Geneva CUSD 304
Content-Area Curriculum Frameworks
Grades 6-12
Science

Mission Statement	<u>The Mission of Science Education Is:</u> 1) To nurture an active interest in science that continues throughout life. 2) To teach the learning skills and concepts necessary for the scientific process. 3) To develop student understanding of the interrelationships between science, society, and the environment 4) To encourage students to discover and develop their talent in science.
Course Sequence (Grades 6-12)	**6th grade:** Earth Science **7th grade:** Life Science **8th grade:** Physical Science **9th grade:** General Science Earth Science Biology Biology Honors **10th ,11th,12 grade:** Chemistry Chemistry Honors Physics Astronomy Natural Disasters Anatomy and Physiology I and II Horticulture I and II AP Chemistry AP Biology AP Environmental Science

Course Framework

Course Title **Grade Level** **Semesters (1-2-3-4)** **Prerequisite**	Anatomy and Physiology I 11th/12th 1 Biology and Geometry
Course Description	This laboratory course deals primarily with human anatomy: the structures found in the human body and the physiological functions within the body. It is a one-semester, senior-level, life science course. Juniors who have completed chemistry may also take the course. Anatomy and Physiology should not be considered as a simple continuation of the science curriculum and should be taken only by those students who intend to major in science or a science related field in college. Students who are not strong in science, should not take Anatomy and Physiology. The labs and topics reflect what is typically offered at colleges and universities in freshman-level courses. The topics of Anatomy and Physiology I include the functions of and interactions between the major systems of the human body such as integumentary, skeletal, muscular, nervous, and special senses systems. A small part of the course involves animal dissection and there are some graphic displays in the form of surgery videos. The ability to manipulate the tools and carry out dissection is of importance in this course due to the fact that no alternatives to dissection are offered.
District-approved Materials and/or Resources	Fundamentals of Anatomy & Physiology Publisher: Benjamin Cummings ISBN: 01318-36625 Copy write: 2004

Unit of Study: major topics	**Unit 1: Introduction to Human Anatomy and Physiology**	Resources that will support instruction Fetal Pig Dissection Lab Internet Links to Practice Quizzes Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**11.A.4a** Formulate hypotheses referencing prior research and knowledge. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	Define anatomy and physiology, and describe various specialties within each discipline. Discuss careers related to the human anatomy and physiology. Identify the major levels of organization in organisms, from the simplest to the most complex. Identify the major functions and components of the organ systems of the human body. Describe how positive feedback and negative feedback are involved in homeostatic regulation. Use anatomical terms to describe body sections, body regions, and relative positions. Identify the major body cavities and their subdivisions. Identify the structure and function of the organs of the fetal pig as they relate to the human body	
Assessments	Performance Tasks Homework Quizzes Tests Lab Practical Exams	Other Evidence Lab-Dissection

Unit of Study: major topics	**Unit 2: Histology**	Resources that will support instruction Prepared Slide Labs- Tissue Identification Blood Type Simulation Lab Internet Links to Practice Quizzes Cosmetic Surgery Video Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**11.A.4c** Collect, organize and analyze data accurately and precisely **12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	Identify the four major types of tissues in the body and describe their roles. Identify the 8 major types of epithelial tissues and describe their functions Describe the relationship between form and function for each type of epithelium. Identify the 12 major types of connective tissues and describe their functions. Explain how epithelial and connective tissues combine to form four types of membranes, and specify the functions of each. Describe how connective tissue establishes the framework of the body. List the 4 blood types and identify the possible genotypes for each. Describe how blood is typed using anti-sera. Describe how blood can be used in paternity testing and criminal investigations. Describe the three types of muscle tissue and the special structural features of each type. Discuss the basic structure and neural tissue and describe its role in the human body. Describe how injuries and aging affect the tissues of the body.	
Assessments	Performance Tasks Homework Labs Quizzes Tests	Other Evidence

Unit of Study: major topics	**Unit 3: Integumentary System**	Resources that will support instruction Internet Review Links Characteristics of Skin and Repair Article History of Skin Color Article Burn Graft Surgery Video Hair Transplant Surgery Video Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12 A.4c** Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	List the components of the integumentary system, and describe their physical relationship to each other and to the subcutaneous layer. Specify the general functions of the integumentary system. Describe the main structural features of the epidermis, and explain their functional significance. Explain what accounts for individual and racial differences in skin, such as skin color. Discuss the effects of ultraviolet radiation on the skin and the role played by melanocytes. Describe the structure and functions of the dermis. Describe the structure and functions of the subcutaneous layer. Explain the mechanisms that produce hair and that determine hair texture and color. Discuss the various kinds of glands in the skin and the secretions of those glands. Explain how the sweat glands of the integumentary system play a major role in regulating body temperature. Describe the anatomical structure of nails and how they are formed. Explain how the skin responds to injury and repairs itself. Summarize the effects of the aging process on the skin	

Assessments	Performance Tasks Homework Quizzes Tests Skin Disorders Power Point Project	Other Evidence

Unit of Study: major topics	**Unit 4: Skeletal System**	Resources that will support instruction Internet Review Links Jaw Reconstruction Video Dislocated Shoulder Repair Video Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12 A.4c** Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	Describe the functions of the skeletal system. Classify bones according to their shapes and internal organization, and give examples of each type. Identify the cell types in bone, and list their major functions. Compare the structures and functions of compact bone and spongy bone. Compare the mechanisms of intramembranous ossification and endochondral ossification. Discuss the effects of nutrition, hormones, exercise, and aging on bone development and on the skeletal system. Describe the types of fractures, and explain how they heal. Summarize the effects of the aging process on the skeletal system. Identify the bones of the axial skeleton and specify their functions. Identify the bones of the cranium and face, and explain the significance of the markings on the individual bones. Identify and describe the curvatures of the spinal column and their functions. Identify the vertebral regions, and describe the distinctive structural and functional characteristics of each vertebral group. Explain the significance of the articulations between the thoracic vertebrae and ribs and between the ribs and sternum. Identify the bones that form the pectoral girdle and their functions. Identify the bones of the upper limbs and their functions. Identify the bones that form the pelvic girdle and their functions. Identify the bones of the lower limbs and their functions. Explain how study of the skeleton can reveal significant information about an individual. Contrast the major categories of joints, and explain the relationship between	

	structure and function for each category. List the types of synovial joints, and discuss how the characteristic motions of each type are related to its anatomical structure. Explain the relationship between joint strength and mobility, using specific examples.	
Assessments	Performance Tasks Homework Quizzes Tests	Other Evidence

Unit of Study: major topics	**Unit 5: Muscular System**	Resources that will support instruction Textbook CD-ROM Animations Internet Review Links Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	Specify the functions of skeletal muscle tissue. Describe the organization of muscle at the tissue level. Explain the unique characteristics of skeletal muscle fibers. Identify the structural components of a sarcomere. Identify the components of the neuromuscular junction, and summarize the events involved in the neural control of skeletal muscles. Explain the key steps involved in the contraction of a skeletal muscle fiber. Compare the different types of muscle contractions. Describe the mechanisms by which muscle fibers obtain the energy to power contractions. Distinguish between aerobic and anaerobic endurance, and explain their implications for muscular performance. Describe the arrangement of fascicles in the various types of muscles, and explain the resulting functional differences. Predict the actions of a muscle on the basis of the relative positions of its origin and insertion. Explain how muscles interact to produce or oppose movements. Explain how the name of a muscle can help identify its location, appearance, or function. Identify the principal axial muscles of the body, together with their origins, insertions, actions, and innervation. Identify the principal appendicular muscles of the body, together with their origins, insertions, actions, and innervation. Compare the major muscle groups of the upper and lower limbs, and relate their differences to their functional roles	

Assessments	Performance Tasks Homework Labs Quizzes Tests	Other Evidence

Unit of Study: major topics	**Unit 6: Nervous System**	Resources that will support instruction Textbook CD-ROM Internet Review Links Sheep Brain Dissection Applications/Clinical Manual PET Scan Analysis Lab Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	List the two major anatomical divisions of the nervous system, and describe the characteristics of each division. Sketch and label the structure of a typical neuron, and describe the functions of each component. Describe the events involved in the generation and propagation of an action potential. Discuss the factors that affect the speed with which action potentials are propagated. Discuss the interactions that make possible the processing of information in neural tissue. Discuss the structure and functions of the spinal cord. Describe the three meningeal layers that surround the central nervous system. Explain the roles of white matter and gray matter in processing and relaying sensory information and motor commands. Name the major regions of the brain, and describe their functions. Explain how the brain is protected and supported. Discuss the formation, circulation, and functions of the cerebrospinal fluid. Describe the anatomical differences between the medulla oblongata and the spinal cord. List the main components of the medulla oblongata and specify their functions. List the main components of the pons and specify their functions. List the main components of the cerebellum and specify their functions. List the main components of the cerebellum and specify their functions. List the main components of the mesencephalon and specify their functions. List the main components of the diencephalon and specify their functions. Identify the main components of the limbic system and specify their locations and	

	functions. Identify the major anatomical subdivisions of the cerebrum. Locate the motor, sensory, and association areas of the cerebral cortex, and discuss their functions.	
Assessments	Performance Tasks Homework Labs Quizzes Tests	Other Evidence

Unit of Study: major topics	**Unit 7: Special Senses**	Resources that will support instruction Vision Lab Olfactory Senses Lab Reflex Lab Cow Eye Dissection Internet Review Links Applications/Clinical Manual Coloring Book
Illinois Learning Standards, Benchmarks, **National Standards Assessment Frameworks, or other standards that will be taught in this unit**	**11.A.4c** Collect, organize and analyze data accurately and precisely **12.A.4a** Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms. **12.A.4b** Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction. **12.A.5a** Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy). **12.A.5b** Analyze the transmission of genetic traits, diseases and defects. **13.B.4b** Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science. **13.B.5b** Analyze and describe the processes and effects of scientific and technological breakthroughs. **13.B.5e** Assess how scientific and techno-logical progress has affected other fields of study, careers and job markets and aspects of everyday life.	
Objectives o **Conceptual** o **Factual** o **Procedural**	Specify the components of the afferent and efferent divisions of the nervous system, and explain what is meant by the somatic nervous system. Identify the receptors for the general senses, and describe how they function. Compare the organization of the autonomic nervous system with that of the somatic nervous system. List the divisions of the ANS, and give the functions of each. Describe the structures and functions of the sympathetic division of the autonomic nervous system. Describe the mechanisms of neurotransmitter release in the sympathetic division. Describe the structures and functions of the parasympathetic division of the autonomic nervous system. Explain how memories are created, stored, and recalled. Distinguish between the levels of consciousness and unconsciousness, and identify the characteristics of brain activity associated with the different levels of sleep. Describe the sensory organs of smell, and trace the olfactory pathways to their destinations in the brain. Explain what is meant by olfactory discrimination, and briefly describe the physiology involved. Describe the sensory organs of taste, and trace the gustatory pathways to their destinations in the brain. Explain what is meant by gustatory discrimination, and briefly describe the physiology involved. Identify the accessory structures of the eye, and explain their functions. Describe the internal structures of the eye, and explain their functions. Explain how we are able to distinguish colors and perceive depth.	

	Describe the structures of the external and middle ears, and explain how they function.	
Assessments	Performance Tasks Homework Labs Quizzes Tests	Other Evidence