

**Shenandoah Community School District**  
**Anatomy and Physiology**  
Grade - 11

**11.2 (SCSD) Life Science**

**11.2.1 Understand levels of organization (I,D,M)**

- Utilize the language of anatomy (I, D, M)
  - Know the directional terms to:
    - ✚ Positions (I, D, M)
    - ✚ Body Cavities (I, D, M)
    - ✚ Planes (I, D, M)
    - ✚ Range of motion (I, D, M)
    - ✚ Body organization (I, D, M)
- Demonstrate an understanding of the chemical concepts essential to living organisms (D, M)
  - Know matter and how it is organized into the molecules of life (D, M)
  - Know the major types of molecules found in living organisms and the importance of each to living systems (D, M)
- Demonstrate an understanding that cells are the basic units of structure and function in living organisms (D, M)
  - Know how cell structure reflects cell function (D, M)
  - Know cell organelles and how each is designed to accomplish its function (D, M)
  - Know methods of cellular transport and metabolic pathways in living cells (I, D, M)
- Demonstrate an understanding of how cells are organized into tissues and tissues into organs (I, D, M)
  - Know the characteristics of the four types of tissues and know examples of each (I, D, M)
  - Know what is meant by an “organ” and how organs are organized into body systems (D, M)
- Demonstrate an understanding of the processes of cell reproduction and differentiation (D, M)
  - Know the cell cycle (D, M)
  - Know the structure of DNA and RNA, and the role of each in the following processes:
    - ✚ Replication (D, M)
    - ✚ Transcription (D, M)
    - ✚ Translation (D, M)
  - Know, compare, and contrast the processes of mitosis and meiosis (D, M)
  - Know differentiation and give examples of controlling factors (I, D, M)

**11.2.2 (SCSD) Understand structures/function relationships (I,D,M)**

- Demonstrate an understanding of the integumentary system (I, D, M)
  - Know location, structure, and function of structures in the epidermis and dermis (I, D, M)
  - Know the function of the skin (I, D, M)
- Demonstrate an understanding of the skeletal system (I, D, M)
  - Know the structure and function of bone tissue and supporting tissue (I, D, M)
  - Know processes in bone growth and repair (I, D, M)

- Know the location and names of major bones of the axial and appendicular skeleton (I, D, M)
  - Understand the types of joints found in the human body and movement allowed (I, D, M)
- Demonstrate an understanding of the muscular system (I, D, M)
  - Know the structure of the muscles and how they apply to the sliding filament theory (I, D, M)
  - Understand the types of muscle tissue giving the major characteristics of each (I, D, M)
  - Identify, name, and give actions of skeletal muscles (I, D, M)
- Demonstrate an understanding of the cardiovascular system (I, D, M)
  - Know the components and functions of blood (I, D, M)
  - Know the major blood types and how to determine blood type (I, D, M)
  - Know the process of hemostasis (I, D, M)
  - Know, compare, and contrast the three types of blood vessels (I, D, M)
  - Know the pathway of blood through the pulmonary circuit, identifying the chambers and vessels of the heart (I, D, M)
  - Know the vessels in the systemic circuit (I, D, M)
  - Understand the components of the cardiac cycle and of blood pressure (I, D, M)
- Demonstrate an understanding of the immune system (I, D, M)
  - Know characteristics of pathogens (I, D, M)
  - Know the role of the lymphatic system in body defenses (I, D, M)
  - Know the lines of defense (I, D, M)
- Demonstrate an understanding of the respiratory system (I, D, M)
  - Know the major parts of the respiratory system and the function of each part in the process of respiration (I, D, M)
  - Understand the changes in pressure and volume in the pleural cavity to inspiration and expiration (I, D, M)
  - Know the external and internal respiration and how CO<sub>2</sub> and O<sub>2</sub> are transported (I, D, M)
- Demonstrate an understanding of the nervous system (I, D, M)
  - Understand the nervous tissue – its components and how action potentials are generated and propagated throughout the neuron to the effectors (I, D, M)
  - Know the divisions of organization in the nervous system (I, D, M)
  - Know the somatic sensations and how senses work (I, D, M)
- Demonstrate an understanding of the endocrine system (I, D, M)
  - Know the characteristics of the endocrine system (I, D, M)
  - Know hormones
    - ✚ Name (I, D, M)
    - ✚ Abbreviation (I, D, M)
    - ✚ Main targets (I, D, M)
    - ✚ Primary actions (I, D, M)
- Demonstrate an understanding of the digestive system (I, D, M)
  - Know the basic processes that accomplish the overall function of the digestive system (I, D, M)
  - Know organs of the digestive system and explain their roles (I, D, M)
  - Know how nutrients are absorbed and their role in nutrition (I, D, M)
- Demonstrate an understanding of the urinary system (I, D, M)
  - Know the structures in the urinary system and know the role of each (I, D, M)
  - Know how the kidneys produce diluted or concentrated urine (I, D, M)
  - Know other functions of the kidneys (I, D, M)
- Demonstrate an understanding of the reproductive system (I, D, M)

- Know, compare, and contrast the male and female reproductive structures and their functions (I, D, M)

### **11.2.3 (SCSD) Understand interdependence of systems (I,D,M)**

- Demonstrate and understanding of homeostasis (I, D, M)
  - Understand positive and negative feedback mechanisms (I, D, M)
  - Know homeostatic conditions (I, D, M)
  - Know the disorder(s) of body systems to include diagnosis, prevention, and treatment (I, D, M)
- Demonstrate an understanding of what cancer is and how it affects the systems of the human body (I, D, M)
  - Know the effects of benign vs. malignant tumors to cells and the human body (I, D, M)
  - Know and analyze cause(s) of cancer and know carcinogens (I, D, M)
  - Know the methods(s) of diagnosis, treatment, and preventions of cancers (I, D, M)
  - Know types of cancer(s) (I, D, M)
- Demonstrate an understanding of the processes involved in development and aging (I, D, M)
  - Know the processes in human development (I, D, M)
  - Understand aging and list factors that affect the aging process (I, D, M)

## **11.4 (SCSD) Science as Inquiry**

### **11.4.1 (SCSD) Identify questions and concepts that guide scientific investigations (M)**

- Understand hypothesis and formulate a testable Hypothesis, demonstrating:
  - Logical connections between the scientific concepts guiding:
    - A hypothesis (M)
    - The design of an experiment (M)
- Understand scientific investigations and demonstrate:
  - Appropriate procedures (M)
  - A knowledge base (M)
  - Conceptual understanding (M)

### **11.4.2 (SCSD) Design and conduct scientific investigations (M)**

- Requires:
  - Understanding of the major concepts in the area being investigated (M)
  - Proper equipment (M)
  - Safety precautions (M)
  - Understanding of methodological problems (M)
  - Use of technologies (M)
  - Scientific knowledge obtained from sources other than the actual investigation (M)
  - Clarification of :
    - Ideas that guide the inquiry (M)
    - Question (M)
    - Method (M)
    - Controls (M)
    - Variables (M)
  - Organization and display of data (M)
  - Revision of methods and explanations (M)
  - Public presentation of the results with a critical response from peers (M)
- Must:
  - Use evidence (M)
  - Apply logic (M)

- Construct an argument for their proposed explanations (M)

#### **11.4.3 (SCSD) Use technology and mathematics to improve investigations and communications (M)**

- A variety of technologies are an integral component of scientific investigations (M)
  - Hand tools (M)
  - Measuring instruments (M)
  - Calculators (M)
  - Computers for data (M)
    - Collection (M)
    - Analysis (M)
    - Display (M)
- Mathematics plays an essential role in all aspects of an inquiry investigation (M)
  - Measurement (M)
    - Posing questions (M)
    - Formulas are used for developing explanations (M)
    - Charts and graphs are used for communicating results (M)

#### **11.4.4 (SCSD) Formulate and revise scientific explanations and models using logic and evidence (M)**

- Inquiries culminate in formulating an explanation or model (M)
  - Model
    - Physical (M)
    - Conceptual (M)
    - Mathematical (M)
- Process of answering the questions involves:
  - Discussions (M)
  - Arguments (M)
  - Revisions of explanations (M)
  - Based on:
    - Scientific knowledge (M)
    - Use of logic (M)
    - Evidence from investigation (M)

#### **11.4.5 (SCSD) Think critically and logically to make the relationship between evidence and explanations (M)**

- Think critically about evidence includes:
  - Deciding what evidence should be used (M)
  - Accounting for anomalous data (M)
- Process
  - Review data from a simple experiment (M)
  - Summarize the data (M)
  - Form a logical argument about the cause-and-effect relationship in the experiment (M)

#### **11.4.6 (SCSD) Recognize and analyze alternative explanations and predictions (M)**

- Develop critical abilities of analyzing an argument by reviewing:
  - Current scientific understanding (M)
  - Weighing the evidence (M)
  - Examining the logic (M)
- Develop the ability to decide which explanations and models are best (M)
  - There may be several plausible explanations, they do not all have equal weight (M)
  - Use scientific criteria to find the preferred explanations (M)

- Know that scientific knowledge is based on repeatable standards to ensure accuracy of the information. This knowledge may be constantly updated or corrected as the world tests and makes new advances in science (M)

#### **11.4.7 (SCSD) Communicate and defend scientific procedures and explanations**

- Develop the abilities associated with accurate and effective communication these include:
  - Writing and following procedures (M)
  - Expressing concepts (M)
  - Reviewing information (M)
  - Summarizing data (M)
  - Using language appropriately (M)
  - Developing diagrams and charts (M)
  - Explaining statistical analysis (M)
  - Speaking clearly and logically (M)
  - Constructing a reasoned argument (M)
  - Responding appropriately to critical comments (M)

#### **11.4.8 (SCSD) Use mathematics in all aspects of scientific inquiry (M)**

- Use mathematics to ask and answer questions about the natural world (M)
- Mathematics is used to:
  - Ask questions (M)
  - Gather data (M)
  - Organize data (M)
  - Present data (M)
  - Structure convincing explanations (M)

#### **11.4.9 (SCSD) Know that a code of ethics governing testing, funding, and the disclosure of scientific information bind progress in science and technology (M)**

#### **11.4.10 (SCSD) Know that advances in science involve technology and research that are bound by the laws of our society (M)**