

Passaic County Technical Institute

Wayne, NJ

Anatomy and Physiology II Curriculum

August 2015

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I. Course Description

Anatomy and Physiology II is a full year in-depth study of the structure and function of the human body. This course follows a sequential development of the major body systems in an organized and structured curriculum. The course is designed to give the student a selective overview of the human anatomical structure and a brief analysis of human physiological principles. Students will be able to apply knowledge gained this course to their everyday lives, make informed choices as members of the community, as well as to further their career in medicine, nursing, physical therapy, biological sciences, food services, cosmetology, and other related vocational areas.

Laboratory investigations will include: simulated blood typing, blood pressure measurement, microscopic slide work, spirometry, and dissection techniques. Students will also design and carry out research investigations using principles of scientific method and use of proper formats for reporting their findings.

II. Course Objectives/Outline

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Endocrine System	Time Frame	5 Weeks
Learning Objectives			
<ol style="list-style-type: none">1. Identify the functions of the endocrine system. (LS1-A)2. Describe the secretions of the endocrine system. (LS1-A)3. Distinguish between endocrine and exocrine glands. (LS1-A)4. Compare the four chemical classes of hormones. (LS1-A)5. Describe how hormones are transported in the blood and how they interact with target receptors. (LS1-A)6. Explain how the secretion of each hormone is regulated. (LS1-A)7. Describe the negative and positive feedback system and how it regulates hormonal secretions. Support with examples. (LS1-A)8. Explain the role of the nervous system in control of the hormonal secretions. (LS1-A)9. Discuss ways hormones promote body homeostasis. (LS1-A)10. Describe the effect of stress on the endocrine system. (LS1-A)			

11. Describe the major pathologic consequences of hyper-secretion and hypo-secretion of endocrine hormones. (LS1-A)
12. Define important terminology related to the endocrine system. (LS1-A)
13. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**
14. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)</p> <ul style="list-style-type: none"> • Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) • Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) <p>Stability and Change (pp. 98-101, NRC, 2012)</p> <ul style="list-style-type: none"> • Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)

Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Blood	Time Frame	3 Weeks

Learning Objectives

1. Describe the functions of blood and describe the basic characteristics of blood. (LS1-A)
2. List the components of blood. (LS1-A)
3. Describe the composition of plasma. (LS1-A)
4. Distinguish between the formed elements found in the blood. (LS1-A)
5. Define and describe normal blood indices. (LS1-A)
6. Define hematopoiesis as a process. (LS1-A)
7. Describe the stages in the blood clotting process and explain factors that promote and inhibit blood clotting. (LS1-A)
8. Explain ABO and Rh blood grouping. (LS1-A)
9. Explain why a person is a universal blood donor or recipient. (LS1-A)
10. Define anemia, polycythemia, leukopenia, leukocytosis, and hemophilia. List possible causes for each. (LS1-A)
11. Compare different types of anemia and their consequences. (LS1-A)
12. Describe how blood reactions may occur between the fetal and maternal tissues. (LS1-A)
13. Describe hemolytic disease of the newborn and prevention. (LS1-A)
14. Define important terminology related to blood. (LS1-A)
15. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
16. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp.</p>	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

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Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

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- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Stability and Change (pp. 98-101, NRC, 2012)

- Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Cardiovascular System	Time Frame	6 Weeks

Learning Objectives

1. Describe the function of the cardiovascular system. (LS1-A)
2. Describe the location of the heart and identify its major anatomical areas including the wall, chambers, all vessels and valves of the heart. (LS1-A)
3. Compare the structures and functions of the arteries, capillaries, and veins. (LS1-A)
4. Trace the pathway of the blood through the heart and vessels of the coronary circulation. (LS1-A)
5. Compare the pulmonary and systemic circuits. (LS1-A)
6. Explain the mechanism that helps in the return of venous blood. (LS1-A)
7. Define blood pressure, pulse and identify the nine major pulse sites. (LS1-A)
8. Describe what factors create and control blood pressure. (LS1-A)
9. Describe the phases, timing and sounds associated with a cardiac cycle. (LS1-A)
10. Describe a clinical use of the ECG. (LS1-A)
11. Describe a normal ECG wave and identify abnormal ECG rhythms. (LS1-A)
12. Explain how the heart rate is regulated. (LS1-A)
13. List and describe the disorders associated with the circulatory system. (LS1-A)
14. Define important terminology related to the circulatory system. (LS1-A)
15. Describe how substances are exchanged between blood in capillaries and the tissue fluid surrounding body cells. (LS1-A)
16. Identify and locate major arteries and veins. (LS1-A)
17. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
18. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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Content Area:	Anatomy and Physiology II		Grade(s)	12
Unit Plan Title:	Lymphatic System and Immunity	Time Frame	3 Weeks	

Learning Objectives				
<ol style="list-style-type: none"> 1. Describe the functions of the lymphatic system. (LS1-A) 2. Describe the parts of the lymphatic system and list their functions. (LS1-A) 3. Locate and describe the various chains of lymph nodes. (LS1-A) 4. Describe the formation and composition of lymph. (LS1-A) 				

5. Describe the lymphatic vessels and lymph circulation. (LS1-A)
6. Differentiate between nonspecific and specific immunity. (LS1-A)
7. Differentiate between nonspecific and specific immunity. (LS1-A)
8. List and describe example of each line of defense. (LS1-A)
9. Describe the roles of antigen presenting cells, T cells, and B cells in a cell-mediated and antibody-mediated immune response. (LS1-A)
10. Discuss the actions of the five types of antibodies. (LS1-A)
11. Distinguish between primary and secondary immune responses. (LS1-A)
12. Describe the development of the lymphatic system. (LS1-A)
13. Explain how allergic reactions and tissue rejections are related to the immune system. (LS1-A)
14. Describe the clinical disorders related to the immune system such as cancer, AIDS, and autoimmune diseases. (LS1-A)
15. Define important terminology related to the immune system. (LS1-A)
16. Describe the effects of aging on the immune system. (LS1-A)
17. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
18. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Digestive System	Time Frame	4 Weeks

Learning Objectives

1. Describe the functions of the digestive system. (LS1-A)
2. Name, describe and locate structures, organs, and accessory structures of the digestive system. (LS1-A)
3. Describe the basic anatomy of the teeth and oral cavity and explain their functions in the digestive system. (LS1-A)
4. List and describe the four layers of the G.I. tract. (LS1-A)
5. Describe the functions of the liver and gallbladder. (LS1-A)
6. Describe the pancreatic structure and functions. (LS1-A)
7. Describe the structure and function of the small and large intestines and the rectum. (LS1-A)
8. Describe the composition and functions of saliva. (LS1-A)
9. List the enzymes secreted by the various digestive organs and describe the functions of each. (LS1-A)
10. Explain how gastric secretions are regulated by the nervous and endocrine systems. (LS1-A)
11. List and explain the digestive functions of pancreatic secretions. (LS1-A)
12. List and describe the functions of the intestinal secretions. (LS1-A)
13. Describe how digestive secretions are regulated. (LS1-A)
14. Describe the mechanism of swallowing, vomiting, and defecating. (LS1-A)
15. Describe the mechanism of peristalsis and its role in the digestive system. (LS1-A)
16. Explain how the processes in the stomach, liver, Pancreas, gallbladder, and small intestines interact. (LS1-A)
17. Describe the absorption of nutrients in the small intestines. (LS1-A)
18. Describe the structure and function of the villi and microvilli in the small intestine. (LS1-A)
19. List and describe the three regions of the small intestine. (LS1-A)
20. Define enzyme, metabolism, anabolism, and catabolism. (LS1-A)
21. List and describe diseases/disorders or clinical applications associated with the digestive system. (LS1-A)

22. Define important terms related to the digestive system. (LS1-A)
23. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
24. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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<p>Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)</p> <ul style="list-style-type: none"> • Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1) 		
<p>Common Core</p>		
<p>WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9</p>		

Content Area:	Anatomy and Physiology II		Grade(s)	12
Unit Plan Title:	Nutrition and Metabolism	Time Frame	2 Weeks	

<p>Learning Objectives</p>				
<ol style="list-style-type: none"> 1. Explain the regulation of food intake. (LS1-A) 2. Distinguish between nutrition, nutrients, and essential nutrients. (LS1-A) 				

3. Define metabolism and contrast anabolism and catabolism. (LS1-A)
4. List several factors that influence metabolic rate. (LS1-A)
5. Describe the basal metabolic rate. (LS1-A)
6. List the forms of carbohydrates utilized by cells. (LS1-A)
7. List how amino acids are utilized by cells. (LS1-A)
8. Discuss the importance of de-animation of proteins. (LS1-A)
9. List the forms of lipids used by cells. (LS1-A)
10. Identify the major sources of carbohydrates, proteins, and fats in food sources. (LS1-A)
11. Recognize the importance of carbohydrates, fats, and proteins in cell metabolism. (LS1-A)
12. Describe the difference between vitamins and minerals. (LS1-A)
13. Describe the difference between fat soluble and water soluble vitamin. (LS1-A)
14. Describe the effects of vitamin deficiencies and toxicity. (LS1-A)
15. Explain the differences between macronutrients and micronutrients. (LS1-A)
16. Describe the characteristics of an adequate diet. (LS1-A)
17. Compare and contrast primary and secondary malnutrition. (LS1-A)
18. List and describe diseases/disorders associated with nutritional status. (LS1-A)
19. Define important terminology in nutrition. (LS1-A)
20. Compare the different types of food pyramids. (LS1-A)
21. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
22. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the

components of a system. (HS-LS1-2)

Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)

- Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today

structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

Stability and Change (pp. 98-101, NRC, 2012)

- Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

as they did in the past and will continue to do so in the future. (HS-LS1-1)

Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Respiratory System	Time Frame	3 Weeks

Learning Objectives

1. Describe the general functions of the respiratory system. (LS1-A)
2. List and describe the structures and organs of the respiratory system. (LS1-A)
3. Describe the protective mechanisms of the respiratory system. (LS1-A)
4. Trace a breath of air through the respiratory system from nose to alveoli. (LS1-A)
5. Describe the events involved in inspiration and expiration. (LS1-A)
6. List and describe each of the respiratory air volumes. (LS1-A)
7. Describe the use and function of spirometry. (LS1-A)
8. Describe alveoli structure and function of type 1 and type 2 cells. (LS1-A)
9. List and describe the various non-respiratory air movements that occur in addition to breathing. (LS1-A)
10. Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs. (LS1-A)
11. Describe the process of gas exchanges in the lungs and tissues. (LS1-A)
12. Explain how respiration gases are carried by the blood. (LS1-A)
13. Explain what is meant by cellular respiration and describe how oxygen is used by cells. (LS1-A)
14. Describe pH changes and respiratory acidosis/alkalosis. (LS1-A)
15. Describe diseases of COPD, asthma, and lung cancer. (LS1-A)
16. Name the brain areas involved in the control of respiration. (LS1-A)
17. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
18. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)</p> <ul style="list-style-type: none"> Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3) <p>Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)</p> <ul style="list-style-type: none"> Constructing explanations and designing solutions in 9–12 builds on K–8 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) <p>Stability and Change (pp. 98-101, NRC, 2012)</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

<p>experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1) 		
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Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Urinary System	Time Frame	3 Weeks

Learning Objectives

1. Describe the general functions of the urinary system. (LS1-A)
2. Name, locate, and describe the structures of the urinary system. (LS1-A)
3. Describe the anatomical differences between the male and female urinary system. (LS1-A)
4. Describe the pathway of blood through the major vessels of the kidney. (LS1-A)
5. Describe the processes of glomerular filtration, tubular re-absorption, and tubular secretion. (LS1-A)
6. Describe the structure of the ureters, urinary bladder, and urethra. (LS1-A)
7. Explain the process and control of the micturition reflex. (LS1-A)

8. Describe the hormonal regulation of blood volume and blood pressure by the kidneys. (LS1-A)
9. List and describe diseases/disorders with the urinary system. (LS1-A)
10. Define important terms related to the urinary system. (LS1-A)
11. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
12. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)</p> <ul style="list-style-type: none"> • Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) • Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) <p>Stability and Change (pp. 98-101, NRC, 2012)</p> <ul style="list-style-type: none"> • Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)

Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Water, Electrolyte and Acid/Base Balance.	Time Frame	3 Weeks

Learning Objectives

1. Describe the fluid components of the body. (LS1-A)
2. Explain what is meant by water and electrolyte balance and discuss the importance of this balance. (LS1-A)
3. Explain how electrolytes enter and leave the body. (LS1-A)
4. Explain what is meant by acid/base balance. (LS1-A)
5. Explain the importance of electrolyte substances in the electrolyte balance. Normal values. (LS1-A)
6. Explain the importance of calcium, phosphate, and magnesium. (LS1-A)
7. Explain the role of buffers with regard to carbon dioxide and the excretion of Hydrogen ions in maintaining pH of body fluids. (LS1-A)
8. List and describe the diseases/disorders associated with fluid, acid/base, and electrolyte balance. (LS1-A)
9. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
10. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)</p> <ul style="list-style-type: none"> • Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) • Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) <p>Stability and Change (pp. 98-101, NRC, 2012)</p> <ul style="list-style-type: none"> • Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

physical, and empirical models.

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
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alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Common Core

WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Female Reproductive System	Time Frame	2 Weeks
Learning Objectives			
<ol style="list-style-type: none"> List and describe the parts of the female reproductive system. (LS1-A) Describe the function of the parts of the female reproductive system. (LS1-A) Describe the structure and functions of the mammary glands. (LS1-A) Describe the structure and function of the ovary and how egg cells and follicles are formed. (LS1-A) Describe the role that hormones play in the control of the female reproductive system. (LS1-A) Describe the sequence of events of the female menstrual cycle. (LS1-A) Describe the sequence of events that occur during uterine and ovarian cycles. (LS1-A) Describe the negative and positive feedback regulation of female reproductive hormones. (LS1-A) Describe the process of fertilization. (LS1-A) Describe the stages of birth and the role that hormones play. (LS1-A) Identify several methods of birth control and the effectiveness of each. (LS1-A) Explain the symptoms caused by STDs. (LS1-A) List and describe diseases/disorder or clinical applications associated with the female reproductive system. (LS1-A) Define important terms related to the female reproductive system. (LS1-A) Explain how hormones control the activities of the female reproductive organs and the development of the secondary sex characteristics. (LS1-A) Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2) Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3) 			
Science and Engineering Practices		Disciplinary Core Ideas	
Developing and Using Models (pp. 56-59. NRC, 2012) <ul style="list-style-type: none"> Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among 		LS1.A: Structure and Function (pp. 143-145, NRC, 2012) <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form 	
		Crosscutting Concepts	
		Systems and System Models (pp. 91-94, NRC, 2012) <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1- 	

variables between systems and their components in the natural and designed worlds.

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)

- Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a

of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (*Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.*)

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

2)

Structure and Function (pp. 96-98, NRC, 2012)

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

Stability and Change (pp. 98-101, NRC, 2012)

- Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)		
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Common Core
WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Male Reproductive System	Time Frame	1 Weeks

Learning Objectives

1. List and describe the parts of the male reproductive system. (LS1-A)
2. Describe the functions of the parts of the male reproductive system. (LS1-A)
3. Discuss the importance of semen and name the glands that produce it. (LS1-A)
4. Describe the role of hormones in the control of the male reproductive system. (LS1-A)
5. Describe the structure of a sperm cell and relate the structure to function. (LS1-A)
6. Describe the structure and function of the prostate gland. (LS1-A)
7. List and describe diseases/disorders associated with the male reproductive system. (LS1-A)
8. Define important terminology related to the male reproductive system. (LS1-A)
9. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
10. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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Developing and Using Models (pp. 56-59, NRC, 2012)

- Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)

- Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Constructing Explanations and Designing Solutions (pp. 67-71, NRC, 2012)

- Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are

LS1.A: Structure and Function (pp. 143-145, NRC, 2012)

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (*Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.*)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Systems and System Models (pp. 91-94, NRC, 2012)

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2)

Structure and Function (pp. 96-98, NRC, 2012)

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

Stability and Change (pp. 98-101, NRC, 2012)

- Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

<p>supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1) 		
Common Core		
<p>WHST.11-12.1.A, WHST.11-12.1.B, WHST.11-12.1.C, WHST.11-12.1.D, WHST.11-12.1.E, WHST.11-12.2, WHST.11-12.2.A, WHST.11-12.2.B, WHST.11-12.2.C, WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9</p>		

Content Area:	Anatomy and Physiology II	Grade(s)	12
Unit Plan Title:	Human Growth and Development	Time Frame	1 Weeks

Learning Objectives			
<ol style="list-style-type: none"> 1. Distinguish between growth and development. (LS1-A) 2. Distinguish between prenatal and postnatal periods. (LS1-A) 3. List and provide details of the major events of cleavage. (LS1-A) 4. Describe the formation of the primary germ layers. (LS1-A) 5. Explain how the placenta is formed and its function. (LS1-A) 6. Distinguish between an embryo and a fetus. (LS1-A) 7. Explain why the embryonic period is extremely critical. (LS1-A) 8. Describe the major circulatory and physiological adaptations that occur in the newborn. (LS1-A) 			

- 9. Describe the stages of development that occur between the neonatal periods throughout maturation. (LS1-A)
- 10. Define important terminology related to growth and development. (LS1-A)
- 11. **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)**
- 12. **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models (pp. 56-59, NRC, 2012)</p> <ul style="list-style-type: none"> • Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) <p>Planning and Carrying Out Investigations (pp. 59-61, NRC, 2012)</p> <ul style="list-style-type: none"> • Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. • Plan and conduct an investigation individually and collaboratively to produce 	<p>LS1.A: Structure and Function (pp. 143-145, NRC, 2012)</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) • Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive 	<p>Systems and System Models (pp. 91-94, NRC, 2012)</p> <ul style="list-style-type: none"> • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) <p>Structure and Function (pp. 96-98, NRC, 2012)</p> <ul style="list-style-type: none"> • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) <p>Stability and Change (pp. 98-101, NRC, 2012)</p> <ul style="list-style-type: none"> • Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

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feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Common Core

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WHST.11-12.2.D, WHST.11-12.2.E, WHST.11-12.4, WHST.11-12.5, WHST.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9, WHST.11-12.10, RST.11-12.1, RST.11-12.2, RST.11-12.3, RST.11-12.4, RST.11-12.5, RST.11-12.6, RST.11-12.7, RST.11-12.8, RST.11-12.9

III. Methods of Student Evaluation

Assessment can be divided into two general categories: formal (graded) and informal/classroom-based (both graded and ungraded). The key to effectively assessing a student's mastery of skills is to match the assessment method to the learning objective.

Formal Assessments

- Evaluation
- Class participation
- Creative assignments
- Homework and classwork assignments
- Reports and presentations
- Research methodology
- Technological applications
- Unit tests
- Various speaking and listening assignments
- Multiple choice exams
- Quizzes (announced and unannounced)
- Essays
- Formal lab reports
- Scientific journal reviews
- Projects
- Short answer and problem solving tests
- Tests and quizzes on blackboard

- Case Study analysis

Informal Assessments

- Instructor's observations of note-taking, and organization of notebooks and assignments
- Cooperative learning activities, including labs
- Creative project assignments
- Laboratory behavior
- Observing citizenship and appropriate social responses
- Instructor's observations of time management skills

Mastering of the core proficiencies of Biology shall be evaluated in accordance with the general grading policies as listed in the student handbook:

- Tests – 40%
- Laboratory Reports and Projects – 20%
- Quizzes – 20%
- Class Participation – 10%

IV. Instructional Strategies Based on Instructional Goals

- Graphs and other visuals
- Engaging in discussions
- Reading silently and aloud
- Listening and speaking activities
- Watching and responding to media
- Brainstorming
- Listening
- Mapping
- Revising and editing
- Participating in small and large groups

- Researching to make connections to texts and classroom discussions
- Collaborative projects
- Answering questions (oral and written)
- Summarizing
- Debating
- Analyzing texts, discussions, etc.
- Peer teaching
- Competing in teams/debating
- Playing games
- Creating games
- Note taking and note making
- Writing

V. Scope and Sequence

Key: I – Introduced, D-developed in Depth, R-Reinforced

Skill/Concepts to be Learned	12
Using appropriate terminology of anatomy and physiology to describe levels of structural organization and homeostasis.	IDR
Use technology to present the design and results of scientific investigation.	IDR
Comparing and contrasting normal and abnormal characteristics of the structures and functions of body systems.	IDR
Evaluate conclusions, problem solve using a case study approach the study of anatomy and physiology of the body systems.	IDR
Utilize laboratory techniques to measure data and apply to a clinical analysis of anatomy and physiology experiments.	IDR
Develop an analytical approach to the study of the regulation of body systems by understanding complex control of biological feedback mechanisms.	IDR

Apply practical information learned in anatomy and physiology to prepare for future college and career experiences.	IDR
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VI. Pacing Chart

Marking Period 1

- **Unit 1**
 - **Endocrine System** (Weeks 1-5): Students will be able to explain the importance of the endocrine system by exploring the endocrine organs, biochemical nature of hormones, types of hormones, endocrine glands, feedback regulation of hormones, and control of hormonal regulation.
- **Unit 2**
 - **Blood** (Weeks 6-8): Students will be able to explain the importance of blood by examining the composition of blood and plasma, function of formed elements of blood, production of blood cells, transport of blood, and various anemias and diseases of the blood.
- **Unit 3**
 - **Cardiovascular System** (Weeks 9-14): Students will be able to explain the importance of the cardiovascular system but focusing on the structures of the heart, layers and membranes, chambers of the heart, circulation of blood through the heart, valves, vessels and chambers, structure and function of myocardial muscle tissue, ECG rhythms of the heart, details of the cardiac cycle, structure and function of blood vessels: arterial and venous, and the major arterial and venous circulation routes.

Marking Period 2

- **Unit 4**
 - **Lymphatic System and Immunity** (Weeks: 15-17): Students will be able to explain the importance of the lymphatic system by exploring the , structure and function of the lymphatic system, structure of lymph vessels and nodes, non-specific defenses and infection, specific immune responses: T and B lymphocyte responses, types of hypersensitivities as well as autoimmunity.
- **Unit 5**
 - **Digestive System** (Weeks 18-21): Students will be able to explain the importance of the digestive system by examining the structures of the GI system, accessory organs of digestion, biochemistry of digestive enzymes,

regulation of digestive organ interactions and feedback loops, functions of the pancreas and liver, and the chemical mechanisms of digestion and absorption of nutrients.

- **Unit 6**
 - **Nutrition and Metabolism** (Weeks 22-23): Students will be able to explain the importance of nutrition and metabolism by identifying the major organic nutrients, energy values of these nutrients, functions of various vitamins and minerals as well as their recommended dosage, and study the importance of a balanced diet.

Marking Period 3

- **Unit 7**
 - **Respiratory System** (Weeks 24-26): Students will be able to explain the importance of the respiratory system by exploring the major structures of the respiratory pathway, mechanical events of breathing, neural control of breathing, respiratory lung volumes and spirometry, mechanisms of oxygen and carbon dioxide transport, and various lung diseases.
- **Unit 8**
 - **Urinary System** (Weeks 27-29): Students will be able to explain the importance of the urinary system by examining the general structures of the organs, blood flow through the urinary system, estimations of glomerular filtration rate, process of filtrate formation, hormonal regulations of the kidneys, importance of the micturition reflex, and various urinary system disorders.
- **Unit 9**
 - **Water, Electrolyte, and Acid Balance** (Weeks: 30-32): Students will be able to explain the importance of water, electrolytes and acids and bases in the human body by describing the fluid components of the body, explaining the normal values of electrolytes, how you gain and lose water and electrolytes, the importance of buffers in pH balance, and list and describe disorders associated with fluid and electrolyte balance.

Marking Period 4

- **Unit 10**
 - **Female Reproductive System** (Weeks 33-34): Students will be able to explain the female reproductive system by describing the organs and role of hormones, events in the menstrual cycle, stages of birth, causes of STDs, and the formation of secondary sex characteristics.

- **Unit 11**
 - **Male Reproductive System** (Week 35): Students will be able to explain the male reproductive system by describing the organs of the male reproductive system, role of hormones in the male reproductive system, structure and function of sperm cells, and the various disorders associated with the male reproductive system.
- **Unit 12**
 - **Human Growth and Development** (Week 36): Students will be able to explain the importance of human growth and development by examining the events of cleavage of a fertilized egg, embryonic stages of development, circulatory and physiological adaptations of a newborn, and describing the stages of development throughout life.

VII. Proficiencies

Upon successful completion of this course, students will be able to:

1. Utilize the language of anatomy and physiology to describe levels of structural organization and examples of homeostasis.
2. Demonstrate and use correctly the instruments, apparatus, and technologies of Anatomy & Physiology.
3. Identify ways in which the study of Anatomy & Physiology serves as a foundation for many career opportunities in medicine, dentistry, and biological services.
4. Demonstrate the ability to use scientific skills and processes in solving problems and case studies in Anatomy & Physiology.
5. Identify and locate gross structures of the human body and explain the functions of the body.
6. Describe how a disease is the result of a malfunctioning system, organ, and cell. Relate this to possible treatment interventions.
7. Describe the effect of exercise contributing to blood pressure measurements and the consequential benefits on overall cardiovascular health.
8. Describe the effect of exercise and relate to lung volumes using spirometry.
9. Describe the laboratory techniques of blood typing and relate the applications for medicine and forensics.
10. Identify the regulation of negative and positive feedback mechanisms of body systems by neurotransmitter and hormones.

11. Describe and apply knowledge of nutrition, body surface area, metabolic rates and exercise to maintain healthy body systems.
12. Describe the development of the reproductive systems and apply knowledge of prevention of sexually transmitted infections.
13. Describe the development process of birth, human growth and development, and effects of the aging process.
14. Conduct a research project using modern techniques of technology to analyze various endocrine disorders.