**GENERAL INFORMATION**

**Course Number:** 2000350  
**Course Path:** Section: Basic and Adult Education » **Grade Group:** Secondary Grades 9-12 » **Subject:** Science » **SubSubject:** Biological Sciences 

**Course Title:** Anatomy and Physiology  
**Course Section:** Basic and Adult Education  
**Abbreviated Title:** ANAT PHYSIO  
**Number of Credits:** One credit (1)  
**Course Length:** Year  
**Course Type:** Core  
**Course Level:** 2  
**Course Status:** State Board Approved  
**General Notes:** Laboratory investigations which include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course.

**RELATED BENCHMARKS (45):**

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Descriptor</th>
<th>Cognitive Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE.912.C.1.3</td>
<td>Evaluate how environment and personal health are interrelated.</td>
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<tr>
<td>HE.912.C.1.4</td>
<td>Analyze how heredity and family history can impact personal health.</td>
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<tr>
<td>LA.910.2.2.3</td>
<td>The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining);</td>
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<tr>
<td>LA.910.4.2.2</td>
<td>The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information;</td>
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<tr>
<td>MA.912.S.1.2</td>
<td>Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.</td>
<td>Moderate</td>
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<tr>
<td>MA.912.S.3.2</td>
<td>Collect, organize, and analyze data sets, determine the best format High for the data and present visual summaries from the following:</td>
<td></td>
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</tbody>
</table>
- bar graphs
- line graphs
- stem and leaf plots
- circle graphs
- histograms
- box and whisker plots
- scatter plots
- cumulative frequency (ogive) graphs

SC.912.L.14.2  Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).

SC.912.L.14.6  Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.

SC.912.L.14.11 Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.

SC.912.L.14.12 Describe the anatomy and histology of bone tissue.

SC.912.L.14.13 Distinguish between bones of the axial skeleton and the appendicular skeleton.

SC.912.L.14.14 Identify the major bones of the axial and appendicular skeleton.

SC.912.L.14.15 Describe the anatomy and histology, including ultrastructure, of muscle tissue.

SC.912.L.14.16 List the steps involved in the sliding filament of muscle contraction.

SC.912.L.14.17 Describe signal transmission across a myoneural junction.

SC.912.L.14.18 Identify the major muscles of the human on a model or diagram.

SC.912.L.14.19 Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.

SC.912.L.14.20 Identify the parts of a reflex arc.

SC.912.L.14.21 Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.

SC.912.L.14.22 Identify the major parts of a cross section through the spinal cord.

SC.912.L.14.23 Identify the major parts of the brain on diagrams or models.

SC.912.L.14.24 Identify the major functions of the spinal cord.

SC.912.L.14.25 Define the terms endocrine and exocrine.
SC.912.L.14.30 Compare endocrine and neural controls of physiology. Moderate
SC.912.L.14.32 Describe the anatomy and physiology of the endocrine system. Moderate
SC.912.L.14.33 Describe the basic anatomy and physiology of the reproductive system. Moderate
SC.912.L.14.34 Describe the composition and physiology of blood, including that of the plasma and the formed elements. Moderate
SC.912.L.14.35 Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions. Moderate
SC.912.L.14.36 Describe the factors affecting blood flow through the cardiovascular system. Moderate
SC.912.L.14.38 Describe normal heart sounds and what they mean. Moderate
SC.912.L.14.39 Describe hypertension and some of the factors that produce it. Moderate
SC.912.L.14.41 Describe fetal circulation and changes that occur to the circulatory system at birth. Moderate
SC.912.L.14.42 Describe the anatomy and the physiology of the lymph system. Moderate
SC.912.L.14.44 Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation. Moderate
SC.912.L.14.46 Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control. Moderate
SC.912.L.14.47 Describe the physiology of urine formation by the kidney. Moderate
SC.912.L.14.49 Identify the major functions associated with the sympathetic and parasympathetic nervous systems. Moderate
SC.912.L.14.50 Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems. Moderate
SC.912.L.14.51 Describe the function of the vertebrate integumentary system. Low
SC.912.L.14.52 Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. Moderate
SC.912.L.16.8 Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer. Moderate
SC.912.L.18.1 Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. Moderate
SC.912.L.18.11 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity. Moderate
SC.912.N.1.1 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:

1. pose questions about the natural world,
2. conduct systematic observations,
3. examine books and other sources of information to see what is already known,
4. review what is known in light of empirical evidence,
5. plan investigations,
6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),
7. pose answers, explanations, or descriptions of events,
8. generate explanations that explicate or describe natural phenomena (inferences),
9. use appropriate evidence and reasoning to justify these explanations to others,
10. communicate results of scientific investigations, and
11. evaluate the merits of the explanations produced by others.

SC.912.N.1.2 Describe and explain what characterizes science and its methods. Moderate

RELATED GLOSSARY TERM DEFINITIONS (46)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Area</td>
<td>The number of square units needed to cover a surface.</td>
</tr>
<tr>
<td>Chart</td>
<td>A data display that presents information in columns and rows.</td>
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<tr>
<td>Histogram</td>
<td>A bar graph that shows how many data values fall into a certain interval. The number of data items in an interval is a frequency. The width of the bar represents the interval, while the height indicates the number of data items, or frequency, in that interval.</td>
</tr>
<tr>
<td>Set</td>
<td>A set is a finite or infinite collection of distinct objects in which order has no significance.</td>
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<tr>
<td>Absorption</td>
<td>The taking up and storing of energy, such as radiation, light, or sound, without it being reflected or transmitted.</td>
</tr>
<tr>
<td>Activation energy</td>
<td>The least amount of energy required to start a particular chemical reaction.</td>
</tr>
<tr>
<td>Anatomy</td>
<td>The scientific study of the shape and structure of organisms and their parts.</td>
</tr>
<tr>
<td>Axial skeleton</td>
<td>The bones constituting the head and trunk of a vertebrate body.</td>
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<tr>
<td>Cardiovascular</td>
<td>The bodily system consisting of the heart, blood vessels, and blood that circulates blood throughout the body, delivers nutrients</td>
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</tbody>
</table>
and other essential materials to cells, and removes waste products.

Catalyst  
A substance that speeds up or slows down the rate of a reaction without being consumed or altered.

Cell  
The smallest structural unit of an organism that is capable of independent functioning, consisting of one or more nuclei, cytoplasm, and various organelles, all surrounded by a semipermeable cell membrane.

Circulatory system  
The bodily system consisting of the heart, blood vessels, and blood that circulates blood throughout the body, delivers nutrients and other essential materials to cells, and removes waste products.

Coagulation  
The process of changing from a liquid to a gel or solid state by a series of chemical reactions, especially the process that results in the formation of a blood clot.

Connective tissue  
Tissue that connects, supports, binds, or encloses the structures of the body. Connective tissues are made up of cells embedded in an extracellular matrix and include bones, cartilage, mucous membranes, fat, and blood.

Digestive system  
The alimentary canal and digestive glands regarded as an integrated system responsible for the ingestion, digestion, and absorption of food.

Endocrine  
Of or relating to endocrine glands or the hormones secreted by them.

Environment  
The sum of conditions affecting an organism, including all living and nonliving things in an area, such as plants, animals, water, soil, weather, landforms, and air.

Enzyme  
Any of numerous proteins produced in living cells that accelerate or catalyze the metabolic processes of an organism.

Epithelial tissue  
Membranous tissue covering internal organs and other internal surfaces of the body.

Exocrine  
Producing, being, or relating to a secretion that is released outside its source.

Gas  
one of the fundamental states of matter in which the molecules do not have a fixed volume or shape.

Genetic  
Affecting or determined by genes.

Hemostasis  
The stoppage of blood flow through a blood vessel or body part.

Histology  
The scientific study of the microscopic structure of plant and animal tissues.

Hypertension  
Abnormally high blood pressure and especially arterial blood pressure.

Immune system  
The body system in humans and other animals that protects the
organism by distinguishing foreign tissue and neutralizing potentially pathogenic organisms or substances. The immune system includes organs such as the skin and mucous membranes, which provide an external barrier to infection, cells involved in the immune response, such as lymphocytes, and cell products such as lymphokines.

Investigation A procedure that is carried out in order to observe a response caused by a stimulus; not a complete experiment.

Light Electromagnetic radiation that lies within the visible range.

Membrane A thin layer of tissue that surrounds or lines a cell, a group of cells, or a cavity; any barrier separating two fluids.

Model A systematic description of an object or phenomenon that shares important characteristics with the object or phenomenon. Scientific models can be material, visual, mathematical, or computational and are often used in the construction of scientific theories.

Mutation The process by which a gene undergoes a change in DNA sequence or a structural change.

Nervous system The system of cells, tissues, and organs that regulates the body's responses to internal and external stimuli. In vertebrates it consists of the brain, spinal cord, nerves, ganglia, and parts of the receptor and effector organs.

Observation A statement based on what one has noticed or observed.

Organ A structure containing different tissues that are organized to carry out a specific function of the body (e.g., heart, lungs, brain, etc.)

pH A symbol for the measure of the acidity or alkalinity of a solution.

Physiology The scientific study of an organism's vital functions, including growth and development, the absorption and processing of nutrients, the synthesis and distribution of proteins and other organic molecules, and the functioning of different tissues, organs, and other anatomic structures.

Plasma The pale yellow or gray-yellow, protein-containing fluid portion of the blood in which the blood cells and platelets are normally suspended.

Reflex arc The neural path of a reflex.

Reproductive system The system of organs involved with animal reproduction, especially sexual reproduction.

Respiratory system The system of organs and structures in which gas exchange takes place, consisting of the lungs and airways in air-breathing vertebrates, gills in fish and many invertebrates, the outer covering of the body in worms, and specialized air ducts in insects.
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<td>Skeleton</td>
<td>The internal structure of vertebrate animals, composed of bone or cartilage, that supports the body, serves as a framework for the attachment of muscles, and protects the vital organs and associated structures.</td>
</tr>
<tr>
<td>Spinal cord</td>
<td>The long, cordlike part of the central nervous system that is enclosed within the vertebral column (spine) and descends from the base of the brain, with which it is continuous. The spinal cord branches to form the nerves that convey motor and sensory impulses to and from the tissues of the body.</td>
</tr>
<tr>
<td>Synapse</td>
<td>The small junction across which a nerve impulse passes from one nerve cell to another nerve cell, a muscle cell, or a gland cell.</td>
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<tr>
<td>Tissue</td>
<td>Similar cells acting to perform a specific function; four basic types of tissue are muscle, connective, nerve, and epidermal.</td>
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<tr>
<td>Vaccine</td>
<td>A preparation of a weakened or killed pathogen, such as a bacterium or virus, or of a portion of the pathogen's structure, that stimulates immune cells to recognize and attack it, especially through antibody production.</td>
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<tr>
<td>Vertebrate</td>
<td>Any of a large group of chordates of the subphylum Vertebrata (or Craniata), characterized by having a backbone. Vertebrates include fish, amphibians, reptiles, birds, and mammals.</td>
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</tbody>
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