

Anatomy & Physiology 446-Honors

Chapter 1: An Introduction to the Human Body

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central concept: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships with body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.1 Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.
- 4.8: Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
<ol style="list-style-type: none"> 1. Define anatomy and physiology and name several subdivisions of these sciences. 2. Describe the levels of structural organization of the human body. 3. List the 11 systems of the human body, representative organs present in each, and their general function. 4. List and describe the characteristic of life. 5. Define homeostasis and explain the relationship with interstitial fluid; the internal environment of the body. 6. Describe the components of a feedback system. 7. Compare and contrast the operation of negative and positive feedback systems. 8. Explain and give example of how homeostatic imbalances are related to illness. 9. Describe the orientation of the body in the anatomical position. 10. Describe the location of the major body cavities, list the organs they contain and their associated linings. 11. Properly use the terms that describe planes, direction, position, sections and regions of the body. 12. Describe the principles and importance of medical imaging in the evaluation of organ function and diagnosis of disease. 	<ol style="list-style-type: none"> 1. Relate structure to function 2. Define the levels of organization from simple to complex and connect this with matter and energy relationships. 3. List and describe the processes that distinguish living organism from non-living things. Are virus alive? 4. Be able to locate the four main body cavities. 5. Recognize and label the organs of the digestive system and relate their positions to the nine regions of the abdominal cavity. 6. Use proper anatomical terms to reference regional body structure. 7. Relate homeostasis to the internal environment. Give an example of a positive and negative feedback system in the body and disease related to a dysfunction of that system 8. Be able to recognize 	<p>Syllabus: 446 Human Anatomy & Physiology</p> <p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006)</p> <p>Tortora: Chapter 1</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab: 1A Organization of the Body</p> <p>Human Torso Models</p> <p>Anatomical Wall Charts</p> <p>Lab: 1B Anatomical Terms</p> <p>Medical Dictionary</p> <p>PowerPoint: Chapter 1</p> <p>Laser disc: <u>The Living Textbook: "The Human Body"</u>: Video clips-Scanning Technologies: MRI, CAT,SPECT, PET, X-Ray,</p>	<p>Informal Observation</p> <p>Dip-sticking during discussions</p> <p>Lab Reports: Lab 1-A & B, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Chapter 1 test: Type 1-3 writing.</p>

	<p>medical image scans and their application</p> <p>9. Dissection and analysis of Critical thinking question #4, chapter 1 test.</p>	<p>Radiographic tracers; angiography Imaging Scans: examples of list above</p> <p>Transparencies: <u>Principle of Anatomy & Physiology</u>: chapter 1</p> <p>Video: “Incredible Human Machine”</p> <p>Study Guide: Chapter 1</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	
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Anatomy & Physiology 446-Honors

Chapter 2: The Chemical Level of Organization

Framework Standard I:

Biology I:

1. The Chemistry of Life

Central Concept: Chemical elements form organic molecules that interact to perform basic functions.

- 1.1 Recognize that biological organisms are composed primarily of very few elements. The six most common are C,H,N,O,P,S.
- 1.2 Describe the basic molecular structures and primary functions of the four main categories of organic molecules (carbohydrates, lipids, proteins, nucleic acids).
- 1.3 lipids, proteins, nucleic acids).
- 1.4 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, that have an effect on enzymes.

Chemistry I:

4. Chemical Bonding

Central Concept: Atoms bond with each other by transferring or sharing valence electrons to form compounds.

- 4.1 Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons.
- 4.2 Draw Lewis dot structures for simple molecules and ionic compounds.
- 4.3 Use electronegativity to explain the difference between polar and nonpolar covalent bonds.
- 4.4 Use valence-shell electron-pair repulsion theory (VSEPR) to predict the molecular geometry (linear, trigonal planar, and tetrahedral) of simple molecules.
- 4.5 Identify how hydrogen bonding in water affects a variety of physical, chemical, and biological phenomena (e.g., surface tension, capillary action, density, boiling point).
- 4.6 Name and write the chemical formulas for simple ionic and molecular compounds, including those that contain the polyatomic ions.

5. Chemical Reactions and Stoichiometry

Central Concepts: In a chemical reaction, one or more reactants are transformed into one or more new products. Chemical equations represent the reaction and must be balanced. The conservation of atoms in a chemical reaction leads to the ability to calculate the amount of products formed and reactants used (stoichiometry).

- 5.1 Balance chemical equations by applying the laws of conservation of mass and constant composition (definite proportions).
- 5.2 Classify chemical reactions as synthesis (combination), decomposition, single displacement (replacement), double displacement, and combustion.
- 5.4 Determine percent compositions, empirical formulas, and molecular formula

6. States of Matter, Kinetic Molecular Theory, and Thermochemistry

Central Concepts: Gas particles move independently of each other and are far apart. The behavior of gas particles can be modeled by the kinetic molecular theory. In liquids and solids, unlike gases, particles are close to each other. The driving forces of chemical reactions are energy and entropy. The reorganization of atoms in chemical reactions results in the release or absorption of heat energy.

6.3 Using the kinetic molecular theory, describe and contrast the properties of gases, liquids, and solids. Explain, at the molecular level, the behavior of matter as it undergoes phase transitions.

6.4 Describe the law of conservation of energy. Explain the difference between an endothermic process and an exothermic process.

6.5 Recognize that there is a natural tendency for systems to move in a direction of disorder or randomness (entropy).

7. Solutions, Rates of Reaction, and Equilibrium

Central Concepts: Solids, liquids, and gases dissolve to form solutions. Rates of reaction and chemical equilibrium are dynamic processes that are significant in many systems (e.g., biological, ecological, geological).

7.1 Describe the process by which solutes dissolve in solvents.

7.3 Identify and explain the factors that affect the rate of dissolving (e.g., temperature, concentration, surface area, pressure, mixing).

7.4 Compare and contrast qualitatively the properties of solutions and pure solvents (colligative properties such as boiling point and freezing point).

7.5 Identify the factors that affect the rate of a chemical reaction (temperature, mixing, concentration, particle size, surface area, catalyst).

7.6 Predict the shift in equilibrium when a system is subjected to a stress (LeChatelier's principle) and identify the factors that can cause a shift in equilibrium (concentration, pressure, volume, temperature).

8. Acids and Bases and Oxidation-Reduction Reactions

Central Concepts: Acids and bases are important in numerous chemical processes that occur around us, from industrial procedures to biological ones, from the laboratory to the environment. Oxidation-reduction reactions occur when one substance transfers electrons to another substance, and constitute a major class of chemical reactions.

8.1 Define the Arrhenius theory of acids and bases in terms of the presence of hydronium and hydroxide ions in water and the Bronsted-Lowry theory of acids and bases in terms of proton donors and acceptors.

8.2 Relate hydrogen ion concentrations to the pH scale and to acidic, basic, and neutral solutions. Compare and contrast the strengths of various common acids and bases (e.g., vinegar, baking soda, soap, citrus juice).

8.3 Explain how a buffer works.

8.4 Describe oxidation and reduction reactions and give some everyday examples, such as fuel burning and corrosion. Assign oxidation numbers in a reaction.

Framework Standard II: Scientific Inquiry Skills Standard:

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SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.

- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Identify the main chemical elements of the body (CHNOPS) 2. Describe and draw models of atoms, ions, molecules, free radicals and compounds. 3. Describe how valence electrons form chemical bonds. 4. Distinguish between ionic, covalent and hydrogen bonds. 5. Define a chemical reaction 6. Describe the various forms of energy. 7. Compare exergonic and endergonic reactions. 8. Describe the role of activation energy and catalysts in chemical reactions. 9. Describe synthesis, decomposition, exchange and reversible reactions. 10. Describe the properties of water and those of inorganic acids, bases and salts. 11. Distinguish between solutions, colloids and suspensions 12. Define pH and explain the role of	1. Make atomic models of CHNOPS, Na and Cl 2. Draw diagrams and make molecular models of $H_2, O_2, NH_3, H_2O, CO_2, CH_4$. 3. Make the analogy of simple compounds (inorganic) combining to form complex compounds (organic) by adding energy to form covalent bonds. 4. Connect this concept with Chemical evolution: Haldane/Urey theory and Stanley Miller's Nobel Prize experiment. 5. Construct a amino acid models from the inorganic molecules above: 6. Construct a polymer of amino acid molecular model by removing a water molecule thus demonstrating dehydration synthesis(anabolism),	Syllabus: 446 Human Anatomy & Physiology High School Lab Safety Regulations <u>Principles of Anatomy & Physiology</u> , 11 th edition, (2006) Tortora: Chapter 2 Lab Manual: A&P 11 th edition Lab 2A-pH and Identification of biological Molecules Lab2B-Biochemistry of enzyme activity Molecular Model Kits Video Clip: Nobel Laureate Stanley Miller's experiment	Informal Observation Dip-sticking during discussions Lab Reports: Lab 2-A & B, Type 1-3 writing Film Report: Sumarization: Type 1-3 writing Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing Study guide completion

<p>buffer systems in homeostasis.</p> <p>13. Describe the functional groups of organic molecules.</p> <p>14. Identify the building blocks and the functions of carbohydrates, lipids and enzymes.</p> <p>15. Describe the structure and function of DNA, RNA and ATP.</p>	<p>polymerization and peptide (covalent) bonding</p> <p>7. Deconstruct the amino acid polymer model by adding water, thus demonstrating hydrolysis and decomposition(catabolism).</p> <p>8. Diagram Na and Cl atomic models and diagram a model of NaCl (ionic bonding)</p> <p>9. Construct diagrams of water n all three states of matter demonstrating hydrogen bonding, polarity and expansion as a solid.</p> <p>10. Connect molecular construction with designer drugs chemistry (MPTP story and Heroine today)</p> <p>11. Conduct a controlled experiment to identify the four types of biological molecules using indicators (qualitative analysis)</p> <p>12. Be able to identify diagrams and models of the four types of biological molecules and give their functions.</p> <p>13. Conduct a controlled experiment to study the effect that temperature and pH has on enzyme activity.</p> <p>14. Relate the levels of organization proteins to</p>	<p>Demo: Solutions and electrolytes</p> <p>Demo: pH indicator for acid/base and effect of buffer on pH.</p> <p>Video: Nova, “The Case of the Frozen Addicts.”</p> <p>Video: “Molecular Building blocks of Life”</p> <p>Video: “Lorenzo’s Oil” ALD and lipid biochemical pathways</p> <p>Demo: Folding colored paper analogy to represent the primary, secondary, tertiary and quaternary structure of proteins.</p> <p>Demo: Interactive CD-hemoglobin amino acid substitution (mutation) and effects: sickle cell anemia, etc.</p> <p>PowerPoint: Chapter 2</p> <p>Transparencies: Chapter 2</p> <p>Study Guide: Chapter 2</p> <p>Newspaper/Magazine handouts on MPTP/Parkinson’s disease, designer drug story and connection, Drug “Ecstasy”, stem</p>	<p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Chapter 1 test: Type 1-3 writing.</p>
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	structure, active site, function and denaturation of enzymes.	cells, fetal cell transplants. Student website for <u>Principles of Anatomy and Physiology</u> : www.wiley.com/college/apcentral	
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Chapter 3: The Cellular Level of Organization

Framework Standard:

Biology I:

2. Cell Biology

Central Concepts: Cells have specific structures and functions that make them distinctive. Processes in a cell can be classified broadly as growth, maintenance, and reproduction.

- 2.1 Relate cell parts/organelles (plasma membrane, nuclear envelope, nucleus, nucleolus, cytoplasm, mitochondrion, endoplasmic reticulum, Golgi apparatus, lysosome, ribosome, vacuole, cell wall, chloroplast, cytoskeleton, centriole, cilium, flagellum, pseudopod) to their functions. Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, facilitated diffusion, active transport)
- 2.4 Identify the reactants, products, and basic purposes of cellular respiration. Explain the interrelated nature of photosynthesis and cellular respiration.

- 2.5 Explain the important role that ATP serves in metabolism.
- 2.6 Describe the cell cycle and the process of mitosis. Explain the role of mitosis in the formation of new cells, and its importance in maintaining chromosome number during asexual reproduction.
- 2.7 Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in sexual reproduction, and how gametes form diploid zygotes in the process of fertilization.
- 2.8 Compare and contrast a virus and a cell in terms of genetic material and reproduction.

3. Genetics

Central Concepts: Genes allow for the storage and transmission of genetic information. They are a set of instructions encoded in the nucleotide sequence of each organism. Genes code for the specific sequences of amino acids that comprise the proteins characteristic to that organism.

- 3.1 Describe the basic structure (double helix, sugar/phosphate backbone, linked by complementary nucleotide pairs) of DNA, and describe its function in genetic inheritance.
- 3.2 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic processes of transcription and translation, and how they result in the expression of genes. Distinguish among the end products of replication, transcription, and translation.
- 3.3 Explain how mutations in the DNA sequence of a gene may or may not result in phenotypic change in an organism. Explain how mutations in gametes may result in phenotypic changes in offspring.
- 3.4 Distinguish among observed inheritance patterns caused by several types of genetic traits (dominant, recessive, codominant, sex-linked, polygenic, incomplete dominance, multiple alleles).

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.6 Recognize that the sexual reproductive system allows organisms to produce offspring that receive half of their genetic information from their mother and half from their father, and that sexually produced offspring resemble, but are not identical to, either of their parents.
- 4.7 Recognize that communication among cells is required for coordination of body functions. The nerves communicate with and some cells produce signals to communicate only with nearby cells.
- 4.8 Recognize that the body's systems interact to maintain homeostasis.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.

- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.

Framework Standard III:Mathematical Skills

State questions raised by an experiment that may require further investigation. Students are expected to know the content of the *Massachusetts Mathematics Curriculum Framework*, through grade 8. Below are some specific skills from the *Mathematics Framework* that students in this course should have the opportunity to apply:

- ✓ Construct and use tables and graphs to interpret data sets.
- ✓ Solve simple algebraic expressions.
- ✓ Perform basic statistical procedures to analyze the center and spread of data.
- ✓ Measure with accuracy and precision (e.g., length, volume, mass, temperature, time)
- ✓ Convert within a unit (e.g., centimeters to meters).
- ✓ Use common prefixes such as *milli-*, *centi-*, and *kilo-*.
- ✓ Use scientific notation, where appropriate.
- ✓ Use ratio and proportion to solve problems.

The following skills are not detailed in the *Mathematics Framework*, but are necessary for a solid understanding in this course:

- ✓ Determine the correct number of significant figures.
- ✓ Determine percent error from experimental and accepted values.
- ✓ Use appropriate metric/standard international (SI) units of measurement for mass (kg); length (m); and time (s).
- ✓ Use the Celsius scale.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Name and describe the three main parts of a cell. 2. Describe the structure and function of the plasma membrane.	1. Draw and label the parts of a cell. 2. Trace the description of membrane structure predicated	Syllabus: 446 Human Anatomy & Physiology High School Lab Safety	Informal Observation Dip-sticking

<ol style="list-style-type: none"> 3. Explain the concept of selective permeability. 4. Define the electrochemical gradient and describe its components. 5. Describe the processes that transport substances across the plasma membrane. 6. Describe the structure and function of the cytoplasm, cytosol and organelles. 7. Describe the structure and function of the nucleus. 8. Describe the sequence of events in protein synthesis. 9. Discuss the stages, events and significance of somatic and reproductive cell division. 10. Describe the signals that induce somatic cell division. 11. Describe how cells differ in size and shape. 12. Describe the cellular changes that occur with aging and cancer 	<p>on technological advances.</p> <ol style="list-style-type: none"> 3. Diagram the fluid-mosaic model of the plasma membrane 4. List, diagram and explain models of functional membrane proteins, and give an example of a molecular disease involving membrane proteins (cystic fibrosis/familial hypercholesterolemia). 5. Diagram and explain how the membrane is polarized, and the role proteins play in generating this electrochemical gradient. 6. Compare and contrast passive transport, active transport and bulk transport across membranes. 7. Design an experiment to test which molecules permeate dialysis tubing, relate this to membrane permeability and suggest how this material might be used in clinical medicine. 8. Make an analogy between a factory and the cell with its cell organelles. 9. Make an analogy of the genetic code to the English language. 10. Work through a simulation of protein synthesis. Then delete one nucleotide in the sequence and explain the effect (mutation). 11. Relate cell destiny to apoptosis, 	<p>Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 3</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 3A: Experimental Design: Synthetic membrane material Permeability (dialysis tubing)</p> <p>Lab 3B: Protein Synthesis simulation.</p> <p>Medical Dictionary</p> <p>PowerPoint: Chapter 3</p> <p>Transparencies: <u>Principle of Anatomy & Physiology</u>: chapter 3</p> <p>Video clips: “Cell membrane” “Sodium-potassium pump”, “Symports & antiports”, and “Receptor mediated endocytosis”. “Stormy Jones: familial hypercholesterolemia” “Goldstein & Brown: LDL-receptor and cholesterol”</p> <p>Demo: Analogy of three doors in</p>	<p>during discussions</p> <p>Lab Reports: Lab 3-A & B, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Chapter 3 test: Type 1-3 writing.</p>
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	<p>necrosis and the p53 gene.</p> <p>12. Relate cell aging to telomeres, free radicals and cancer.</p>	<p>classroom to gated-ion channels in the membrane and electrochemical gradient in membrane polarity.</p> <p>VCR: "Protein synthesis", "Mitosis and cell division" "Free radicals"</p> <p>Video: " Man Immortal" on longevity, progeria and aging</p> <p>DVD: "The Biology of Cancer: The critical role of apoptosis"</p> <p>Interactive CD-ROM: "Cystic Fibrosis"</p> <p>Newspaper/Magazine reading handouts: Nobel prize: Apoptosis, gene therapy, Mitochondria, free radicals, smoking, cloning and autoimmune disease.</p> <p>Study Guide: Chapter 3</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	
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Anatomy & Physiology 446-Honors

Chapter 4: The Tissue Level of Organization

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.7 Recognize that communication among cells is required for coordination of body functions. The nerves communicate with and some cells produce signals to communicate only with nearby cells.
- 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.

- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
<ol style="list-style-type: none"> 1. Name the four basic types of tissues that make up the human body and state the characteristics of each. 2. Describe the structure and functions of the five main types of cell junctions. 3. Describe the general features of epithelial tissue. 4. List the locations, structure and function of various types of epithelial tissue. 5. Describe the general features of connective tissue. 6. Describe the structure and function of various types of connective tissue. 7. Define Membranes and describe their classifications. 8. Describe the general features of muscular tissue. 9. Compare and contrast the structure, location and mode of control of skeletal, cardiac and muscle 10. Describe the structural and functional features of nervous tissue and explain the concept of electrical excitability. 11. Describe the role of tissue repair in 	<ol style="list-style-type: none"> 1. Become proficient with the use of the compound light microscope. 2. Be able to recognize and distinguish between the four fundamental types of tissues using prepared microscope slides, diagrams, illustrations, and video projections. 3. Understand the convention by which epithelial tissue is named. 4. Be able to recognize and distinguish between six specific types of epithelial tissue and specify a location and function in the body. 5. Understand the classification system for naming connective tissues. 6. Be able to recognize and distinguish between eleven types of mature connective tissues and specify a location and function in the body. 7. Explain the how and why connective and epithelial tissue 	<p>Syllabus: 446 Human Anatomy & Physiology</p> <p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 4</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 4-Histology:Cells into Tissues</p> <p>Laser Disc: Slides:Epithelial tissue classification, Connective, Muscular and Nervous tissue.</p> <p>CD-ROM: Epithelial and connective tissue</p> <p>VCR slides: Epithelial, Connective, Muscular and Nervous tissue slides</p>	<p>Informal Observation</p> <p>Dip-sticking during discussions</p> <p>Lab Reports: Lab Report: Histology, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio</p>

<p>restoring homeostasis and relate this to tissue engineering and transplantation.</p> <p>12. Describe the effects of aging on tissues.</p>	<p>are combined in membranes.</p> <p>8. Be able to recognize and distinguish between the three types of muscle tissue.</p> <p>9. Recognize and name the basic structural components of nerve cells.</p> <p>10. Relate concepts of tissue repair and tissue aging with current stem cell research, tissue engineering and transplantation.</p>	<p>Microscope prepared slides of tissues.</p> <p>Video Clip: Tissue engineering</p> <p>Video: Nova “Fat Chance in a Thin World”-obesity</p> <p>Video: Innovation: “Stem Cells”</p> <p>DVD: HHMI: “Science of Fat”</p> <p>PowerPoint: Chapter 4</p> <p>Transparencies: Chapter 4</p> <p>Study Guide: Chapter 4</p> <p>Newspaper/Magazine handouts on: Caloric Restriction and aging, Biomedical engineering, Tissue engineering, Cartilage repair, Tumor Growth</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	<p>organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Histology Lab Practical Exam</p> <p>Chapter 4 test: Type 1-3 writing.</p>
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Anatomy & Physiology 446-Honors

Chapter 5: The Integumentary System

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.7 Recognize that communication among cells is required for coordination of body functions. The nerves communicate with and some cells produce signals to communicate only with nearby cells.
- 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

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- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Describe the layers of the epidermis and the cells that compose them. 2. Compare the composition of the	1. Label a diagram of the components of the Integumentary system.	Syllabus: 446 Human Anatomy & Physiology	Informal Observation

<p>papillary and reticular regions of the dermis.</p> <ol style="list-style-type: none"> 3. Explain the basis for different skin pigmentation. 4. Contrast the structure, distribution, and functions of hair, skin glands and nails. 5. Compare the structural and functional differences in thin and thick skin. 6. Describe how the skin contributes to regulation of body temperature, blood storage, protection, sensation, excretion, absorption, and synthesis of vitamin D. 7. Explain how epidermal and deep wounds heal. 8. Describe the development of skin. 9. Describe the effects of aging on the integumentary system. 10. Recognize and explain the differences in the three types of skin cancer. 11. Describe the effects of burns on the skin and body homeostasis. 12. Describe how burns are graded and treated. 	<ol style="list-style-type: none"> 2. Describe the function of the epidermis and dermis skin layers. 3. Explain the process of skin grafting and the new technology “artificial skin” in the treatment of burns. 4. Explain how the skin helps maintain body temperature homeostasis. 5. Describe the inflammatory response and its effect on skin. 6. Describe the photosynthesis of vitamin D and its effect on bone growth and remodeling. 7. Describe the effect of UV radiation in photo-aged skin and carcinogenesis. 	<p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 5</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 5-Integument: The Skin</p> <p>Laser Disc: Slides: Epidermis and dermis, Skin illustrations.</p> <p>Laser Disc: Video Clips: “Skin Structure and tanning”, “Sweat Formation”, “Allergies”, “Skin Cancer Types”, “Cancer: Detection and treatment”</p> <p>Video: “Skin”</p> <p>VCR Segment: “ Miracles by Design: Burns and Artificial Skin”</p> <p>PowerPoint: Chapter 5</p> <p>Transparencies: Chapter 5</p> <p>Study Guide: Chapter 5</p> <p>Student website for <u>Principles of</u></p>	<p>Dip-sticking during discussions</p> <p>Lab Reports: Lab Report: Skin, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Chapter 5 test: Type 1-3 writing.</p>
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		<u>Anatomy and Physiology:</u> <u>www.wiley.com/college/apcentral</u>	
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Anatomy & Physiology 446-Honors

Chapters 6-9: The Skeletal System-Bones and Joints

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.5 Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with other systems to support the body and allow for movement. Recognize that bones produce blood cells.
- 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
<ol style="list-style-type: none"> 1. Describe the six main functions of the skeletal system. 2. Describe the structure and functions of a typical long bone. 3. Describe the histology of osseous tissue. 4. Describe the blood and nerve supply of bone. 5. Describe how bone grows in length and thickness. 6. Explain the role of nutrients and hormones in regulating bone growth and remodeling. 7. Describe the sequence of events in fracture repair. 8. Describe how exercise and mechanical stress affect bone tissue. 9. Describe the effects of aging on bone tissue. 10. Describe the structural and functional classifications of joints. 11. Distinguish between the structure of fibrous and cartilaginous joints and give their functions. 12. Describe the structure of a typical synovial joint. 13. Describe the structure and function of bursae and tendon sheaths. 14. Describe the types of movements that can occur at synovial joints. 	<ol style="list-style-type: none"> 1. Identify the components of a typical long bone at the macroscopic, cellular and molecular level. 2. Compare and contrast compact and spongy bone. 3. Compare and contrast compact bone and reinforced concrete. 4. Explain bone growth in length and diameter. 5. Site scanning technologies that can be employed in detecting the age and condition of bones. 6. Describe the effects that osteoporosis and rickets have on bone structure. 7. Explain the dynamics of bone remodeling and factors that can affect this process. 8. Explain fracture reduction and bone grafting. 9. Label the bones of the articulated skeleton. 10. Distinguish between the axial and appendicular skeleton. 11. Label the principle bones of the skull. 12. Explain the factors that make the components of the knee joint so vulnerable to trauma and damage. 	<p>Syllabus: 446 Human Anatomy & Physiology</p> <p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapters 6-9</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 6: Skeletal System: Skull, axial and appendicular bones</p> <p>Laser Disc: Slides: osseous tissue and bone illustrations. Radiographs of fractures and trauma to bones.</p> <p>Laser Disc: Video Clips: “Long bone growth”, “Craniofacial reconstruction”, “Osteoarthritis”, “Joint Structure”, “Knee Injuries”, “Knee arthroplasty”, “Rheumatoid arthritis”.</p> <p>Video: “Bones and Joints”-arthroscopic surgery and ACL-</p>	<p>Informal Observation</p> <p>Dip-sticking during discussions</p> <p>Lab Report: Skeletal System, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Work Sheet</p>

<p>15. List and explain factors that can affect joint movement.</p> <p>16. Describe the main components of the knee joint and explain this joints movements</p> <p>17. Explain the technology involved with arthroscopic surgery and arthroplasty.</p>	<p>13. Distinguish between rheumatoid arthritis, osteoarthritis, and the affects of lyme’s disease.</p> <p>14. Distinguish between dislocation and separation using the shoulder as an example.</p>	<p>replacement</p> <p>Video: “Fracture and repair”</p> <p>Video: “Knee arthroscopic surgery”-Medial meniscus</p> <p>VCR Segment: “ Miracles by Design: Arthritis and Hip Arthroplasty”, “Bone scans and peak-bone-mass”</p> <p>X-Ray reader: Radiograph examples of fetal hand compared with adult and fractures. MRI: Medial meniscus tear</p> <p>Newspaper and Magazine articles: “Why women athletes are hurring”, “On Bended Knee”, “Bone loss and senior citizens”</p> <p>PowerPoint: Chapter 6 & 9</p> <p>Transparencies: Chapter 6-9</p> <p>Study Guide: Skeletal system</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	<p>completion: Axial and Appendicular skeleton</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Chapter 6-9 test: Type 1-3 writing.</p>
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Anatomy & Physiology 446-Honors

Chapters 10: Muscle Tissue

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.6 Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with other systems to support the body and allow for movement. Recognize that bones produce blood cells.
- 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.

- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.

- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
<ol style="list-style-type: none"> 1. Explain the properties, structural and functional differences between the three types of muscle tissue. 2. Describe the structure of a typical skeletal muscle for the organ level to the molecular level. 3. Outline the steps involved in the sliding filament mechanism of muscle contraction 4. Describe how muscle action potentials arise at the neuromuscular junction, and suggest way of altering NMJ impulse conduction. 5. Describe the reactions by which muscle fibers produce ATP and CP. 6. Distinguish between anaerobic and aerobic cellular respiration. 7. Describe the factors that lead to muscle fatigue. 8. Describe the structure and function of the motor unit. 9. Explain the phases of a twitch contraction. 10. Describe how frequency of stimulation affects muscle tension. 	<ol style="list-style-type: none"> 1. Diagram and identify the components of skeletal muscle at the Organ, cellular, sub-cellular and molecular level. 2. Diagram and label the components of a sarcomere. 3. Diagram, label and explain the function of the neuromuscular junction (NMJ). 4. List and explain four ways of altering impulse conduction at the NMJ. 5. Suggest a clinical use for Curare and succinyl choline in surgery. 6. Diagram and explain Huxley's sliding filament theory of muscle contraction. 7. Explain the effects of rigor mortis on muscle physiology. 8. Identify the reactions for the production of energy for muscle contraction. 9. Explain the effects that aerobic vs anaerobic exercise have on muscle metabolism. 	<p>Syllabus: 446 Human Anatomy & Physiology</p> <p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 10</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 7: Muscle Reaction Times</p> <p>Laser Disc: Slides: Muscle tissue: sketetal, cardiac, and smooth.</p> <p>Demo: Interactive class demo using lab tables and chairs: "Sliding Filaments" in contraction at the molecular level</p> <p>Laser Disc: Video Clips: "Sketetal muscle", "Fiber types",</p>	<p>Informal Observation</p> <p>Dip-sticking during discussions</p> <p>Lab Report: Reaction Times, Type 1-3 writing</p> <p>Film Report: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p>

<p>11. Describe the difference between isotonic and isometric contractions.</p> <p>12. Compare and contrast the structure and function of the three types of skeletal muscle fibers.</p> <p>13. Describe the effects exercise, hormones and aging have on skeletal muscle fibers.</p>	<p>10. Diagram the components of a twitch contraction from a myogram and relate each part to the physiology of muscle contraction.</p> <p>11. Distinguish between red muscle(slow-twitch) and white muscle (fast twitch) fiber's structure and function.</p>	<p>“ Contraction at the Molecular level”, “Myoelectric arm” and “Somatypes”.</p> <p>WEB Animation: “Neurotransmitter release at NMJ”</p> <p>Demo: Kymograph: Frog leg muscle-myogram</p> <p>Video: “Muscles”</p> <p>Video: “The Body Electric” Segment-implanted electrical muscle stimulators for quadrapelegics.</p> <p>PowerPoint: Chapter 10</p> <p>Transparencies: Chapter 10</p> <p>Study Guide: Muscular system</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	<p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations Type 1-4 writing</p> <p>Chapter 10 test: Type 1-3 writing.</p>
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Anatomy & Physiology

446-Honors Chapter 12: Nervous Tissue

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication among different parts of the body and mediates the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.
- 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
<ol style="list-style-type: none"> 1. List the structures and the basic function of the nervous system. 2. Describe the organization of the nervous system. 3. Compare and contrast the structure and function of neurons and neuroglia. 4. Distinguish between gray and white matter. 5. Describe the cellular properties that permit communication between neurons and effectors. 6. Compare the basic ion channels, and explain how they relate to action potentials and graded potentials. 7. Describe the factors that maintain a resting membrane potential. 8. List the sequence of events that generate an action potential. 9. Explain the events of impulse transmission at a chemical synapse. 10. Give examples of excitatory and inhibitory neurotransmitters, and describe how they affect impulse transmission. 11. Describe the classes of neurotransmitters. 12. Identify the various types of neural assemblies (circuits) in the nervous system. 	<ol style="list-style-type: none"> 1. Diagram the structure of a typical motor neuron. 2. Differentiate between types of neurons predicated on their structural and functional classification. 3. Distinguish between the six major types of glial cells, and give their location in nervous tissue. 4. Give examples of demyelinating diseases and chemicals that cause demyelination. 5. Work through the experimental design for the animal model (squid axon) used in elucidating impulse conduction on a non-myelinated axon. 6. Diagram and explain impulse conduction along an axon involving Na,K,Cl voltage-gated ion channels and active transport ion pumps. 7. List and explain three ways of altering impulse conduction along an axon. 8. Distinguish between continuous and salutatory 	<p>Syllabus: 446 Human Anatomy & Physiology</p> <p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 12</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 8: Reaction times Lab 9: Sensory receptors</p> <p>Laser Disc: Slides: Nervous tissue and Illustrations of neurons.</p> <p>Laser Disc: Video Clips: "Neural conduction", "Axonal transport"</p> <p>WEB Animation: "Propagation of action potential", "Channel gating during action potential", "Synaptic vesicle fusion and transmitter release at NMJ", "A comparison of excitatory and inhibitory</p>	<p>Informal Observation</p> <p>Dip-sticking during discussions</p> <p>Lab Report: Sensory Receptors, Type 1-3 writing</p> <p>Film Report: Summarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization &</p>

<p>13. Define plasticity and neurogenesis. 14. Describe the events involved in damage and repair of a peripheral nerve.</p>	<p>impulse conduction, and explain the evolutionary significance of myelination.</p> <p>9. Explain excitatory postsynaptic potentials (EPSP) at synapses involving ligand-gated sodium channels.</p> <p>10. Explain inhibitory postsynaptic potentials (IPSP) at synapses involving either ligand-gated potassium or chloride channels</p> <p>11. List and explain 4 ways of altering impulse transmission at a synapse.</p> <p>12. Relate inhibition with hyperpolarization.</p> <p>13. Compare and contrast spatial and temporal summation at synapses.</p> <p>14. List examples of excitatory and inhibitory neurotransmitter and their functions in the nervous system, and how altering the balance of these transmitters leads to neurological conditions and disease.</p> <p>15. Explain cocaine's affect on the brain and how its use leads to addiction.</p>	<p>neurotransmitter actions”</p> <p>Video Clip segments: “Frontiers in Biomedicine”-Squid axons, “The Brain: Sight and Movement” squid axon dissection and experient</p> <p>Video: “The Brain: Enlightened Machine”, Excitatory and inhibitory neurons, transmitters and disease effects: epilepsy. Neuronal connectionism; synapse formation.</p> <p>Video: “The Mind: Development”-neuroplasticity, glial cells (radial), neural darwinism, environmental insults;alcohol and radiation</p> <p>Newspaper/Magazine articles: “Advances in nerve cell regrowth”, “Bacterial infection and MS”, “Why Japanese gourmands will die for the taste of fugu”, “The Dope on Drugs”</p> <p>PowerPoint: Chapter 12</p> <p>Transparencies: Chapter 12</p> <p>Study Guide: Nervous Tissue</p>	<p>assessment: Notebook</p> <p>Oral presentations: Type 1-4 writing</p> <p>Chapter 12 test: Type 1-3 writing.</p>
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		Student website for <u>Principles of Anatomy and Physiology:</u> www.wiley.com/college/apcentral	
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Anatomy & Physiology 446-Honors Chapter 14: The Brain and Cranial Nerves

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication among different parts of the body and mediates the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.
- 4.9 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Identify the major parts of the brain 2. Describe how the brain is protected. 3. Describe the blood supply to the Brain, and the formation and circulation of CSF. 4. Describe the structures and functions of the brain stem. 5. Describe the structure and function of the cerebellum. 6. Describe the structure and function of the diencephalons. 7. Describe the cortex and its gyri and sulci. 8. Locate the lobes of the cerebrum. 9. Describe the nuclei that comprise the basal ganglia. 10. List the structures and describe the functions of the limbic system. 11. Describe the regional geography of the cortex and list the locations of the sensory, association and motor cortex locations.	1. Label brain diagrams of sagittal, lateral and inferior illustrations of the brain 2. Diagram the structure of the meninges, give their functions and relate to epidural anesthesia, spinal tap and subdural hematoma. 3. Explain the formation and re-absorption of CSF. Relate its functions with concussion and hydrocephalus. 4. Relate the brain stem structures and functions with autonomic control and diseases processes: Depletion of NE; Anxiety & depression, SAD. 5. Label the major gyri and sulci of the cerebral cortex and relate the location to their function. 6. Relate the function of the basal ganglia to Parkinson’s disease.	Syllabus: 446 Human Anatomy & Physiology High School Lab Safety Regulations <u>Principles of Anatomy & Physiology</u> , 11 th edition, (2006) Tortora: Chapter 14 Lab Manual: A&P 11 th edition Lab 10: Brain Dissection Lab 11: Cranial Nerves and functions Laser Disc: Slides: Brain illustrations, MRI: coronal, sagittal and transverse sections of the brain, ventricular system	Informal Observation Dip-sticking during discussions Lab Reports: Brain Dissection and Cranial nerves, Type 1-3 writing Film Reports: Sumarization: Type 1-3 writing Homework completion: End of chapter questions & critical thinking

<p>12. Explain the significance of hemispheric lateralization.</p> <p>13. Define brain waves, their significance and the technology for their study.</p> <p>14. Identify and give the functions of the 12 cranial nerves.</p> <p>15. Describe the effects of aging and related disease processes on the brain and nervous system.</p>	<p>7. Relate the concept of synapse formation and connectionism to the effects of stress on the brain</p> <p>8. Describe and explain the limbic systems role in learning and memory and relate how neural disease affects these functions.</p> <p>9. Explain the effects that alcohol, opiates and cocaine have on the brain and synaptic transmission.</p> <p>10. Describe the effects that the diseases and disorders of ALS, MS, Alzheimer's, Parkinson's, ADHD and stroke have on the brain and suggest treatments.</p>	<p>Laser Disc: Video Clips: "Head trauma: concussion", "Stroke"</p> <p>WEB Animation: PBS: "How Drugs work": Normal Neurotransmission, Effects of Cocaine, Alcohol, Opiates.</p> <p>Video: "The Brain: Stress & Emotions", Excitatory and inhibitory neurons transmitters Neuronal connectionism and Limbic system.</p> <p>Video: "The Brain: Learning & Memory" Limbic system, cell assemblies and Hebbian connectionism & plasticity, neural Darwinism and effects of disease: Stroke, Alzheimer's...</p> <p>Video: "Cocaine's effect on the Brain", SPECT scans comparisons with stroke and Alzheimer's patients.</p> <p>Video: NOVA: "Brain Transplant"; Neonatal tissue transplantation into the brain to cure degenerative disease; Parkinson's disease, Sequel to "Case of Frozen Addicts"</p> <p>CD-ROM: Interactive lab on</p>	<p>questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations: Type 1-4 writing</p> <p>Chapter 14 test: Type 1-3 writing.</p>
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		<p>Addiction: Cocaine's affect on dopamine receptors in the limbic system</p> <p>Newspaper/Magazine articles: "How street drugs alter our minds", "Nerve Disorder:ALS", "Street drug damages the brain", "Effects of Nicotine", "Prozac", "Radical brain surgery"</p> <p>PowerPoint: Chapter 14</p> <p>Transparencies: Chapter 14</p> <p>Study Guide: CNS & SNS</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	
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Anatomy & Physiology
446-Honors
Chapter 17: The Special Senses

Framework Standard:
Biology I:
4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

- 4.7 Recognize that communication among cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells produce signals to communicate only with nearby cells.**
- 4.10 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.**

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently

- making observations
- making and recording measurements at appropriate levels of precision
- collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Describe the olfactory receptors the neural pathway for olfaction.	1. Relate both olfaction and gestation as chemical receptors	Syllabus: 446 Human Anatomy & Physiology	Informal Observation

<ol style="list-style-type: none"> 2. Describe the gustatory receptors and the neural pathway for gestation. 3. List and describe the accessory structures of the eye and the structural components of the eye ball. 4. Discuss image formation involving refraction, accommodation and pupil constriction. 5. Describe the processing of visual signals in the retina and the neural pathway for vision. 6. Describe the anatomy of the structures in the three main regions of the ear. 7. List the major events in the physiology of hearing. 8. Identify the receptor organs for equilibrium, and describe how they function. 9. Describe the auditory and equilibrium neural pathways. 10. Describe the development of the eyes and ears. 11. Describe age-related changes that occur in the eyes and ears. 	<p>involving dissolved odorants and tastants.</p> <ol style="list-style-type: none"> 2. Label a diagram of the structures of the eye and its accessory structures. 3. Explain how the aqueous humor is formed and reabsorbed and the relationship with glaucoma. 4. Diagram and explain how the four refracting media of the eye focus an image on the retina. 5. Diagram and explain how lens curvature relates to refraction and relate this to near point vision. 6. Describe the refraction abnormalities of myopia, hyperopia and astigmatism, and explain how these conditions can be corrected. 7. Explain the application of Lasik and corneal transplant surgery for refractive correction. 8. Explain the physiology of the photoreceptors; rod and cones, and relate these to night-blindness and color-blindness. 9. Label a diagram of the structures in the three regions of the ear. 10. Diagram and explain the structure and function of the cochlea and the organ of corti (spiral organ). 11. Explain the physiology of equilibrium involving the utricle, saccule and the semicircular 	<p>High School Lab Safety Regulations</p> <p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 17</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 12: Eye Dissection Lab 13: Visual Function Lab 14: Ophthalmoscopic Exam</p> <p>Laser Disc: Slides: Ear and eye illustrations, receptor structure</p> <p>Laser Disc: Video Clips: Ear Anatomy and infection, Eye Anatomy, cataracts, movement and surgery.</p> <p>Video: “The Senses”, Lasik eye surgery, Nova series: Mystery of the sense organs, The Brain- “Vision and Movement”—vision segment</p> <p>Newspaper/Magazine articles:</p> <p>PowerPoint: Chapter 17</p> <p>Transparencies: Chapter 17</p>	<p>Dip-sticking during discussions</p> <p>Lab Reports: Eye dissection, visual function and eye exam Type 1-3 writing</p> <p>Film Reports: Sumarization: Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations: Type 1-4 writing</p>
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	canals. 12. Explain the technological application of cochlear implants.	Study Guide: Sensation Student website for <u>Principles of Anatomy and Physiology</u> : www.wiley.com/college/apcentral	Chapter 17 test: Type 1-3 writing.
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Anatomy & Physiology 446-Honors Chapter 19-21: Circulatory System

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.

4.2 Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from blood.

4.11 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way
- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.

- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Describe the functions of blood 2. Describe the physical characteristics and principle components of blood. 3. Explain the origin, structure, function of red cells, white cells and platelets. 4. Describe the function of the immune system. 5. Describe three mechanisms for hemostasis. 6. Identify the stages in blood clotting, and explain the factors that can promote or inhibit the process. 7. Distinguish between ABO & Rh blood groups 8. Discuss the external and internal	1. List and describe the constituents of blood plasma 2. Identify and give the function of blood formed elements. 3. Diagram and explain the loading and unloading of oxygen and carbon dioxide on the active-site and allosteric-site of the hemoglobin molecule on the red cells. 4. Relate and explain anemia, SCD, hypoxia, physiological polycytemia, EPO and blood doping. 5. Relate the formation and	Syllabus: 446 Human Anatomy & Physiology High School Lab Safety Regulations <u>Principles of Anatomy & Physiology</u> , 11 th edition, (2006) Tortora: Chapter 19-21 Lab Manual: A&P 11 th edition Lab 15: Blood Typing Lab 16: Heart Dissection Lab 17: ECG, Blood Pressure &	Informal Observation Dip-sticking during discussions Lab Reports: Cardiovascular System Type 1-3 writing Film Reports: Sumarization: Type 1-3 writing

<p>structure of the heart.</p> <ol style="list-style-type: none"> 9. Trace the blood flow through the heart and through system, pulmonary and coronary circulation. 10. Describe the structural and functional aspects of cardiac muscle, its electrical conduction system and the relationship with ECG and arrhythmias. 11. Discuss blood pressure and volume changes relative to cardiac output, stroke volume and heart rate. 12. Explain the relationship between exercise and heart rate regulation in the cardiovascular system. 13. Describe CAD, CHF, Blue Baby-Tetralogy of Fallot and MI relative to diagnosis and treatment modalities. 14. Compare and contrast the structure and function of arteries, arterioles, capillaries, venules and veins. 15. Discuss the pressures that and cause movement of fluids between tissue and pulmonary capillaries and interstitial spaces. 16. Explain how the blood pressure changes throughout the cardiovascular system. 17. Describe how blood pressure is regulation. 18. Define pulse, systole and diastole and how blood pressure is measured. 19. Define shock, hypotension and hypertension. 	<p>destruction of red cells with hepatitis, jaundice and hemolytic blood disease of the new-born.</p> <ol style="list-style-type: none"> 6. Relate obstructive jaundice and Vitamin K deficiency to blood clotting and hemophilia. 7. Compare and contrast anticoagulants-Heparin and Warfarin with thrombolytic agents—streptokinase and tPA and aspirin. 8. Compare the genotypes of human blood groups and relate them in blood typing and crossing-matching in transfusion. 9. Distinguish between the 5 types of white cells and relate their functions in the immune response. 10. Dissect a sheep heart and label the parts. 11. Trace the blood flow through the heart and relate this blood movement to the heart's pacemaker system. 12. Explain the causes of atherosclerosis and the effects it has on the heart. 13. List the ways of diagnosing and treating a diseased heart with the latest technological interventions. 14. Briefly explain what problems result from a ventricular septal defect and what technological advances have done for the 	<p>Heart rates</p> <p>Laser Disc: Slides: Cardiovascular System illustrations: blood, heart and vessels</p> <p>Laser Disc: Video Clips: “Red Cells”, “Blood Flow”, “Sickle Cells”, “Effects of ACH, E and vagus nerve stimulus on heart”, “Heart Valves”, “Angiography”, “Angioplasty”, “Congestive heart Failure”, “Ultrasonography”, “Aids”, “Immune Response”</p> <p>Video: “Heart Attack: A Closer Look”</p> <p>Video: The Health Century- tPA, angioplasty, open heart surgery and Tetralogy of Fallot-Blue Baby</p> <p>Video: HBO, “Something the Lord Made”—first attempt at heart surgery—Blue Baby</p> <p>Video: “The Causes of Heart Attack and Stroke”</p> <p>Video: Living Body: “Heart”</p> <p>Video: “The Immune System”</p>	<p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations: Type 1-4 writing</p> <p>Chapter 19-21 test: Type 1-3 writing.</p>
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	<p>treatment of this condition.</p> <p>15. Explain how heart rate and blood pressure is regulated.</p> <p>16. Measure blood systemic blood pressure and relate this to the cardiac cycle.</p> <p>17. Listen to the heart sounds and explain their origin.</p> <p>18. Diagram and explain the structural differences between blood vessels.</p> <p>19. Compare and contrast the differences in movement of materials across tissue and pulmonary capillaries.</p> <p>20. Explain why we don't drown in our own fluids, and why pulmonary edema is a problem in CHF.</p>	<p>News Paper /Magazine Articles</p> <p>CD-ROM: Interactive lab on Sickle Cell Anemia</p> <p>PowerPoint: Chapter 19-21</p> <p>Transparencies: Chapter 19-21</p> <p>Study Guide: Blood, Heart & Blood Vessels</p> <p>Student website for <u>Principles of Anatomy and Physiology</u>: www.wiley.com/college/apcentral</p>	
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Anatomy & Physiology 446-Honors Chapter 23: The Respiratory System

Framework Standard:

Biology I:

4. Anatomy and Physiology

Central Concepts: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism. Homeostasis

allows the body to perform its normal functions.

4.3 Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbon dioxide.

4.12 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.

Framework Standard II: Scientific Inquiry Skills Standard:

Scientific literacy can be achieved as students inquire about the biological world. The curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use scientific skills in biology, along with the inquiry skills listed below.

SIS1. Make observations, raise questions, and formulate hypotheses.

- Observe the world from a scientific perspective.
- Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.
- Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.

SIS2. Design and conduct scientific investigations.

- Articulate and explain the major concepts being investigated and the purpose of an investigation.
- Select required materials, equipment, and conditions for conducting an experiment.
- Identify independent and dependent variables.
- Write procedures that are clear and replicable.
- Employ appropriate methods for accurately and consistently
 - making observations
 - making and recording measurements at appropriate levels of precision
 - collecting data or evidence in an organized way

- Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storage.
- Follow safety guidelines.

SIS3. Analyze and interpret results of scientific investigations.

- Present relationships between and among variables in appropriate forms.
 - Represent data and relationships between and among variables in charts and graphs.
 - Use appropriate technology (e.g., graphing software) and other tools.
- Use mathematical operations to analyze and interpret data results.
- Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.
- State questions raised by an experiment that may require further investigation.

SIS4. Communicate and apply the results of scientific investigations.

- Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.
- Review information, explain statistical analysis, and summarize data collected and analyzed as the result of an investigation.
- Explain diagrams and charts that represent relationships of variables.
- Construct a reasoned argument and respond appropriately to critical comments and questions.
- Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentation software) and other tools to present findings.
- Use and refine scientific models that simulate physical processes or phenomena.

Learning Objectives/ Content Outcomes (The learner should be able to...)	Skills	Resources	Assessments
1. Describe the anatomy of the respiratory structures: nose, pharynx, larynx, trachea, bronchi and lungs. 2. Identify the functions of the each respiratory structure.	1. Diagram and label the parts of the respiratory system 2. Measure the rate of respiration at rest, after exercise and determine the recovery time.	Syllabus: 446 Human Anatomy & Physiology High School Lab Safety Regulations	Informal Observation Dip-sticking during discussions

<ol style="list-style-type: none"> 3. Describe the events that cause inhalation and exhalation. 4. Explain the difference between tidal volume, inspiratory reserve volume, expiratory reserve volume and residual volume. 5. Differentiate between inspiratory capacity, vital capacity and total lung capacity. 6. Explain Dalton's and Henry's gas laws. 7. Describe the exchange of oxygen and carbon dioxide in external and internal respiration. 8. Describe how the blood transports oxygen and carbon dioxide. 9. Explain how the nervous system controls respiration. 10. List the factors that can alter the rate of respiration. 11. Describe the effects of exercise has on the respiratory system. 12. Describe the effects of aging on the respiratory system. 	<ol style="list-style-type: none"> 3. Measure the tidal volume, inspiratory capacity, vital capacity and expiratory capacity. 4. Relate the Boyle's gas law to pulmonary ventilation. 5. Relate the muscle actions involved in inhalation and exhalation. 6. Relate Dalton's law of partial pressures and Henry's law of gas solubility to gas exchange in external and internal respiration. 7. Diagram and explain a model to represent the loading and unloading of oxygen on the hemoglobin molecule at the pulmonary and tissue capillaries. 8. Relate oxygen, carbon dioxide and carbon monoxide gas transport. 9. Relate the red cells role in controlling blood pH. 10. Explain physiological polycythemia and relate to blood doping and EPO abuse. 11. Connect the control of respiration with centers in the CNS and factors that can affect respiratory control. 12. Relate the effect that exercise and smoking have on the 	<p><u>Principles of Anatomy & Physiology</u>, 11th edition, (2006) Tortora: Chapter 23</p> <p>Lab Manual: A&P 11th edition</p> <p>Lab 18: Pulmonary Volumes and respiratory rates.</p> <p>Laser Disc: Slides: Respiratory illustrations: Alveoli, inhalation & exhalation.</p> <p>Laser Disc: Video Clips: "Ventilation", "Gas exchange", "Sinuses" and "Bronchial Asthma"</p> <p>Video: "Breath of Life"- Respiratory system</p> <p>Video: NOVA; "Dying to Breathe"-Lung Transplants</p> <p>Video: Virtual body: "Respiration and Breathing"</p> <p>Video; "Breath of Life"</p> <p>Newspaper/Magazine articles</p> <p>PowerPoint: Chapter 23</p>	<p>Lab Reports: Respiratory rates and Volumes Type 1-3 writing</p> <p>Film Reports: Sumarization: Respiratory Videos Type 1-3 writing</p> <p>Homework completion: End of chapter questions & critical thinking questions: type 1-3 writing</p> <p>Study guide completion</p> <p>Portfolio organization & assessment: Notebook</p> <p>Oral presentations: Type 1-4 writing</p> <p>Chapter 23 test: Type 1-3 writing.</p>
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	respiratory system. 13. Explain how aging and disease affect the respiratory system.	Transparencies: Chapter 23 Study Guide: Respiratory System Student website for <u>Principles of Anatomy and Physiology</u> : www.wiley.com/college/apcentral	
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