SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Human Anatomy and Physiology 2 B – Special Topics	**Length of Course:** 15 cycles
Grade Level(s): 12	**Periods Per Cycle:** 6
Units of Credit: .5	**Length of Period:** 43 minutes
Classification: Elective	**Total Instructional Time:** 64.5 hours

Course Description

Human Anatomy and Physiology II B – Special Topics will offer students who are pursuing a medical career the opportunity to gain concepts that are designed to help them in a nursing or pre-medical major in college. Concepts to be covered include: respiratory system, urinary (renal) system, nutrition, growth and development of the body, and microbiology. Dissection of specimens will include various organs that correlate with body systems. Microbiology will include working with microbes and analyzing growth and behavior patterns of such species.

Instructional Strategies, Learning Practices, Activities, and Experiences

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

Assessments

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

Materials/Resources

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

Adopted: 5/15/2017
Revised:

Body Systems	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Respiratory System a. Functional Anatomy b. Respiratory Physiology c. Homeostatic Imbalances 2. Urinary (Renal) System a. Kidney Anatomy b. Ureters, Urinary bladder, Urethra Anatomy c. Urine Formation d. 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.

Body Systems (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: Functional Anatomy of the Respiratory System Name the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs and describe the function of each. Describe several protective mechanisms of the respiratory system. Describe the structure and function of the lungs and the pleural coverings. Respiratory Physiology Define *cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration,* and *inspiration.* Explain how the respiratory muscles cause volume changes that lead to air flow 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.* Name several nonrespiratory air movements and explain how they differ from normal respiratory air movements. Describe the process of gas exchanges in the lungs and tissues. Describe how oxygen and carbon dioxide are transported in the blood. Explain the relative importance of oxygen and carbon dioxide in modifying breathing rate and depth. Explain why it is not possible to stop breathing voluntarily. Define *apnea, dyspnea, hyperventilation, hypoventilation,* and *chronic obstructive pulmonary disease (COPD).* Kidneys Describe the location of the kidneys in the body. Identify the regions of a kidney. Recognize that the nephron is the structural and functional unit of the kidney, and describe its anatomy. Describe the process of urine formation, identifying nephron responsibility 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 composition of normal urine. List abnormal urinary components.

Body Systems (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Ureters, Urinary Bladder, and Urethra Describe the general structure and function of the ureters, urinary bladder, and urethra. Describe the difference in control of the external and internal urethral sphincters. Name three common urinary tract problems. Fluid, Electrolyte, and Acid-Base Balance Name and localize the three main fluid compartments of the body. Compare and contrast the relative speed of buffers, the respiratory system, and the kidneys in maintaining the acid-base balance of the blood.

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 (continued)	
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, disseminated intravascular coagulation (DIC), fluorescence, and confocal microscopy. Differentiate types of staining such as acidic dye, basic dye, and more gram staining. Identify the three basic types of bacteria. Identify characteristics of prokaryotic cells. Classify microbial growth based on temperatures and potential of hydrogen (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.

Nutrition	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Dietary Sources a. Carbohydrates b. Lipids c. Proteins d. Vitamins and Minerals 2. Metabolism 3. Macromolecule Metabolism 4. Role of the Liver in Metabolism 5. 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.

Nutrition (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: 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 effect for each factor. Describe how body temperature is regulated.

Growth and Development of the Body	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
1. Developmental Aspects of Body Systems 2. Interrelationships of the Body Systems a. Integumentary System b. Skeletal System c. Muscular System d. Nervous System with Special Senses e. Endocrine System f. Cardiovascular System g. Lymphatic System h. Respiratory System i. Urinary (Renal) System j. Reproductive System	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.

Growth and Development of the Body (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	Objectives: List several examples of integumentary system aging. Identify some of the causes of bone and joint problems throughout life. Explain the importance of a nerve supply and exercise in keeping muscles healthy. Describe the changes that occur in aging muscles. 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, and cerebral palsy. Explain the decline in brain size and weight that occurs with age. Define *senility,* and list some possible causes. Describe changes that occur with age in the special sense organs. Describe the effect of aging on the endocrine system and body homeostasis. Explain the basis of physiologic jaundice seen in some newborn babies. Indicate blood disorders that increase in frequency in the aged. Briefly describe the development of the cardiovascular system. Name the fetal vascular modifications, or "fetal shunts," and describe their function before birth. Explain how regular exercise and a diet low in fats and cholesterol may help maintain cardiovascular health. Describe the origin of the lymphatic vessels. Describe the effects of aging on immunity. Describe normal changes that occur in respiratory system functioning from infancy to old age. Name important congenital disorders of the digestive system and significant inborn errors of metabolism. Describe the effect of aging on the digestive system. Describe three common congenital problems of the urinary system. Describe the effect of aging on urinary system functioning. Describe the importance of the presence/absence of testosterone during embryonic development of the reproductive system organs. Define *menarche* and *menopause.* List common reproductive system problems seen in adult and aging men and women.