SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Human Anatomy and Physiology 2	**Length of Course:** 30 cycles
Grade Level(s): 10, 11, 12	**Periods Per Cycle:** 6
Units of Credit: 1	**Length of Period:** 40 minutes
Classification: Core or Elective	**Total Instructional Time:** 120 hours

Course Description

This advanced level course will examine human anatomy and physiology, and it is designed for students wishing to pursue a medical career. This course will study the following (but not limited to) body systems: Anatomy Terminology, Nervous System, Special Senses, Endocrine System, Renal/Urinary System, Digestive System, Reproductive System, and Microbiology which are essential to understanding human physiology. Human anatomy & physiology will offer a variety of laboratory experiences, which will include specimen dissections.

Instructional Strategies, Learning Practices, Activities, and Experiences

Teacher Demonstration
Detailed Laboratory Experiments
Inquiry Laboratory Experiments
Textbook Reading
Homework
Posted Objectives and Agenda
Formal Assessments
Guided Practice
Online Tutorials/Resources
Critical Thinking
Bell Ringers
Class Discussion
Flexible Groups
APL Strategies

Assessments

Chapter Examinations
Laboratory Write-ups/Reports
Mid Term and Final Exam
Unit Projects
Directed Reading Packets
Study Guides

Materials/Resources

Anatomy and Physiology Textbook
Current Book: Essentials of Human Anatomy and Physiology 8th Ed.
PowerPoint Lectures
Note Packets
Online Resources
Laboratory Resources and Equipment
Laboratory Experiments

Adopted: 5/23/22
Revised:

Language of Anatomy	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Overview of Anatomy and Physiology 2. Language of Anatomy 3. Prefixes/Suffixes	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Language of Anatomy	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **Overview of Anatomy and Physiology** Define *anatomy* and *physiology*. Explain how anatomy and physiology are related. **Language of Anatomy** Name the levels of structural organization that make up the human body and explain how they are related. 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. Identify and correctly use prefixes and suffixes as they pertain to anatomy.

Nervous System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Organization of the Nervous System 2. Structure and Function 3. Central Nervous System 4. Peripheral Nervous System 5. Developmental Aspects	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Nervous System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **Organization of the Nervous System** List the general functions of the nervous system. Explain the structural and functional classifications of the nervous system. **Nervous Tissue: Structure & Function** State the function of neurons and neuroglia. Describe the general structure of a neuron and name its important anatomical regions. Describe the composition of gray matter and white matter. List the two major functional properties of neurons. Classify neurons according to structure and function. List the types of general sensory receptors and describe their functions. Describe the events that lead to the generation of a nerve impulse and its conduction from one neuron to another. Define *reflex arc* and list its elements. **Central Nervous System** Define *central nervous system* and *peripheral nervous system* and list the major parts of each. Identify and indicate the functions of the major regions of the cerebral hemispheres, diencephalon, brain stem, and cerebellum on a human brain model or diagram. Name the three meningeal layers and state their functions. Discuss the formation and function of cerebrospinal fluid and the blood-brain barrier. Compare the signs of a CVA with those of Alzheimer's disease; of a contusion with those of a concussion. List two important functions of the spinal cord. Describe spinal cord structure. **Peripheral Nervous System** Describe the general structure of a nerve. Identify the cranial nerves by number and by name, and list the major functions of each. Name the four major nerve plexuses, give the major nerves of each, and describe their distribution. Contrast the effect of the parasympathetic and sympathetic divisions on the following organs: heart, lungs, digestive system, blood vessels. Define spinal cord injuries and differentiate between the types.

Special Senses	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. The Eye and Vision 2. The Ear: Hearing and Balance 3. Chemical Senses: Taste and Smell 4. Developmental Changes and Disease	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Special Senses	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **The Eye and Vision** When provided with a model or diagram, identify the accessory eye structures and list the functions of each. Explain the physiology of crying. Name the eye tunics and indicate the major function of each. Explain how rod and cone function differ. Describe image formation on the retina. Trace the pathway of light through the eye to the retina. Explain disorders such as: *night blindness, colorblindness, floaters, and astigmatism.* Define the following terms: accommodation, blind spot, cataract, emmetropia, glaucoma, hyperopia, myopia, and refraction. Trace the visual pathway to the optic cortex. Discuss the importance of the pupillary and convergence reflexes. **The Ear: Hearing and Balance** Identify the structures of the external, middle, and internal ear, and list the functions of each. Explain the function of the organ of Corti in hearing. Define *sensorineural* and *conductive deafness* and list possible causes of each. Describe how the equilibrium organs help maintain balance. **Chemical Senses: Taste and Smell** Identify the structures of the tongue and nose and list the functions of each. Describe the location, structure, and function of the olfactory and taste receptors. Name the four basic taste sensations and list factors that modify the sense of taste. State the factors that affect gustation. Explain phenomena such as odor snapshots, olfactory auras and anosmia. Describe changes that occur with age in the special sense organs.

Endocrine System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Chemistry of Hormones 2. Functions of Hormones 3. Major Endocrine Organs 4. Physiology of the Organs 5. Homeostatic Imbalances	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Endocrine System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **The Endocrine System and Hormone Function—An Overview** Define *hormone* and *target organ.* Describe how hormones bring about their effects in the body. Explain how various endocrine glands are stimulated to release their hormonal products. Define *negative feedback* and describe its role in regulating blood levels of the various hormones. **The Major Endocrine Organs** Describe the difference between endocrine and exocrine glands. On an appropriate diagram, identify the major endocrine glands and tissues. List hormones produced by the endocrine glands and discuss their general functions. Discuss ways in which hormones promote body homeostasis by giving examples of hormonal actions. Describe the functional relationship between the hypothalamus and the pituitary gland. Describe major pathological consequences of hypersecretion and hyposecretion of the hormones considered in this chapter.

Aspects of the Reproductive System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Male vs. Female Anatomy 2. Spermatogenesis 3. Oogenesis 4. Mammary Glands 5. Survey of Pregnancy 6. Homeostatic Imbalances	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Aspects of the Reproductive System	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **Anatomy of the Male Reproductive System** Discuss the common purpose of the reproductive system organs. When provided with a model or diagram, identify the organs of the male reproductive system, and discuss the general function of each. Name the endocrine and exocrine products of the testes. Discuss the composition of semen, and name the glands that produce it. Trace the pathway followed by a sperm from the testis to the body exterior. Define *erection, ejaculation,* and *circumcision.* **Male Reproductive Functions** Define *meiosis* and *spermatogenesis.* Describe the structure of a sperm, and relate its structure to its function. Describe the effect of FSH and LH on testis functioning. **Anatomy of the Female Reproductive System** When provided with an appropriate model or diagram, identify the organs of the female reproductive system, and discuss the general function of each. Describe the functions of the vesicular follicle and corpus luteum of the ovary. Define *endometrium, myometrium,* and *ovulation.* Indicate the location of the following regions of the female uterus: cervix, fundus, body. **Female Reproductive Functions and Cycles** Define *oogenesis.* Describe the influence of FSH and LH on ovarian function. Describe the phases and controls of the menstrual cycle. **Mammary Glands** Describe the structure and function of the mammary glands. **Survey of Pregnancy and Embryonic Development** Define *fertilization* and *zygote.* Describe implantation. Distinguish between an embryo and a fetus. List the major functions of the placenta. Indicate several ways that pregnancy alters or modifies the functioning of the mother's body. Describe how labor is initiated, and briefly discuss the three stages of labor. List several agents that can interfere with normal fetal development.

Digestive System and Nutrition	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Anatomy of the Digestive System 2. Functions of the Digestive System 3. Dietary Sources a. Carbohydrates b. Lipids c. Proteins d. Vitamins & Minerals 4. Metabolism 5. Macromolecule Metabolism 6. Role of the Liver in Metabolism 7. Body Energy Balance	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Digestive System and Nutrition	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: **Digestive System Anatomy and Functions** 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. Describe the composition and function(s) of saliva. Name the deciduous and permanent teeth. Explain how villi aid digestive processes in the small intestine. Describe the mechanisms of swallowing, vomiting, and defecation. Describe how foodstuffs in the digestive tract are mixed and moved along the tract. Describe the function of local hormones in the digestive process. **Dietary Sources** List the major enzymes or enzyme groups produced by the digestive organs or accessory glands and name the foodstuffs on which they act. Name the end products of protein, fat, and carbohydrate digestion. State the function of bile in the digestive process. **Nutrition** Define *nutrient* and *kilocalorie*. List the six major nutrient categories. Note important dietary sources and their main cellular uses. **Metabolism** Define *enzyme, metabolism, anabolism,* and *catabolism.* Describe the metabolic roles of the liver. Recognize the uses of carbohydrates, fats, and proteins in cell metabolism. Explain the importance of energy balance in the body, and indicate consequences of energy imbalance. List several factors that influence metabolic rate, and indicate each one's effect. Describe how body temperature is regulated.

Microbiology	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Prokaryotes – Anatomy 2. Classifying and Naming Microbes 3. Microscopy for Microbes 4. Microbial Growth 5. Diseases and Infections	**3.1.12.A1:** Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms. **3.1.12.A5:** Analyze how structure is related to function at all levels of biological organization from molecules to organisms. **3.1.12.A6:** Analyze how cells in different tissues/organs are specialized to perform specific functions. **CC.3.5.11-12.G.** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **CC.3.5.11-12.H.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **CC.3.5.11-12.B.** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **CC.3.5.11-12.C.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **CC.3.5.11-12.D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **CC.3.6.11-12.B.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **CC.3.6.11-12.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **CC.3.6.11-12.E.** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **CC.3.6.11-12.F.** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Microbiology	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: Differentiate among the major characteristics of each group of microorganisms. Define bacteriology, mycology, parasitology, immunology, and virology. List at least four beneficial activities of microorganisms. Define normal microbiota and resistance. Define and describe several infectious diseases. Define emerging infectious diseases. Identify different types of microscopy: light, TEM, SEM, bright field, dark field, phase-contrast, DIC, fluorescence, and confocal microscopy. Differentiate types of staining such as acidic dye, basic dye, gram staining and more. Identify the three basic types of bacteria. Identify characteristics of prokaryotic cells. Classify microbial growth based on temperatures and pH. Classify microbes based on oxygen use and other nutrient requirements. Examine growth measures of microbes. Define phases of growth. Differentiate prokaryotic groups based on pathogenic nature, growth habits, and nutrient requirements. Identify pathogenic microbes based on gram staining, special features, and type of infectious disease it causes. List defining characteristics of fungi. Differentiate a virus from a bacterium. Define viral species. Identify common viral species based using viral characteristics.