			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit #1**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 1: Anatomy** **Introduction and Review of Biological Concepts**	**Suggested Timeline:** **6 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 1: Anatomy Introduction and Review of Biological Concepts
Unit Summary	Anatomy and physiology are the studies of the components of the body and how they work together. The human body is a complex system, consisting of many levels of organization. This organization begins with the chemistry that makes life possible, and continues through cells, tissues, organs, and organ systems. Understanding the structure and vocabulary to these levels of organization is key to understanding their function.

Unit Essential Questions: 1. How are prefixes and suffixes useful in anatomy and physiology? 2. How do we use anatomical terminology to understand anatomy and physiology? 3. What is the relationship between basic biological concepts and anatomy and physiology?	**Key Understandings:** 1. Students will understand prefixes and suffixes used to describe anatomical and physiological vocabulary 2. Students will understand anatomical terminology that includes directional terms, planes of the body, and body cavities 3. Students will understand basic biological concepts including biological levels of organization, homeostasis, metabolism, and identification of the systems of the human body

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.12.A1.	Relate changes in environment to various organisms' ability to compensate using homeostatic mechanisms.
3.1.10.A1.	Explain the characteristics of life common to all organisms.
3.1.B.A3.	Explain how all organisms begin their life cycles as a single cell and that in multicellular organisms, successive generations of embryonic cells form by cell division.
3.1.10.A8.	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism.
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. Students believe that they will just learn general structure of the human body.	1. Students will learn not only the learn the general structure, but also tie in the biological concepts that they already know from Biology. Physiology is also a large component in the course.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn all of the important suffixes, prefixes, and root words that are important for anatomy and physiology. ● Students will learn about the various biological concepts ● Students will review biological principles and how these principles are all needed to maintain the human body. ● Students will review basic microscopy and dissection skills.	● SWBAT define unknown words from known prefixes, suffixes, and root word. ● SWBAT explain the importance of the biological principles in the maintenance of the human body. ● SWBAT demonstrate their knowledge of important terminology through dissection and microscope work. ● SWBAT demonstrate their knowledge of microscope work through various microscopy drawings. ○ Focus the microscope on the various powers. ○ Understand the relationship between magnification and field of view. Detail of drawings should match understanding of magnification.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:

- Alphabetical list of biological prefixes and suffixes (see appendix document Unit 1A)
- Directional Terms
  - Superior or cranial
  - Inferior or caudal
  - Posterior or dorsal
  - Anterior or ventral
  - Medial
  - Lateral
  - Proximal
  - Distal
- Planes of the Body
  - Coronal Plane or Frontal plane
  - Sagittal plane or lateral plane
  - Axial plane or transverse plane
  - Median plane
- Body Cavities
  - Thoracic cavity
  - Abdominopelvic cavity
  - Dorsal cavity
- Levels of organization
  - organelles
  - Cells
  - Tissues
  - Organ
  - Organ system
  - Organisms
- Homeostasis
  - Catabolism
  - Anabolism
  - Dehydration synthesis
  - Hydrolysis
  - Feedback systems
    - Positive
    - Negative
- Human body systems
  - Skeletal system
  - Muscular system
  - Nervous system
  - Endocrine system
  - Lymphatic system
  - Digestive system
  - Respiratory system
  - Urinary system
  - Reproductive system
  - Integumentary system

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Quick online class “quizzes”
  - Short quizzes on each topic within the unit
  - Lab work “check ins”
- Summative assessments including:
  - Larger quizzes (in various formats)
  - Unit Exam (in various formats)
    - Students will demonstrate their ability to classify biological levels of organization and apply these levels to various images.
    - Students will demonstrate their ability to analyze a scenario and apply their understanding of feedback mechanisms to the scenario.
    - Students will demonstrate their knowledge of prefixes and suffixes by using terms that they are unfamiliar with. Students will then describe how they made meaning of the terms.
    - Students will be shown various specimen to apply their directional terms to the marked specimens.

Differentiation:

- Student grouping for projects.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge

of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
    - Such as anatomy and physiology Biology Corner website
    - Such as the https://training.seer.cancer.gov/anatomy/
- Dissection guides
- Various models and posters
- Microscopy work and prepared slides
- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer

			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit #2**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 2: Support and Movement**	**Suggested Timeline:** **8 - 10 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 2: Support and Movement
Unit Summary	This unit will focus on organs and organ systems and how these systems interact to carry out the functions of life. The integumentary, skeletal, and muscular systems are responsible for the support and movement of the body. This unit will introduce how the skin, bone, and muscle allow for complex movement and interaction with the world around us.

Unit Essential Questions:	**Key Understandings:**
1. What are the essential components of integumentary, skeletal, and muscular systems? 2. How does the structure of the skin, bones, and muscles impact our body movements? 3. What are the responsibilities of the integumentary, skeletal, and muscular systems? 4. What are the common diseases of the integumentary, skeletal, and muscular systems? How are these diseases diagnosed and treated?	1. Students will understand the type of cells, tissues, and organs that make up the integumentary, skeletal, and muscular systems. 2. Students will understand the relationship between the structure of the skin, bones, and muscles and their impact on movement of the human body. 3. Students will understand the various roles and functions of the integumentary, skeletal, and muscular systems. 4. Students will understand common diseases, diagnosis, and treatment for skin, bone, and muscular abnormalities.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.10.A8.	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.

3.1.10.A5.	Relate life processes to sub-cellular and cellular structures to their functions.
3.1.10.A.6.	Identify the advantages of multi-cellularity in organisms.
3.1.10.A.7.	Explain how cells store and use information to guide their functions.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism.
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. The skin is not an organ. 2. Each system is independent of the other systems.	1. The skin is actually the largest organ of the human body. 2. All of the systems rely and work with one and other in many different ways.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn a basic understanding of the complexities of the integumentary, skeletal, and muscle systems. ● Students will learn the relationship between structure and function of the various components of these systems. ● Students will learn how these three systems function to allow for support and movement of the human body. ● Students will learn to identify the major bones and muscles and their parts that make up the human body. ● Student will learn the common diseases, diagnosis, and treatment for these three systems.	● SWBAT describe and identify the different components of the skeletal, integumentary, and muscle systems. ● SWBAT explain the relationship between the structure of these systems and the function of these systems as a whole. ● SWBAT explain the role that the systems play in movement and support of the human body. ● SWBAT use a skeletal and muscle model to orally tell me the names of the various bones and muscles of the body including origin and insertion points. ● SWBAT to analyze common diseases for these three systems.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:

Integumentary terms

- Epithelial cell shapes
  - Squamous
  - Cuboidal
  - Columnar
- Epithelial cell numbers
  - Simple
  - stratified
- Basement membrane
- Microvilli
- Epidermis
  - Stratusm
  - Basale
  - Keratin
  - Melanin
  - Eumelanin
  - Pheomelanin
- Dermis
- Subcutaneous layer
  - Exocrine gland
    - Merocrine gland
    - Apocrine gland
    - Holocrine gland
  - Endocrine gland

Accessory Skin Structures

- Nails
- Hair follicles
- Sebaceous glands (sebum)
- Sweat glands

Skeletal terms

- Bone and Cartilage cells
  - Osteocytes
  - Chondrocytes
- Bone Classification
  - Long bones
    - Epiphysis

    Spongy bone

    Trabeculae

    Articular cartilage
    - Diaphysis

    Compact bone

    Medullary cavity

    Endosteum

    Marrow
    - Periosteum
  - Short bones
  - Flat bones

  Intramembranous bones

  Osteoblasts
  - Irregular bones
- Microscopic structures of bones
  - Lamellae
  - cancliculi
- Endochondral Bones
  - Epiphyseal plate
- Hematopoiesis
- Axial skeleton
  - Skull
  - Facial bones
  - Hyoid bone
  - Vertebral column
  - Sacrum
  - Coccyx
  - Thoracic cage - ribs, sternum
- Appendicular skeleton
  - Pectoral girdle -scapula, clavicle
  - Upper limb - humerus, radius, ulna, carpals metacarpals, phalanges
  - Pelvic girdle - pelvis
  - Lower limb - femur, tibia, fibula, patella, tarsals, metatarsals
- Joints
  - Fibrous joints
  - Cartilaginous joints
  - Synovial joints
- Types of Joints
  - Ball and socket
  - Condylar
  - Plane
  - Hinge

Muscular terms

- Muscle tissue

  Skeletal

  Smooth

  cardiac

Connective tissue coverings

  Fascia

  Epimysium

  Perimysium
  - Fascicles
  - Endomysium
  - Aponeuroses
- Skeletal muscle fibers
  - Myofibrils
  - Myosin
  - Actin
  - Sarcomeres
  - Sarcoplasmic reticulum
  - Transverse tubules
  - Cisternae
- Neuromuscular junction
  - Synapse
  - Neurotransmitters
  - Neuromuscular junction
  - Neuroplate
  - Motor end
  - Synaptic cleft
- Skeletal Muscular Contraction
  - Sliding filament model
  - ATPase
  - Acetylcholine
  - acetylcholinesterase
  - Creatine phosphate
  - Hemoglobin
  - Myoglobin
  - Lactic acid
  - Oxygen debt
- Muscular responses
  - Twitch
  - Latent period
  - Summation
  - Complete tetanic contraction
  - Motor unit
  - Recruitment
  - Muscle tone
  - Multiunit smooth muscle
  - Visceral smooth muscle
  - Peristalsis
  - Intercalated discs
- Origin and insertion
- Flexion and extension

	○ Pivot ○ saddle ● Types of Joint Movements ○ Flexion ○ Extension ○ Dorsiflexion ○ Plantar flexion ○ Hyperextension ○ Abduction ○ Adduction ○ Rotation ○ Circumduction ○ Pronation ○ Supination ○ Eversion ○ Inversion ○ Retraction ○ Protraction ○ Elevation ○ depression	● Agonist (prime mover) and antagonist ● Synergists ● Major skeletal muscles

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Questioning technique
  - "Quick quizzes"
  - Individual time with student groupings to see how students are learning
  - Lab notebook checks for the microscopy work
  - Individualized oral checks of material
- Summative assessments including:
  - Larger quizzes on each of the three systems independently.
  - End of unit exam with various components:
    - A section where students will have to describe the three systems and how they work together to allow for support, protection and movement of the human body.
    - A section of matching and multiple choice that will focus on the vocabulary for the unit.
    - A practical section where different diagrams and structures are provided and students will identify the different labeled parts.
    - An oral section where students are responsible for identifying structures on a model.

Differentiation:

- Student grouping for projects.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
    - Such as anatomy and physiology Biology Corner website
    - Such as the https://training.seer.cancer.gov/anatomy/
- Dissection guides
- Various models and posters
    - Human skeleton for practical quiz.
    - Models and posters of the skin and muscle systems.
- Microscopy work and prepared slides
    - Slides of the various tissue types of skin, muscle, and bone.
- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer

			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit #3**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 3: Integration and coordination**	**Suggested Timeline:** **6 - 8 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and Physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 3: Integration and Coordination
Unit Summary	The organ systems of the human body are responsible for a multitude of functions. These systems work together to maintain homeostasis. The nervous system, the senses, and the endocrine system all work together to relay information between different systems within the human body.

Unit Essential Questions:	**Key Understandings:**
1. What are the essential components of the nervous system, the senses, and the endocrine system? 2. What are the responsibilities of the nervous system, the senses, and endocrine system? 3. What are the common diseases of the nervous and endocrine systems? How are these diseases diagnosed and treated?	1. Students will understand the various components to the nervous and endocrine systems and how these systems interact. 2. Students will understand how these systems, along with senses, are responsible for the many feedback mechanisms involved with homeostasis. 3. Students will understand some of the common diseases of the nervous and endocrine system and explain how they are diagnosed and treated.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.10.A8	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.
3.1.10.A5.	Relate life processes to sub-cellular and cellular structures to their functions

3.1.10.A.6.	Identify the advantages of multi-cellularity in organisms.
3.1.10.A.7.	Explain how cells store and use information to guide their functions.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. Nerves are not made up of cells. 2. All cells undergo mitosis.	1. Nerves are made up of cells. 2. Nervous system cells do not undergo mitosis after the system is fully developed. Damage can be permanent.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn the parts and functions of the nervous and endocrine systems. ● Students will learn the various hormones involved with the endocrine system and the feedback mechanisms they provide. ● Students will learn how the senses relate to the nervous system. ● Students will learn the parts of the ears and eye and how they provide sight and hearing.	● SWBAT explain the interaction of the parts of the nervous and endocrine systems. ● SWBAT determine the target cells for various endocrine hormones and analyze the feedback mechanisms that they cause. ● SWBAT relate the five senses to the nervous and endocrine systems. ● SWBAT identify the parts of the eye and ear and explain how each part functions. ● SWBAT dissect a sheep brain to identify the location of various brain structures and the location of the cranial nerves.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:

Nervous System ● Neurons ● Impulses ● Synapse ● Neurotransmitters ● Cell body ● Dendrites ● Axons ● Central nervous system ● Peripheral nervous system ● Sensory receptors ● Effectors	The Senses ● Types of receptors ○ Chemoreceptors ○ Pain receptors ○ Mechanoreceptros ○ Photoreceptors ● Sensation ● Perception ● Projection ● Sensory adaptation ● Special senses ● Olfactory receptors	Endocrine System ● Hormones ● Endocrine glands ● Target cells ● Paracrine ● Autocrine ● Steroids ● Nonsteroids ● Signal transduction ● Prostaglandins ● Pituitary gland ○ Anterior pituitary

- Somatic nervous system
- Autonomic nervous system
- Myelin
- Myelin sheath
- Neuron structure
  - Neurofilaments
  - Chromatophilic substance
  - Neurilemma
  - Nodes of Ranvier
- Classification of neurons
  - Multipolar neurons
  - Bipolar neurons
  - Unipolar neurons
- Neuron Function
  - Sensory neuron
  - Interneurons
  - Motor neurons
- Synaptic cleft
- Action potential
- Resting potential
- Polarized vs. depolarized
- Threshold potential
- Excitatory
- Inhibitory
- Facilitation
- Convergence
- Divergence
- Motor nerves
- Mixed nerves
- Afferent fibers
- Efferent fibers
- Relex arc
- Reflexes
- Meninges
  - Dura mater
  - Arachnoid mater - cerebrospinal fluid
  - Pia mater
- Spinal cord
- Spinal nerves
- Ascending tracts vs. descending tracts
- Brain
- Cerebrum
  - Corpus callosum
  - Gyri
  - Sulcus
  - Fissure
  - Frontal lobe
  - Parietal lobe
  - Occipital lobe
  - Temporal lobe
  - Insula
  - Cerebral cortex
- Diencephalon
- Brainstem
  - Midbrain
  - Pons
- Ear
  - Auricle
  - External acoustic meatus
  - Eardrum
  - Auditory ossicles
  - Oval window
  - Auditory tube
  - Labyrinth
  - Perilymph
  - Endolymph
  - Semicircular canals
  - Cochlea
  - Round window
- Equilibrium
  - Static equilibrium
  - Dynamic equilibrium
  - Vestibule
  - Ampulla
  - Crista ampullaris
- Eye
  - Eyelid
  - Lacrimal apparatus
  - Extrinsic muscles
  - Sclera
  - Choroid coat
  - Ciliary body
  - Lens
  - Iris
  - Aqueous humor
  - Pupil
  - Retina
  - Macula lutea
  - Fovea centralis
  - Optic disc
  - Vitreous humor
  - Refraction
  - Rods
  - Cones
  - rhodopsin
  - Posterior pituitary
  - Growth hormone
  - Prolactin
  - thyroid -stimulating hormone
  - Adrenocorticotropic hormone
  - Follicle-stimulating hormone
  - Luteinizing hormone
  - Antidiuretic hormone
  - oxytocin
- Thyroid gland
  - Thyroxine
  - Triiodothyronine
  - calcitonin
- Parathyroid gland
  - Parathyroid hormone
- Adrenal gland
  - Adrenal medulla
  - Adrenal cortex
  - Epinephrine
  - Norepinephrine
  - Aldosterone
  - minearl corticoid
  - Cortisol
  - glucocorticoid
- Pancreas
  - Glucagon
  - insulin

○ Medulla oblongata ● Cerebellum ○ Cerebellar cortex ● Somatic nervous system ● Autonomic nervous system ● Sympathetic and parasympathetic divisions		

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Questioning technique
  - "Quick quizzes"
  - Individual time with student groupings to see how students are learning
  - Lab notebook checks for the microscopy work
  - Individualized oral checks of material
  - Graded work for the dissection of the brain
- Summative assessments including:
  - Larger quizzes on the endocrine system and nervous system.
  - End of unit exam with various components:
    - A section where students will have to describe the relationship between the senses, the nervous system, and endocrine system. They will need to compare and contrast the nervous and endocrine systems. Explain how these systems work together along with the muscular and skeletal system to maintain homeostasis.
    - A section of matching and multiple choice that will focus on the vocabulary for the unit.
    - A practical section where different diagrams and structures are provided and students will identify the different labeled parts.
    - An oral section where students are responsible for identifying structures on a model.

Differentiation:

- Student grouping for projects and dissections.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
  - Such as anatomy and physiology Biology Corner website
  - Such as the https://training.seer.cancer.gov/anatomy/
- Dissection guide for the brain
  - Sheep brains
- Various models and posters
  - Human brain model
  - Human nervous system model model
  - Various posters and the thin man diagram
- Microscopy work and prepared slides
  - Slides of the various tissues of brain and nerve cells.
- Sheep brain dissection equipment

- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer

			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit #4**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 4: Transport**	**Suggested Timeline:** **4 - 5 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 4: Transport
Unit Summary	Blood, the cardiovascular system, and the lymphatic system work to transport materials between various parts of the human body, and help maintain the internal environment. In this unit the components of blood will be explored along with the heart, blood vessels, and pathway of blood throughout the human body. Lymphatic system parts and their functions will be also examined. These systems will be studied to show how they work together to move various substances within the human body to maintain homeostasis.

Unit Essential Questions: 1. What are the essential components of blood, the cardiovascular system, and the lymphatic system? 2. How do the components of blood, the heart, the blood vessels, and the lymphatic system allow for transport of substances through the human body? 3. What are the common diseases of the blood, cardiovascular system, and lymphatic system? How are these diseases diagnosed and treated?	**Key Understandings:** 1. Students will understand the essential components of the blood. They will also understand the parts of the cardiovascular system and lymphatic systems. 2. Students will understand how the components of the blood, cardiovascular system, and lymphatic systems all work together to transport material through the body. 3. Students will understand common disorders, diagnosis, and treatments of the cardiovascular, blood, and lymphatic systems.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.10.A8.	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.
3.1.10.A5.	Relate life processes to sub-cellular and cellular structures to their functions.
3.1.10.A.6.	Identify the advantages of multi-cellularity in organisms.
3.1.10.A.7.	Explain how cells store and use information to guide their functions.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism.
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. Students believe that their blood is blue before coming in contact with oxygen.	1. Since a major component of blood is iron, blood is red.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn the anatomy of the components of blood, the lymphatic system, and the cardiovascular system. ● Students will learn how the structure of these components allow for the function of transport within the human body. ● Students will learn the basic diseases associated with the organs of the cardiovascular and lymphatic systems.	● SWBAT identify the structure of the cardiovascular and lymphatic systems using various diagrams and models. ● SWBAT describe the functions of the various structures within these systems and how they work as a whole. ● SWBAT dissect a heart and locate all important structures of the heart. ● SWBAT describe the different diseases, diagnosis, and treatment of a variety of common diseases associated with the cardiovascular and lymphatic systems.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:		
Composition of Blood ● Hematocrit ● Plasma ○ Albumins ○ Globulins ○ Fibrinogen ○ antibodies	Cardiovascular System ● Pulmonary circuit ● Systemic circuit ● Mediastinum ● Heart ○ Pericardium ○ Epicardium	Lymphatic System ● Lymphatic pathways ● Lymph ● Lymph nodes ○ Lymphatic nodules ○ Lymphatic sinuses ● Collecting ducts

- Erythrocytes
  - Hemoglobin
  - Hematopoietic stem cells
  - Erythropoietin
  - antigen
- Leukocytes
  - Granulocytes - neutrophils, eosinophils, basophils
  - Agranulocytes - monocytes, lymphocytes
  - Diapedesis
  - leukopenia
- Thrombocytes
- Hemostasis
  - Vascular spasm
  - Coagulation
  - Prothrombin
  - Thrombin
  - Serum
  - Thrombus
  - Embolus
  - agglutination
  - Myocardium
  - Endocardium
  - Atria
  - Ventricles
  - Septum
  - Vena cavae
  - Tricuspid valve
  - Mitral valve
  - Aorta
  - Aortic valve
  - Coronary arteries
  - Coronary sinus
  - Diastole
  - Systole
  - Cardiac cycle
  - Functional syncytium
  - Cardiac conduction system
  - Sinoatrial node
  - Atrioventricular node
  - AV bundle
  - Purkinje fibers
  - electrocardiogram
- Blood vessels
  - Arteries - arterioles
  - Endothelium
  - Vasoconstriction
  - Vasodilation
  - Capillaries
  - Veins - venules
  - Systolic pressure
  - Diastolic pressure
  - Pulse
  - Stroke volume
  - Cardiac output
  - Peripheral resistance
  - Viscosity
  - baroreceptors
- Naming of various arteries and veins of the human body
- Edema
- Mucosa-associated lymphoid tissue
- Thymus
- Spleen
- Pathogen
- Infection
- Innate defense
- Adaptive defense
- Species resistance
- Mechanical barriers
- Inflammation
- Chemical barriers
- Interferons
- Complement
- Natural killer cells
- Perforins
- Phagocytosis
- antigen -presenting cell
- Cellular immune response
- Immunoglobulins
- Humoral immune response
- Primary immune response
- Secondary immune response
- Vaccine
- Allergens
- Autoantibodies
- autoimmunity

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Questioning technique
  - “Quick quizzes”
  - Individual time with student groupings to make a progression check
  - Lab notebook checks for the microscopy work for histological samples of various blood, lymph nodes and cardiovascular tissues.
  - Individualized oral checks of material
  - Graded work for the dissection of the heart
- Summative assessments including:
  - Larger quizzes:
    - Components of blood
    - The cardiovascular system

        - The lymphatic system
    - End of unit exam with various components:
        - A section where students will have to describe the relationship between the blood, cardiovascular system, and lymphatic system and explain how each of these parts contributes to the role of transportation of material throughout the human body.
        - A section of matching and multiple choice questions that will focus on the vocabulary for the unit.
        - A practical section where different diagrams and structures are provided and students will identify the different labeled parts for both the lymphatic and cardiovascular systems. Students will also need to differentiate between leukocytes and erythrocytes using prepared slides under the microscope.
        - An oral section where students are responsible for identifying structures on a model of the heart.

Differentiation:

- Student grouping for projects and dissections.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
    - Such as anatomy and physiology Biology Corner website
    - Such as the https://training.seer.cancer.gov/anatomy/
- Dissection guide for the heart
- Various models and posters
    - Human heart model
    - Human cardiovascular model
    - Various posters and the thin man diagram
- Microscopy work and prepared slides
    - Slides of the various tissues of heart and lymph tissues.
- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer

			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit #5**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 5: Absorption and Excretion**	**Suggested Timeline:** **4 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 5: Absorption and Excretion
Unit Summary	The focus of this unit will include how substances are introduced, incorporated, and eliminated from the human body to maintain homeostasis. The systems that will be covered are the digestive, respiratory, and urinary systems. The digestive and respiratory systems will focus on the delivery of raw materials needed to fuel the body, such as nutrients and oxygen. The urinary system works to ensure the proper volume and composition of the body fluids. All three of these systems work to excrete waste.

Unit Essential Questions:	**Key Understandings:**
1. What are the essential components of the digestive, respiratory, and urinary systems? 2. How do the structures of digestive, respiratory, and urinary systems assist in maintaining homeostasis? 3. What are the common diseases of the digestive, respiratory, and urinary systems? How are these diseases diagnosed and treated?	1. Students will understand the type of cells, tissues, and organs that make up the digestive, respiratory, and urinary systems. 2. Students will understand the relationship between the structure of the various organs of theses systems and how they deliver substances and excrete waste in the human body to maintain homeostasis. 3. Students will understand common diseases, diagnosis, and treatment for digestive, respiratory, and urinary abnormalities.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.10.A8.	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.
3.1.10.A5.	Relate life processes to sub-cellular and cellular structures to their functions.
3.1.10.A.6.	Identify the advantages of multi-cellularity in organisms
3.1.10.A.7.	Explain how cells store and use information to guide their functions.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism.
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. Students think that the digestive system is internal.	1. In reality the digestive system is external, mouth through anus.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn the anatomy of the digestive, respiratory, and urinary systems. ● Students will learn structure of these systems and how the different structures contribute to the function of each system as a whole. ● Students will learn the basic diseases associated with the digestive, respiratory, and urinary systems.	● SWBAT find and label the important structures for the digestive, respiratory, and urinary systems using models or diagrams. ● SWBAT explain the function of the various parts within each system and analyze the importance of the individual parts to the entire system as a whole. ● SWBAT describe the common diseases associated with the three systems and describe their diagnosis and treatment.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:		
Digestive ● Alimentary canal ● Mucosa ● Lumen ● Submucosa ● Muscularis ● Serosa	Respiratory ● Respiration ● Nasal cavity - nasal septum, nasal conchae ● Pharynx ● Larynx - glottis, epiglottis ● Trachae	Urinary ● Kidney - retroperitoneally, renal sinus, renal pelvis, medulla, renal cortex, nephrons, urine, renal arteries, afferent arterioles, renal vein, renal corpuscle, renal tubule, glomerulus, glomerular

• Segmentation • Peristalsis • Tongue - lingual frenulum, papillae • Palate - uvula • Teeth - enamel, dentin, cementum • Salivary glands - parotid glands, submandibular glands, sublingual glands • Pharynx - nasopharynx, oropharynx, laryngopharynx • Esophagus - bolus, lower esophageal sphincter • Stomach - gastric glands, mucous cells, parietal cells, chief cells, gastric juice, pepsin, pepsinogen, intrinsic factor, gastrin, cholecystokinin, chyme • Pancreas - pancreatic juice, zymogen granules • Liver - hepatic lobules, hepatic sinusoids, Kupffer cells, hepatic ducts, bile • Gallbladder - cystic duct, bile duct, emulsification • Small intestines - duodenum, ileum, jejunum, mesentery, intestinal villi, lacteal, intestinal glands, goblet cells, ileoceal sphincter • Large intestine- cecum, appendix, colon, rectum, anus, feces • Nutrients - macronutrients, micronutrients, calorie, essential nutrients	• Bronchial tree - main bronchi, bronchioles, alveolar ducts, alveolar sacs, alveoli, bronchodilation, bronchoconstriction • Lungs - visceral pleura, parietal pleura, pleural cavity • Inspiration - surface tension, surfactant • Expiration • Respiratory volumes -tidal volume, resting tidal volume, inspiratory reserve volume, expiratory reserve volume, residual volume, respiratory capacities, vital capacity, inspiratory capacity, functional residual capacity, total lung capacity • Respiratory areas - medullary respiratory center • Hyperventilation • Respiratory membrane - partial pressure • Oxyhemoglobin • Hypoxia • Carbaminohemoglobin • Carbonic anhydrase • Acidosis • alkalosis	capsule, efferent arteriole, juxtaglomerular apparatus • Glomerular filtration- tubular reabsorption, tubular secretion, urine, glomerular filtrate, net filtration pressure, glomerular filtration rate • Urea - uric acid • Ureter • Urethra • Electrolytes - electrolyte balance • Intracellular fluid compartment • Extracellular fluid compartment • Transcellular fluid • Water balance

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Questioning technique
  - “Quick quizzes”
  - Individual time with student groupings to make a progression check
  - Lab notebook checks for the microscopy work for histological samples of various digestive and respiratory tissue samples
  - Individualized oral checks of material
  - Graded work for models of each system that students will build.
- Summative assessments including:
  - Larger quizzes:
    - Digestive system
    - Respiratory system
    - Urinary system
  - End of unit exam with various components:
    - A section where students will have to describe the various parts and functions of the digestive system, the respiratory system, and the urinary system. Students will need to be able to describe how all of the parts contribute to the overall function of these systems.

- A section of matching and multiple choice questions that will focus on the vocabulary for the unit.
- A practical section where different diagrams and structures are provided and students will identify the different labeled parts for the digestive, urinary, and respiratory systems. Students will also need to identify key parts of the digestive system using prepared microscope slides that will be set up for the exam.
- An oral section where students are responsible for identifying structures on a model of the digestive system, respiratory system, or urinary system.

Differentiation:

- Student grouping for projects and dissections.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
    - Such as anatomy and physiology Biology Corner website
    - Such as the https://training.seer.cancer.gov/anatomy/
- Material for students to build their own models (craft material, play dough, butcher paper, etc)
- Various models and posters
    - Human digestive system model
    - Human respiratory model
    - Urinary system model
- Microscopy work and prepared slides
    - Slides of the various tissues within each of the systems
- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer

			Anatomy and Physiology **10th, 11th, 12th Grade** **Unit # 6**
Course/Subject: Anatomy and Physiology	**Grade:** 10th, 11th, 12th	**Unit 6: The Human Life Cycle**	**Suggested Timeline:** **3 weeks**

Grade Level Summary	This college preparatory class is designed for students who want to learn about the intricacies of the human body. Students will learn about the systems of the human body and how all of these systems work together from both an anatomical and physiological perspective. This class will be lab and dissection based and will require both memorization and application of material. There will be an emphasis of critical thinking, effective written and verbal communication, and work ethic.
Grade Level Units	Unit 1: Anatomy Introduction and Review of Biological Concepts Unit 2: Support and Movement Unit 3: Integration and Coordination Unit 4: Transport Unit 5: Absorption and Excretion Unit 6: The Human Life Cycle

Unit Title	Unit 6: The Human Life Cycle
Unit Summary	In this unit the path of the human life cycle will be examined. This pathway will begin with the production of sperm and oocytes by the male and female reproductive systems, to fertilization and formation of a zygote, through pregnancy, birth, and aging. The previous units will be revisited to gain a better understanding of how their specialized characteristics are determined during embryonic development.

Unit Essential Questions:

1. What are the essential components of human reproductive system?
2. How do the structure of the gonads create haploid cells?
3. What are the responsibilities of tissues and organs in the human reproductive system?
4. What events lead up to cellular specialization or differentiation after fertilization has occurred?
5. What are the common diseases of the human reproductive system? How are these diseases diagnosed and treated?

Key Understandings:

1. Students will understand the functions of the essential components within the male and female reproductive systems.
2. Students will understand how sexual reproduction works and how haploid cells are created within the gonads.
3. Students will understand how the different parts of the reproductive systems are all related to the end function of sexual reproduction.
4. Students will understand the events that lead to cellular specialization and differentiation.
5. Students will understand the diseases that affect the reproductive system.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.1.10.A8.	Investigate the spatial relationships of organisms' anatomical features using specimens, models, or computer programs.
3.1.10.A5.	Relate life processes to sub-cellular and cellular structures to their functions.
3.1.10.A.6.	Identify the advantages of multi-cellularity in organisms.
3.1.10.A.7.	Explain how cells store and use information to guide their functions.

Important Standards Addressed in the Unit:	
3.1.C.A1.	Explain the chemistry of metabolism.
3.4.10.E1.	Assess how medical technologies over time have impacted prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering.

Misconceptions:	**Proper Conceptions:**
1. Students believe that fertilization occurs in the uterus. 2. Students believe that a female starts producing oocytes at puberty.	1. Fertilization of an egg occurs in the oviduct. 2. Oocytes are formed before birth, but remain in prophase I of meiosis until puberty.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Students will learn the anatomy related to the male and female reproductive systems. ● Students will learn the function of the different structures and how these structures all work together for sexual reproduction to occur. ● Students will learn about the steps of cellular specialization that occurs after the fertilization process. ● Students will learn about the various diseases, diagnosis, and treatments for ailments associated with the reproductive system.	● SWBAT located the various important structures of the reproductive system on models or diagrams. ● SWBAT explain the function of the various parts of the reproductive system and analyze how all of the parts are interrelated to the system as a whole. ● SWBAT describe the process that occurs after fertilization as the embryo begins to develop. ● SWBAT describe symptoms and diagnosis of common reproductive system ailments.	● <u>Encouraging Inquiry and Curiosity:</u> ○ Modeling, developing and encouraging students to ask and answer questions about the interactions between anatomy and physiology and the human body.

Academic Vocabulary:		
Male Reproductive System ● Testes - seminiferous tubules, spermatogenic cells, interstitial cells, spermatogenesis	Growth and Development ● Prenatal period ○ Fertilization - zygote	Aging ● Free radicals ● Apoptosis ● Genetics

● Epididymides ● Ductus deferentia ● Seminal vesicles ● Prostate gland ● Bulbourethral glands (Cowper's glands) ● Semen ● Scrotum ● Penis - glans penis ● Hormones - gonadotropins, androgens, testosterone Female Reproductive Tract ● Ovaries - primordial follicles, oogenesis, polar body, primary follicles, follicular cells, antral follicle, ovulation ● Uterine tubes (fallopian tubes or oviducts) ● Uterus - cervix, endometrium, myometrium, perimetrium ● Vagina ● Hormones - estrogen, progesterone ● Menstrual cycle - menarche, corpus luteum, menopause ● Mammary glands	○ Embryonic stage - cleavage, blastocyst, embryo ○ Implantation ○ Placenta ○ Chorion ○ Amnion ○ Embryonic disc ○ Umbilical cord ○ Yolk sac ○ Allantois ○ Placental membrane ○ Gastrulation - ectoderm, endoderm, mesoderm, primary germ layers, organogenesis, gastrula, teratogens ○ Fetal stage- fetus, ductus venosus, foramen ovale, ductus arteriosus ● Neonatal period ● Postnatal period	

Assessments:

- Various formative assessments including:
  - Ticket in/ out door
  - Questioning technique
  - "Quick quizzes"
  - Individual time with student groupings to make a progression check
  - Individualized oral checks of material
- Summative assessments including:
  - Larger quizzes:
    - Male reproductive system
    - Female reproductive system
    - Embryology
  - End of unit exam with various components:
    - A section where students will have to describe the different parts of both the male and female reproductive system and relate the different structures to each other and the overall function of sexual reproduction.
    - A section of matching and multiple choice questions that will focus on the vocabulary for the unit.
    - A section on embryology where students will have to describe the overall process that takes one cell after fertilization and creates a human made of trillions of specialized cells.

Differentiation:

- Student grouping for projects and dissections.
- Design lessons based on student learning styles
- The online component ConnectED
- Continually assess (formative) student learning

Interdisciplinary Connections:

- Student understanding of Anatomy and Physiology and how the human body functions is very useful for a more complete understanding of various other disciplines. The study of Anatomy is very vocabulary heavy and this knowledge of root words, suffixes and prefixes is important across all disciplines and can help students find meaning to unfamiliar terms.

Additional Resources:

- ConnectED program that is connected to the textbook.
- Various online resources to help provide students with a visual of content.
    - Such as anatomy and physiology Biology Corner website
    - Such as the https://training.seer.cancer.gov/anatomy/
- Material for students to build their own models (craft material, play dough, butcher paper, other craft supplies)
- Various models and posters
    - Reproductive system posers
    - Thin man model
- Professionals in the field that could skype or come in for a presentation.

Created By: Ryan Fryer