups will combine the information from each group to compile a comprehensive list. The teacher will facilitate a review with the class. (AR, CR)
3. Teacher will lecture using the thermostat system in home temperature regulation as a comparison to explain the mechanisms of thermoregulation in the human body and define homeostasis and its importance. (CS).
4. Teacher will lecture using thermoregulation and blood clotting to explain the processes of positive and negative feedback systems.
5. Students will create a game or song to help the class learn the anatomical terms for the common names of the body parts. They will facilitate the game as a review for the unit test. (AR, CR, CS)
6. Students will work in groups of 4 and create diagrams of the human body, identifying the following: anatomical landmarks, abdominopelvic regions and quadrants, body planes and sections, and body cavities. (AR, CR, CS).
7. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about orientation, topography, and surface anatomy. (AS)

8. In small groups, students will analyze a case study to assess the injuries for a person hit by a car and apply their knowledge of anatomical body cavities. (AR, CR)

### **C. Evaluations**

1. Group diagrams of anatomical and directional terminology will be graded.
2. "Anatomy 360°" analysis questions will count towards the lab grade.
3. A quiz will be administered to assess understanding of homeostasis and disease.
4. A test will be administered assessing comprehension of the unit objectives.
5. Anatomical games/songs will be graded based on a teacher-created rubric.

### **D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Materials for diagramming the human body
4. "Anatomy 360°" CD-ROM
5. Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

## **II. Tissue Level of Organization**

### **A. Objectives: The Student Will Be Able To:**

1. Classify and describe the tissues of the body based on structure and function. (5.5.12.A.1, 5.3.12.A.2)
2. Describe the various types of cell junctions between epithelial cells.
3. Compare the structure, location, and function for the following types of epithelium: simple squamous, simple cuboidal, simple columnar (nonciliated and ciliated), stratified squamous, stratified cuboidal, stratified columnar, transitional, and pseudostratified. (5.5.12.A.1, 5.3.12.A.2)
4. Demonstrate proficient use of the microscope to examine and identify various types of tissues. (5.1.12.D.3, 5.1.12.B.1, 5.1.12.D.3,)
5. Distinguish between exocrine and endocrine glands.
6. Classify exocrine glands according to their mode of secretion and structural complexity.
7. Discuss how epithelial and connective tissues are related.
8. Describe and compare the three major categories of connective tissue: connective tissue proper, fluid connective tissue, and supporting connective tissue. (5.5.12.A.1, 5.3.12.A.2)
9. Compare the types of connective tissue fibers.
10. Describe the characteristics of ground substance in connective tissue. (5.5.12.A.1, 5.3.12.A.2)
11. Identify and distinguish between the types of loose and dense connective tissues.
12. Explain the mechanisms for the growth of cartilage.
13. Compare the structure, location, and functions of hyaline, elastic, and fibrocartilage. (5.5.12.A.1, 5.3.12.A.2)

14. Compare the structural and metabolic features of cartilage and bone. (5.5.12.A.1, 5.3.12.A.2)
15. Compare and contrast the characteristics, location, and function of mucous, serous, cutaneous, and synovial membranes.
16. Describe the structure, location, and function of superficial, deep, and subserous fascia. (5.5.12.A.1, 5.3.12.A.2)
17. Contrast the three types of muscle tissue with regard to structure and location.
18. Describe the structural features and functions of neural tissue. 19. Explain how injuries and aging affect the tissues of the body.

### ***B. Activities***

1. Teacher lecture using PowerPoint on the types of tissues. (AS)
2. Students will complete an online laboratory which examines microscopic anatomy of epithelia at:  
[www.lab.anhb.uwa.edu.au/mb140/CorePages/Epithelia/Epithel.htm#labduo](http://www.lab.anhb.uwa.edu.au/mb140/CorePages/Epithelia/Epithel.htm#labduo) (CS, AS, CR)
3. Students will utilize the compound light microscope to examine various types of tissues. (AR, CR, CS)
4. Students will work in small groups to construct a concept map to critically analyze the four types of tissues. (AR, CS)

### ***C. Evaluations***

1. Epithelial and connective tissue microscope/Internet labs will be graded. 2. A quiz will be administered to assess understanding of epithelial tissue. 3. A test will be administered assessing comprehension of tissues. 4. Concept maps will be graded according to the distributed rubric. 5. Microscope lab reports will be graded.

### ***D. Resources***

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Compound Light Microscopes and prepared slides of various types of tissues.
4. Computer lab with Internet access
5. Marieb, Anatomy & Physiology Coloring Workbook
6. Kapit and Elson, The Anatomy Coloring Book
7. Kapit, Macey, and Meisami, The Physiology Coloring Book

## **III. The Integumentary System**

### ***A. Objectives: The Student Will Be Able To:***

1. Identify the general functions of the skin and subcutaneous layer. 2. Describe and diagram the structure of the cutaneous membrane.
3. Distinguish between the layers of the epidermis. (5.5.12.A.1, 5.3.12.A.2) 4. Describe common visible abnormalities of the skin surface.
5. Describe the cause, symptoms, and treatment for common disorders of the integumentary system.
6. Explain why people have different skin colors.



7. Discuss both the positive and negative effects of ultraviolet radiation on the skin. 8. Explain the roles of Epidermal Growth Factor on epithelia.
9. Describe the papillary and reticular layers of the dermis. 10. Describe the characteristics of the dermis.
11. Explain the characteristics and functions of the subcutaneous layer. (5.5.12.A.1, 5.3.12.A.2)
12. Diagram and describe the structure of a hair and hair follicles. 13. Explain how the body produces hair.
14. Compare the structure, function, and secretions of sebaceous and sweat glands.
15. Describe mammary and ceruminous glands.
16. Explain how the integumentary system plays a major role in maintaining homeostasis.
17. Describe the anatomical structure of nails. 18. Explain how nails are formed.
19. Outline the events that occur in healing a wound, as a result of superficial and deep epidermal injury.
20. Summarize the effects of the aging process on the skin.
21. Demonstrate proficient use of the microscope to examine and identify parts of the integument. (5.1.12.D.3, 5.1.12.B.1, 5.1.12.D.3,)

### ***B. Activities***

1. Teacher lecture using PowerPoint on the characteristics, structure, and functions of the integumentary system components. (AS)
2. Students will complete an online laboratory which examines microscopic anatomy of the integument. (AS, CR)
3. Students will utilize the compound light microscope to examine various parts of the integument. (AR, CR, CS)
4. Students will work in small groups to construct a concept map to critically analyze the components of the Integumentary system. (AR, CS)
5. In pairs, students will investigate disorders and diseases of the integumentary system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)

### ***C. Evaluations***

1. Integument microscope/Internet labs will be graded.
2. A quiz will be administered to assess understanding of the cutaneous membrane. 3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

### ***D. Resources***

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Compound Light Microscopes and prepared slides of the integument.
4. Computer lab with Internet access

5. Marieb, Anatomy & Physiology Coloring Workbook
6. Kapit and Elson, The Anatomy Coloring Book
7. Kapit, Macey, and Meisami, The Physiology Coloring Book

#### **IV. The Skeletal System**

##### **A. Objectives: The Student Will Be Able To:**

1. Summarize the five primary functions of the skeletal system.
2. Distinguish between long, flat, sutural, irregular, short, and sesamoid bones. 3. Use anatomical terms to describe bone surface features.
4. Diagram and identify the structures of a long and flat bone. 5. Describe the major characteristics of bone tissue.
6. Describe the composition and characteristics of bone matrix. (5.5.12.A.1, 5.3.12.A.2)
7. Distinguish between the characteristics, location, and functions of bone cells; including osteocytes, osteoblasts, osteoprogenitor cells, and osteoclasts. (5.5.12.A.1, 5.3.12.A.2)
8. Compare the structures and functions of compact bone and spongy bone. (5.5.12.A.1, 5.3.12.A.2)
9. Explain the functions of periosteum and endosteum.
10. Compare the mechanisms of bone formation and growth. (2.1.12.B.1)
11. Summarize the steps involved in endochondral ossification and intramembranous ossification.
12. Discuss the impact of age, physical stress, hormones, nutrition, exercise, genetics, and the environment on bones and the skeletal system. 13. Identify the major types of fractures.
14. Summarize the body's repair mechanisms for a fracture. 15. Distinguish between the axial and appendicular skeleton.
16. Identify the bones of the adult skull and the major markings associated with each.
17. Identify the major sutures, sinuses, foramina, fissures, and fontanelles of the skull.
18. Identify the regions of the vertebral column. 19. Describe the structure of a typical vertebra.
20. Explain how a herniated (slipped) disc can occur.
21. Identify overall structure, major bones, characteristics, and functions of pectoral girdle, upper limbs, pelvic girdle, and lower limbs of the appendicular skeleton.
22. Define the structural features, importance of, and problems associated with the arches of the foot. (5.3.12.A.6)
23. Compare the types of articulations.
24. Explain the role of cartilage, synovial fluid, fat pads, ligaments, tendons, and bursae in the formation and function of articulations.
25. Demonstrate the types of movements at synovial joints.
26. Identify and describe selected articulations of the body with respect to the bones that enter into their formation, structural classification, and anatomical components.
27. Research and present information about the cause, symptoms, and treatment for common disorders of the skeletal system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

**B. Activities**

1. Teacher lecture using PowerPoint on the characteristics, structure, and functions of the skeletal system components. (AS)
2. Using "Anatomy 360°" and the computers, students will examine digital representations of the human skeleton from various perspectives and complete analysis questions about the skeletal system. (AS)
3. Students will physically demonstrate the various types of movements at synovial joints while participating in a game of "Simon Says". (AR, CR, CS)
4. Students will observe beef, chicken, turkey bones and joints in the laboratory setting. (AR, CR, CS)
5. Students will work in small groups to construct a concept map to critically analyze the components of the skeletal system. (AR, CS)
6. In pairs, students will investigate disorders and diseases of the skeletal system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)

**C. Evaluations**

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of bone histology.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Samples of beef, chicken, turkey bones and joints
4. "Anatomy 360°" CD-ROM
5. Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

**V. The Muscular System**

**A. Objectives: The Student Will Be Able To:**

1. Compare and contrast the location, characteristics, structure, and functions of skeletal, cardiac, and smooth muscle tissue.
2. Demonstrate proficient use of the microscope to examine and identify types of muscle tissue. (5.1.12.D.3, 5.1.12.B.1, 5.1.12.D.3)
3. Explain how skeletal muscles play a major role in maintaining homeostasis.
4. Describe the structure and organization of a skeletal muscle. (5.5.12.A.1, 5.3.12.A.2)
5. Explain the relation of blood vessels and nerves to skeletal muscles.
6. Diagram the structure and identify the components of a sarcomere. (5.5.12.A.1, 5.3.12.A.2)

7. Describe the principal events associated with the sliding-filament theory of muscle contraction. (5.5.12.A.1, 5.3.12.A.2)
8. Explain the structure of the neuromuscular junction. (5.5.12.A.1, 5.3.12.A.2)
9. Summarize the steps involved in triggering muscle contraction at the neuromuscular junction.
10. Explain the steps involved in the contraction cycle of skeletal muscles at the molecular level.
11. Describe the conditions for muscle fatigue and recovery.
12. Compare the types of skeletal muscle fibers in relation to muscle performance.
13. Explain how exercise can affect muscle tissue.
14. Contrast the arrangements of skeletal muscle fibers. (5.5.12.A.1, 5.3.12.A.2)
15. Describe the classes of levers on the basis of placement of the fulcrum, effort, and resistance.
16. Discuss most body movements as activities of groups of muscles by explaining the roles of the prime mover, antagonist, synergist, and fixator.
17. Identify the principal skeletal muscles in different regions of the body by name, origin, insertion, action, and innervation.
18. Discuss how aging affects the muscular system.
19. Identify and describe selected pairs of muscles with respect to type of movement produced, anatomical location, and classification.
20. Research and present information about the cause, symptoms, and treatment for common disorders of the muscular system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

### ***B. Activities***

1. Students will utilize the compound light microscope to examine various types of muscle tissues. (AR, CR, CS)
2. Students will work in small groups to construct a concept map to critically analyze the muscular system. (AR, CS)
3. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the muscular system. (AS)
4. Using "Interactive Physiology" and the computers, students will complete the muscular system module, concentrating on the neuromuscular junction, sliding filament theory, and contraction of whole muscle. (AS)
5. In pairs, students will investigate disorders and diseases of the muscular system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
6. Interdisciplinary: Students will choose a type of movement from a particular sport or exercise and describe its mechanics and the metabolism utilized to sustain it. (AR, CR, CS)

### ***C. Evaluation***

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of skeletal muscle structure.
3. Concept maps will be graded according to the distributed rubric.

4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
  2. PowerPoint presentations, CD-ROM images
  3. "Anatomy 360°" CD-ROM
  4. "Interactive Physiology" CD-ROM 5.
- Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
  7. Kapit and Elson, The Anatomy Coloring Book
  8. Kapit, Macey, and Meisami, The Physiology Coloring Book

**VI. The Nervous System**

**A. Objectives: The Student Will Be Able To:**

1. Describe the anatomical and functional divisions of the nervous system.
2. Draw and label a typical neuron. (5.5.12.A.1, 5.3.12.A.2)
3. Contrast the histological characteristics and functions of neuroglia and neurons. (5.5.12.A.1, 5.3.12.A.2)
4. Classify neurons by structure and function. (5.5.12.A.1, 5.3.12.A.2)
5. Distinguish between ependymal cells, astrocytes, oligodendrocytes, and microglia.
6. Explain how resting potential is created and maintained.
7. Diagram and explain the generation, propagation, and speed of an action potential.
8. Describe the structure and events that occur at chemical synapses. (5.5.12.A.1, 5.3.12.A.2)
9. Identify the major types and functions of neurotransmitters and neuromodulators.
10. Discuss the interactions that make information processing possible in neural tissue.
11. Describe the function and gross anatomical features of the spinal cord.
12. Describe the structure, function, and location of the spinal meninges.
13. Distinguish between neuronal circuit patterns in relation to their functions.
14. Summarize the steps involved in a reflex arc.
15. Explain the functions of the spinal cord as a conduction pathway and a reflex center.
16. Classify reflexes based on their development, nature of resulting motor response, complexity of neuronal circuit, and site of information processing.
17. Compare the types of monosynaptic and polysynaptic reflexes.
18. Identify the principal parts of the brain and their functions.
19. Describe how the brain is protected.
20. Explain the formation, circulation, and functions of cerebrospinal fluid.
21. Describe the blood supply to the brain and the concept of the blood-brain barrier.
22. Identify and describe the major parts of the brain, including the Medulla Oblongata, Pons, Cerebellum, Midbrain, Diencephalon, Thalamus, Hypothalamus, Limbic system, and Cerebrum.
23. Describe the surface features, lobes, tracts, and basal ganglia of the cerebrum.
24. Compare the sensory, motor, and association areas of the cerebrum.

25. Describe the principal waves of an electroencephalogram and explain its significance in the diagnosis of certain disorders.
26. Explain how the nervous system is affected by the aging process.
27. Research and present information about the cause, symptoms, and treatment for common disorders of the nervous system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

**B. Activities**

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. Students will work in small groups to construct a concept map to critically analyze the components of the Nervous system. (AR, CS)
3. Students will examine the microscopic structure of nerves. (CR, CS) 4. Students will examine and dissect a preserved sheep brain. (CR, CS)
5. In pairs, students will investigate disorders and diseases of the nervous system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
6. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the nervous system. (AS)
7. Using "Interactive Physiology" and the computers, students will complete the nervous system module, concentrating on the neuron physiology and action potentials. (AS)

**C. Evaluations**

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of neuron anatomy and physiology.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Dissection Materials
4. "Anatomy 360°" CD-ROM
5. "Interactive Physiology" CD-ROM 6. Computer lab with Internet access
7. Marieb, Anatomy & Physiology Coloring Workbook
8. Kapit and Elson, The Anatomy Coloring Book
9. Kapit, Macey, and Meisami, The Physiology Coloring Book

## VII. The Senses

### A. Objectives: The Student Will Be Able To:

1. Distinguish between afferent and efferent divisions of the nervous system. 2. Explain how receptors respond to specific stimuli.
3. Identify and compare the receptors for pain (nociceptors), temperature (thermoreceptors), touch (tactile receptors), pressure (baroreceptors), monitoring joints/muscle contraction (proprioceptors), and various chemicals (chemoreceptors).
4. Compare components, processes, and functions the major somatic sensory and motor pathways.
5. Explain how we can distinguish between sensations that originate in different areas of the body.
6. Describe the components and functions of the autonomic nervous system.
7. Compare the sympathetic and parasympathetic divisions of the autonomic nervous system in terms of structure, physiology, and neurotransmitters released. (5.5.12.A.1, 5.3.12.A.2)
8. Discuss the relationship between the two divisions of the autonomic nervous system and the significance of dual innervation.
9. Explain the importance of autonomic tone.
10. Diagram and describe the anatomical components of olfaction. (5.5.12.A.1, 5.3.12.A.2)
11. Trace the olfactory pathways to their destinations in the brain. 12. Explain olfactory discrimination.
13. Explain how aging affects our sense of smell.
14. Diagram and describe the anatomical components of gustation. (5.5.12.A.1, 5.3.12.A.2)
15. Trace the gustatory pathways to their destinations in the brain. 16. Explain gustatory discrimination.
17. Explain how aging affects our sense of taste.
18. Identify and describe the anatomy and physiology of the external, internal, and accessory structures of the eye. (5.5.12.A.1, 5.3.12.A.2)
19. Explain the process of photoreception. (5.5.12.A.1, 5.3.12.A.2)
20. Explain how we are able to distinguish colors and perceive depth. (5.5.12.A.1, 5.3.12.A.2)
21. Trace the visual pathways to their destinations in the brain.
22. Identify and describe the anatomy and physiology of the external, middle, and inner ears. (5.5.12.A.1, 5.3.12.A.2)
23. Explain the steps involved in hearing sounds.
24. Trace the hearing and equilibrium pathways to their destinations in the brain.
25. Research and present information about the cause, symptoms, and treatment for common disorders of the sensory systems. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

### B. Activities

1. Students will work in small groups to construct a concept map to critically analyze the components of our senses. (AR, CS)

2. Students will explore the sense of sight, taste, hearing, smell and touch in a laboratory setting. They will also participate in the dissection of a cow eye as well as sensory testing. (AR, CR, CS)
3. In pairs, students will investigate disorders and diseases of the sensory systems using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
4. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the sensory systems. (AS)
5. Using "Interactive Physiology" and the computers, students will complete the sensory system module. (AS)

### **C. Evaluations**

1. "Anatomy 360°" analysis questions will count towards the lab grade. 2. Sensory labs/dissections will be graded.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

### **D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. "Anatomy 360°" CD-ROM
4. "Interactive Physiology" CD-ROM 5.  
Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

## **VIII. Endocrine System**

### **A. Objectives: The Student Will Be Able To:**

1. Identify the endocrine glands and their locations in the body. 2. Compare the major structural classes of hormones.
3. Explain the general mechanisms of hormonal action. (5.5.12.A.1, 5.3.12.A.2)
4. Describe how endocrine activity is controlled. (5.5.12.A.1, 5.3.12.A.2)
5. Describe the structure and function of the pituitary gland. (5.5.12.A.1, 5.3.12.A.2)
6. Explain the relationship between the pituitary gland and the hypothalamus.
7. Summarize the targets, effects, and regulation of the major hormones produced by the pituitary gland. (5.5.12.A.1, 5.3.12.A.2)
8. Describe the structure and function of the thyroid gland. (5.5.12.A.1, 5.3.12.A.2) 9. Identify and describe the functions of hormones produced by the thyroid gland. (5.5.12.A.1, 5.3.12.A.2)
10. Describe the structure and function of the parathyroid glands. (5.5.12.A.1, 5.3.12.A.2)
11. Explain the effects of parathyroid hormone on the body. (5.5.12.A.1, 5.3.12.A.2)



12. Explain the homeostatic regulation of calcium ion concentrations in the body.
13. Describe the structure and function of the adrenal glands. (5.5.12.A.1, 5.3.12.A.2)
14. Identify and describe the functions of hormones produced by the adrenal cortex and medulla. (5.5.12.A.1, 5.3.12.A.2)
15. Describe the structure and function of the pineal gland. (5.5.12.A.1, 5.3.12.A.2)
16. Explain the effects of melatonin on the body.
17. Describe the structure and function of the pancreas. (5.5.12.A.1, 5.3.12.A.2)
18. Identify and describe the functions of hormones produced by the pancreas. (5.5.12.A.1, 5.3.12.A.2)
19. Explain the homeostatic regulation of blood glucose concentration. (5.3.12.A.6)
20. Describe the function of the thymus. (5.5.12.A.1, 5.3.12.A.2)
21. Compare antagonistic, synergistic, permissive, and integrative effects of hormones on a target cell. (5.5.12.A.1, 5.3.12.A.2)
22. Identify and explain the hormones involved in growth. (5.5.12.A.1, 5.3.12.A.2)
23. Explain the stages of a stress response.
24. Describe the effects of aging on the endocrine system.
25. Research and present information about the cause, symptoms, and treatment for common disorders of the endocrine system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

### ***B. Activities***

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. Students will create a game about the endocrine system. They will work in groups of four and the games will be tested by other groups. (AR, CR, CS).
3. Students will work in small groups to construct a concept map to critically analyze the components of the Endocrine system. (AR, CS)
4. In pairs, students will investigate disorders and diseases of the endocrine system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
5. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the endocrine system. (AS)
6. Using "Interactive Physiology" and the computers, students will complete the endocrine system module. (AS)

### ***C. Evaluations***

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of gland location and secretion.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.
6. The games created will be graded according to a specific rubric distributed at the time of assignment.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images, transparencies
3. "Anatomy 360°" CD-ROM
4. "Interactive Physiology" CD-ROM 5.  
Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

**IX. The Cardiovascular System**

**A. Objectives: The Student Will Be Able To:**

1. Describe the principal characteristics of blood and its functions in the body.  
(5.5.12.A.1, 5.3.12.A.2)
2. Describe the components of plasma and their importance. (5.5.12.A.1, 5.3.12.A.2)
3. Compare the origins, characteristics, and functions of the formed elements in blood.  
(5.5.12.A.1, 5.3.12.A.2)
4. Summarize the process of recycling of red blood cell components in the body.
5. Explain the factors that determine blood type. (5.5.12.A.1, 5.3.12.A.2) 6.  
Explain the significance of a differential blood count.
7. Describe the surface and internal anatomy of the heart. 8.  
Describe the structure and function of the pericardium. 9.  
Trace the flow of blood through the heart.
10. Identify and describe the histology of the heart wall. (5.5.12.A.1, 5.3.12.A.2)
11. Describe the structure of cardiac muscle cells. (5.5.12.A.1, 5.3.12.A.2)
12. Explain the function of the fibrous skeleton of the heart. 13. Discuss the  
route of blood in coronary circulation. 14. Identify the components of the  
Conducting System.
15. Explain the steps involved in impulse conduction through the heart.
16. Explain the activities associated with parts of a normal electrocardiogram.
17. Distinguish between systole and diastole. 18. Diagram the phases of the  
cardiac cycle.
19. Identify the risk factors associated with heart disease. (5.3.12.A.6)
20. Compare and contrast the structure and function of arteries, arterioles, capillaries,  
venules, and veins. (5.5.12.A.1, 5.3.12.A.2)
21. Distinguish between continuous capillaries, fenestrated capillaries, and sinusoids.
22. Describe the structure and function of capillary beds. (5.5.12.A.1, 5.3.12.A.2)
23. Explain the mechanisms for regulating blood flow.
24. Identify the principal arteries and veins of systemic and pulmonary circulation.
25. Contrast fetal and adult circulation.
26. Describe the effects of aging on the cardiovascular system.
27. Research and present information about the cause, symptoms, and treatment for  
common disorders of the cardiovascular system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1,  
5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

**B. Activities**

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. Students will perform a dissection of a sheep heart. (AR, CR, CS).
3. Students will work in small groups to construct a concept map to critically analyze the components of the cardiovascular system. (AR, CS)
4. Students will utilize a stethoscope, sphygmomanometer and the calculators to record measurements for their own cardiovascular system. (AR, CR, CS).
5. In pairs, students will investigate disorders and diseases of the skeletal system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
6. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the cardiovascular system. (AS)
7. Using "Interactive Physiology" and the computers, students will complete the cardiovascular system module. (AS)

**C. Evaluations**

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of heart anatomy and physiology.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
  2. PowerPoint presentations, CD-ROM images
  3. "Anatomy 360°" CD-ROM
  4. "Interactive Physiology" CD-ROM 5.
- Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
  7. Kapit and Elson, The Anatomy Coloring Book
  8. Kapit, Macey, and Meisami, The Physiology Coloring Book

**X. The Respiratory System**

**A. Objectives: The Student Will Be Able To:**

1. Summarize the primary functions of the respiratory system.
2. Describe the structure and function for each component of the respiratory system. (5.5.12.A.1, 5.3.12.A.2)
3. Explain how the exposed respiratory surfaces are protected. 4. Explain how we produce sounds.
5. Explain the structure of the alveolar-capillary membrane and its function in the diffusion of respiratory gases. (5.5.12.A.1, 5.3.12.A.2)
6. Describe the mechanisms of inhalation and exhalation.

7. Identify the factors that influence the respiration rate. 8. Describe the effects of aging on the respiratory system.
9. Research and present information about the cause, symptoms, and treatment for common disorders of the respiratory system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

***B. Activities***

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. Students will examine a preserved sheep pluck demonstrating the mechanisms involved in respiration and use a spirometer to test respiratory volumes of individual students. (AR, CR, CS).
3. Students will work in small groups to construct a concept map to critically analyze the components of the respiratory system. (AR, CS)
4. In pairs, students will investigate disorders and diseases of the respiratory system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
5. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the respiratory system. (AS)
6. Using "Interactive Physiology" and the computers, students will complete the respiratory system module. (AS)

***C. Evaluations***

1. "Anatomy 360°" analysis questions will count towards the lab grade. 2. Dissection labs will be collected and graded.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

***D. Resources***

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. Dissection materials
4. Spirometers
5. "Anatomy 360°" CD-ROM
6. "Interactive Physiology" CD-ROM 7.
- Computer lab with Internet access
8. Marieb, Anatomy & Physiology Coloring Workbook
9. Kapit and Elson, The Anatomy Coloring Book
10. Kapit, Macey, and Meisami, The Physiology Coloring Book

## **XI. The Digestive System**

### ***A. Objectives: The Student Will Be Able To:***

1. Summarize the functions of the digestive system.
2. Describe the location, structure, and function of the gastrointestinal and accessory organs of the digestive system. (5.5.12.A.1, 5.3.12.A.2)
3. Identify the major mesenteries of the peritoneal cavity.
4. Describe the histological organization of the gastrointestinal tract. (5.5.12.A.1, 5.3.12.A.2)
5. Explain how digested food moves through the digestive tract.
6. Summarize the mechanisms that control digestive function.
7. Identify the parts of a typical tooth.
8. Summarize the four types of teeth.
9. Compare deciduous and permanent dentitions.
10. Summarize the steps involved in the swallowing process.
11. Identify and describe the secretions produced during digestion.
12. Describe the effects of aging on the digestive system.
13. Identify the chemical events responsible for the digestion of carbohydrates, lipids, and proteins.
14. Describe and distinguish between fat- and water- soluble vitamins.
15. Differentiate between LDLs and HDLs relative to their structures and major roles in the body. (2.1.12.B.1, 5.3.12.A.6)
16. Define basal metabolic rate and total metabolic rate and depict several factors that influence metabolic rate.
17. Research and present information about the cause, symptoms, and treatment for common disorders of the digestive system. (2.1.8.A.3, 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

### ***B. Activities***

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. In pairs, students will investigate disorders and diseases of the digestive system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
3. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the digestive system. (AS)
4. Using "Interactive Physiology" and the computers, students will complete the digestive system module. (AS)

### ***C. Evaluations***

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. Concept maps will be graded according to the distributed rubric.
3. Student presentations will be graded according to the distributed rubric.
4. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images
3. "Anatomy 360°" CD-ROM
4. "Interactive Physiology" CD-ROM 5.  
Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

**XII. The Urinary System**

**A. Objectives: The Student Will Be Able To:**

1. Identify the parts of the urinary system and explain their roles.
2. Describe the external, gross, and microscopic anatomical features of the kidneys. (5.5.12.A.1, 5.3.12.A.2)
3. Describe the processes involved in urine formation as filtrate passes through the nephron. (5.3.12.A.6)
4. Describe the effects of aging on the urinary system.
5. Research and present information about the cause, symptoms, and treatment for common disorders of the urinary system. (2.1.8.A.3, , 2.6.12.A.3, 2.1.12.B.1, 5.1.12.D.2, 3.3.12.D3, 5.3.12.A.6, 8.1.8.A.3, 9.4.12.A.4)

**B. Activities**

1. Teacher lecture, demonstrations, and class discussions pertaining to the objectives listed above. (AS, CS)
2. In pairs, students will investigate disorders and diseases of the urinary system using the Internet and the Applications Manual. They will create a brief presentation according to the discussed rubric (causes, symptoms, treatments and resources used). (AR, AS)
3. Using "Anatomy 360°" and the computers, students will examine digital representations of the human body from various perspectives and complete analysis questions about the urinary system. (AS)
4. Using "Interactive Physiology" and the computers, students will complete the urinary system module. (AS)

**C. Evaluations**

1. "Anatomy 360°" analysis questions will count towards the lab grade.
2. A quiz will be administered to assess understanding of nephron anatomy and physiology.
3. Concept maps will be graded according to the distributed rubric.
4. Student presentations will be graded according to the distributed rubric.
5. A test will be administered assessing comprehension of the unit objectives.

**D. Resources**

1. Martini, Fundamentals of Human Anatomy & Physiology, 7<sup>th</sup> edition
2. PowerPoint presentations, CD-ROM images

## Anatomy and Physiology I

3. "Anatomy 360°" CD-ROM
4. "Interactive Physiology" CD-ROM
5. Computer lab with Internet access
6. Marieb, Anatomy & Physiology Coloring Workbook
7. Kapit and Elson, The Anatomy Coloring Book
8. Kapit, Macey, and Meisami, The Physiology Coloring Book

## APPENDIX A

### *Acronyms for Learning Styles*

#### **The Concrete Random Learner (CR)**

The concrete random learning preference is characterized by an experimental attitude and accompanying behavior. CR learners get the gist or ideas quickly and demonstrate the ability to make intuitive leaps in exploring unstructured problem solving experience sometimes they also have insights and make leaps in structured situations. Then they are chided for not showing their work or jumping to conclusions.

Concrete random learners utilize the trial-and-error in acquiring information. They do not like cut-and-dried procedures that deny them opportunities to find answers in their own ways. They do not respond well to teacher intervention in their dependent efforts. They work well independently or in small groups.

*CR instructional preferences-* mini-lecture, games, simulation, open ended activities, brainstorming.

#### **The Concrete Sequential Learner (CS)**

The concrete sequential learning preference is characterized by the propensity to derive information through direct, hands on experience. CS learners exhibit extraordinary development of their five senses. They appreciate order and logical sequence of the if-then, premise-conclusion variety. They like touchable, concrete materials. In a biology class, a plaster model handled by the teacher would be insufficient for these learners. They want to have the real thing to take apart themselves. The CS learners prefer step-by-step directions when confronted with a learning situation. They not only look for directions but they follow them. They like clearly ordered presentations and a quiet atmosphere.

*CR instructional preferences-* Checklists, charts, practical problems, computer programs, outlines, demonstrations

#### **The Abstract Sequential Learner (AS)**

The abstract sequential learning preference is characterized by excellent decoding abilities with written, verbal, and image symbols. AS learners have a wealth of conceptual "pictures" in their minds against which they read, hear, or see in graphic and pictorial form. They possess and like to use reading, listening, and visual translation skills. A symbol or picture is worth a thousand words to them.



These learners prefer a presentation that has substance, is rational and is sequential in nature. They are able to extract the main ideas from a logical presentation. They learn well from authorities and like vicarious experiences.

AS instructional preferences - lecture, note taking, writing reports, individualized study, instructional media

### **The Abstract Random Learner (AR)**

Abstract random learners are distinguishable by their attention to human behavior and a capacity to sense and interpret "vibrations". They are attuned to nuances of atmosphere and mood. They associate the medium with the message and tie a speaker's manner, delivery, and personality to the message being conveyed. In doing so, they evaluate a learning experience as a whole.

Abstract act random learners prefer to receive information in an unstructured manner and therefore like group discussions, activities which involve multi-sensory experiences, and busy environments. They prefer freedom from rules and guidelines. They seem to gather information and delay reaction; they organize material through reflection to get what they want.

AR instructional preferences- group work, music, poetry, short reading or lecture with discussion, personalized examples role play, journals