Board Approved
October 2015

Wilson Area School District
Planned Course Guide

Title of planned course: Anatomy and Physiology

Subject Area: Science

Grade Level: 12

Course Description: This elective science course includes a detailed study of many human body systems. Homeostasis, the relationship of structure and function, and the interrelationships between body systems are a focus throughout the course. This course is recommended for students who plan to major in a health related field.

Time/Credit for this Course: 1/2 year/0.5

Curriculum Writing Committee: Sandra Tozzoli

Board Approved
October 2015

Curriculum Map

August:

The Language and Organ Systems of Anatomy

September:

Basic Tissues and the Integumentary System
The Skeletal System

October:

The Muscular System
The Neural and Endocrine System

November:

The Circulatory System
The Respiratory System

December:

The Respiratory System continued
The Digestive System

January:

The Urinary System

Board Approved
October 2015

Wilson Area School District
Planned Course Materials

Course Title: Anatomy and Physiology

Textbook:

Essentials of Human Anatomy & Physiology, Elaine N. Marieb; Pearson

Supplemental Books:

Essentials of Human Anatomy & Physiology Laboratory Manual (6th Edition); Elaine N. Marieb; Pearson; 2015

Anatomy & Physiology Coloring Workbook: A Complete Study Guide (11th Edition); Elaine N. Marieb; Pearson; 2015

Teacher Resources:

Premium BioDigital Human Google App

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Language and Organ Systems of Anatomy

Time frame: 1 week

State Standards: 3:1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A8, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6

Essential content/objectives: At end of the unit, students will be able to:

- Diagram areas and identify corresponding organs and body systems
- Use proper anatomical terminology to describe body directions, surfaces, and body planes
- Locate the major body cavities and list the chief organs in each cavity
- Define homeostasis and explain its importance
- Define negative feedback and describe its role in maintaining homeostasis and normal body function

Core Activities: Students will complete/participate in the following:

- Correct Anatomical Terminology Activity
- Name Body Cavities and Indicate the Organs in Each Cavity on an Anatomical Chart

Extensions:

- Explain how anatomy and physiology are related
- List functions that humans must perform to maintain life
- List the survival needs of the human body

Remediation:

- The Language of Anatomy Review Sheet
- Organ Systems Overview Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App Skeleton Bones

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: Basic Tissues and the Integumentary System

Time frame: 1 week

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- Describe the cellular organelles and processes
- Compare/contrast the function and structure and chief locations of the 4 major tissue types
- Recognize and name the following skin structures: epidermis, dermis (papillary and reticular layers), hair and hair follicle, sebaceous gland, and sweat gland
- Name the layers of the epidermis and describe the characteristics of each

Core Activities: Students will complete/participate in the following:

- Microscopic observation and identification of epithelial tissue, connective tissue, muscle tissue and nervous tissue
- Testing Tactile Localization Lab
- Demonstration Adaptation of Touch Receptors Lab

Extensions:

- Describe the process of tissue repair
- Define *neoplasm*, and distinguish between benign and malignant neoplasms
- Differentiate between first-, second-, and third-degree burns
- List several examples of integumentary system aging

Remediation:

- The Integumentary System Review Sheet
- Tissue Structure and Function Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App
- Tissue slides

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Skeletal System

Time frame: 3 weeks

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A5, 3.1.12.A6, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- On a skull or diagram, identify and name the bones of the skull
- Identify the subdivisions of the skeleton as axial or appendicular
- List at least three functions of the skeletal system
- Name the parts of a typical vertebra and explain in general how the cervical, thoracic, and lumbar vertebrae differ from one another
- Identify on a skeleton or diagram the bones of the shoulder and pelvic girdles and their attached limbs
- Name the three major categories of joints and compare the amount of movement allowed by each

Core Activities: Students will complete/participate in the following:

- Examining a Long Bone Lab
- Identifying the Bones of an Adult Skull Lab
- Palpating Skull Markings Lab
- Examining and Identifying Bones of the the Appendicular Skeleton Lab
- Palpating the Surface Anatomy of the Lower Limb Lab
- Demonstrating Movements of Synovial Joints Lab

Extensions:

- Explain how the abnormal spinal curvatures (scoliosis, lordosis, and kyphosis) differ from one another
- Identify some of the causes of bone and joint problems throughout life

Remediation:

- Overview of the Skeleton**,** Appendicular Skeleton and Axial Skeleton Review Sheets

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App Skeleton Bones

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Muscular System

Time frame: 1 week

State Standards: 3.1.10.A, 3.1.12.A, 3.2.12B

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.1.12.A8, 3.2.12.B1

Essential content/objectives: At end of the unit, students will be able to:

- Describe similarities and differences in the structure and function of the three types of muscle tissue and indicate where they are found in the body
- Describe the microscopic structure of skeletal muscle and explain the role of actin- and myosin-containing myofilaments
- Name and locate the major muscles of the human body (on a torso model, muscle chart, or diagram) and state the action of each
- Define origin, insertion, prime mover, antagonist, synergist, and fixator as they relate to muscles
- Define the physiology of muscles

Core Activities: Students will complete/participate in the following:

- Observing the Structure of Skeletal Muscle Lab
- Identifying Head and Neck Muscles Lab
- Make a Muscle Painting Lab

Extensions:

- Explain the importance of a nerve supply and exercise in keeping muscles healthy
- Describe the changes that occur in aging muscles

Remediation:

- Microscopic Anatomy and Organization of Skeletal Muscle Review Sheet
- Gross Anatomy of the Muscular System Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App
- Skeleton Bones

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Neural and Endocrine System

Time frame: 3 weeks

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- List the general functions of the nervous system
- Explain the structural and functional classifications of the nervous system
- Define central nervous system and peripheral nervous system and list the major parts of each
- Describe the general structure of a nerve
- Describe how hormones bring about their effects in the body
- Define *negative feedback* and describe its role in regulating blood levels of the various hormones
- On an appropriate diagram, identify the major endocrine glands and tissues

Core Activities: Students will complete/participate in the following:

- Sheep Eye Dissection
- Examine the Microscopic Structure of a Nerve Lab
- Cranial Nerve Diagram
- Reflex Lab
- Identifying Papillae on the Tongue Lab

Extensions:

- List several factors that may have harmful effects on brain development
- Briefly describe the cause, signs, and consequences of the following congenital disorders: spina bifida, anencephaly, cerebral palsy
- Describe the effect of aging on the endocrine system and body homeostasis

Remediation:

- Neuron Anatomy and Physiology Review Sheet
- Special Senses Review Sheet
- Functional Anatomy of the Exocrine and Endocrine Glands

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App
- Sheep Eye
- Nerve tissue slides

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Circulatory System

Time frame: 3 weeks

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6

Essential content/objectives: At end of the unit, students will be able to:

- Trace the pathway of blood through the heart before and after birth
- Describe the effect of the following on heart rate: stimulation by the vagus nerve, exercise, epinephrine, and various ions
- Compare and contrast the structure and function of arteries, veins, and capillaries
- Identify the body's major arteries and veins and name the body region supplied by each
- Describe the exchanges that occur across capillary walls
- Define *systole*, *diastole*, *stroke volume*, and *cardiac cycle*
- Describe the composition of plasma and discuss its importance in the body
- List the cell types making up the formed elements and describe the major functions of each type
- Define *anemia*, *polycythemia*, *leucopenia*, and *leukocytosis*, and list possible causes for each condition
- Explain the role of the hemocytoblast
- Describe the ABO and Rh blood groups
- Describe the blood-clotting process

Core Activities: Students will complete/participate in the following:

- Sheep Heart Dissection
- Examine the Formed Elements of Blood Microscopically Lab
- Blood Typing Lab
- Locating Major Arteries and Veins on an Anatomical Chart Activity
- Pulse, Cardiac Rhythm and Blood Pressure Lab

Extensions:

- Define *hypertension* and *atherosclerosis* and describe possible health consequences of these conditions
- Name the fetal vascular modifications, or "fetal shunts," and describe their function before birth
- Explain the basis for a transfusion reaction
- Explain how regular exercise and a diet low in fats and cholesterol may help maintain cardiovascular health
- Explain the basis of physiologic jaundice seen in some newborn babies
- Indicate blood disorders that increase in frequency in the aged

Remediation:

- Blood Review Sheet
- Anatomy of the Heart Review Sheet
- Human Cardiovascular Physiology Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App
- Sheep Heart
- Blood Cell Slides
- Human Skeleton

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Respiratory System

Time frame: 2 weeks

State Standards 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- Name the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs (or identify them on a diagram or model) and describe the function of each
- Explain how the respiratory muscles cause volume changes that lead to airflow into and out of the lungs (breathing)
- Define the following respiratory volumes: tidal volume, vital capacity, expiratory reserve volume, inspiratory reserve volume, and residual air
- Define apnea, dyspnea, hyperventilation, hypoventilation, and chronic obstructive pulmonary disease (COPD)
- Describe the process of gas exchanges in the lungs and tissues
- Describe how oxygen and carbon dioxide are transported in the blood

Core Activities: Students will complete/participate in the following:

- Locating Upper and Lower Respiratory Anatomy Chart Activity
- Respiratory Volumes and Capacities - Spirometry Lab
- Demonstrating Respiratory Variations Lab

Extensions:

- Describe the symptoms and probable causes of COPD and lung cancer
- Describe normal changes that occur in respiratory system functioning from infancy to old age

Remediation:

- Anatomy of the Respiratory System Review Sheet
- Respiratory System Physiology Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App Skeleton Bones

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Digestive System

Time frame: 2 weeks

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- Name the organs of the alimentary canal and accessory digestive organs and identify each on an appropriate diagram or model
- Identify the overall function of the digestive system as digestion and absorption of foodstuffs, and describe the general activities of each digestive system organ
- Name the deciduous and permanent teeth and describe the basic anatomy of a tooth
- Describe the function of local hormones in the digestive process
- List the major enzymes or enzyme groups produced by the digestive organs or accessory glands and name the foodstuffs on which they act
- List several factors that influence metabolic rate, and indicate the effect of each
- Describe how body temperature is regulated

Core Activities: Students will complete/participate in the following:

- Identify on a diagram the organs that make up the alimentary canal, and indicate the digestive role of each organ activity
- Observing Movements and Sounds of Digestion Lab

Extensions:

- Name important congenital disorders of the digestive system and significant inborn errors of metabolism
- Describe the effect of aging on the digestive system

Remediation:

- Functional Anatomy of the Digestive System Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App Skeleton Bones

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects

Board Approved
October 2015

Curriculum Scope & Sequence

Planned Course: Anatomy and Physiology

Unit: The Urinary System

Time frame: 1 week

State Standards: 3.1.10.A, 3.1.12.A

Anchor(s) or adopted anchor: 3.1.10.A5, 3.1.12.A1, 3.1.12.A5, 3.1.12.A6, 3.1.12.A8

Essential content/objectives: At end of the unit, students will be able to:

- Identify the following regions of a kidney (longitudinal section): hilus, cortex, medulla, medullary pyramids, calyces, pelvis, and renal columns
- Describe the process of urine formation, identifying the areas of the nephron that are responsible for filtration, reabsorption, and secretion
- Describe the function of the kidneys in excretion of nitrogen-containing wastes.
- Define *polyuria*, *anuria*, *oliguria*, and *diuresis*
- Describe the general structure and function of the ureters, bladder, and urethra
- Compare and contrast the relative speed of buffers, the respiratory system, and the kidneys in maintaining the acid-base balance of the blood
- Describe the composition of normal urine

Core Activities: Students will complete/participate in the following:

- Sheep Kidney Dissection
- Identify on a diagram the structures of the urinary system and the nephron.

Extensions:

- Describe three common congenital problems of the urinary system
- Describe the effect of aging on urinary system functioning
- List abnormal urinary components

Remediation:

- Functional Anatomy of the Urinary System Review Sheet

Instructional Methods:

- Direct instruction
- Cooperative learning labs
- Study guide worksheets
- 3-D visualization and manipulation on Biodigital Human Google App

Materials & Resources:

- Textbooks
- PowerPoint
- Labs
- Digital Human Google App
- Sheep kidney

Assessments:

- Quizzes
- Labs
- Tests
- Student participation
- Journals
- Projects