Scope and Sequence

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Cluster:	Health Science
Course Name:	Pathophysiology
Course Description:	(1) Pathophysiology. In Pathophysiology, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Pathophysiology study disease processes and how humans are affected. Emphasis is placed on prevention and treatment of disease. Students will differentiate between normal and abnormal physiology. (2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable. (3) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.
	(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information). (5) Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.
Course Requirements:	This course is recommended for students in Grades 11-12. Recommended prerequisites: three credits of science. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum).
Equipment & Supplies	Required: Teaching stethoscope, Sphygmomanometers, thermometers (digital IV AC/thermoscope) clock (with second hand), meter sticks or metric rulers, gloves, hand scrub/germicidal soap, reagent strips, slides, cover strips, test tubes, stains for blood and bacteria, distilled water, computers, monitors, tv/dvdplayer, internet access, email
	Recommended: Microscopes, simulated blood typing kit, water bath 37 degrees centigrade, glucometer, refractometer, centrifuge, urinometer, clinitest, acetest, EKG machine, snellen eye chart, scales with height measure, autoclave, autoclave tape, assorted instruments, wraps (paper-sterile, cloth-nylon), multimedia projector

Units of Study	Knowledge and Skills	Student Expectations	Resources
I. History, Trends and the Future			
A. Health and Disease B. The Study of Pathophysiology C. Medical History D. New Developments E. Language of Pathophysiology	(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials; (D) evaluate the impact of scientific research on society and the environment; and (F) research and describe the history of science and contributions of scientists.	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html http://library.med.utah.edu/WebPath/webpath.html http://www.cdc.gov/mmwr/ http://www.medmatrix.org/_SPages/Pathology.asp

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II. Laboratory Safety and the Tools of Investigation			
A. Laboratory Rules and Precautions B. Safety Contract C. Equipment D. Standard Procedures for the Laboratory E. Scientific Method/Reporting	(1) The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations.	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html
		(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials;	
	(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	
		(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
		(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed; and	
		(D) distinguish between scientific hypotheses and scientific theories.	
III. Fundamentals of Pathophysiology			
A. Terminology 1. Homeostasis 2. Disease 3. Signs and Symptoms 4. Diagnosis, therapy and prognosis B. Pathogenesis 1. Development of disease 3. Sequence of events 4. Acute vs. Chronic C. Risk Factors 1. Age 2. Sex 3. Genetic Makeup 4. Stress 5. Lifestyle 6. Occupation 7. Preexisting Illness 8. Environment D. Disease Processes 1. Structural 2. Functional E. Causes of Disease F. Disease Process	(1) The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials;	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html
	(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	
		(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
		(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;	

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		(D) distinguish between scientific hypotheses and scientific theories;	
		(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	
		(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	
		(G) analyze, evaluate, make inferences, and predict trends from data; and	
		(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
	(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	
	(4) The student analyzes the mechanisms of pathology. The student is expected to:	(A) identify biological and chemical processes at the cellular level; and	
		(E) analyze how the body attempts to maintain homeostasis when changes occur.	
	(5) The student examines the process of pathogenesis. The student is expected to:	(A) identify pathogenic organisms using microbiological techniques;	
		(B) differentiate the stages of pathogenesis, including incubation period, prodromal period, and exacerbation or remission;	
		(C) analyze the body's natural defense systems against infection such as barriers, the inflammatory response, and the immune response; and	
		(E) research stages in the progression of disease.	

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IV. Mechanisms of Pathology			
A. Terminology 1. Atrophy 2. Hypertrophy 3. Hyperplasia 4. Metaplasia 5. Dysplasia 6. Anaplasia 7. Neoplasia B. Cell Injury 1. Trauma 2. Chemical Irritant 3. DNA Damage or Oncogenes C. Causative Agents (How they damage the cell or tissue?) 1. Biotic 2. Abiotic	(4) The student analyzes the mechanisms of pathology. The student is expected to:	(B) detect changes resulting from mutations and neoplasms by examining cells, tissues, organs, and systems;	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html
		(C) identify factors that contribute to disease such as age, gender, environment, lifestyle, and heredity; and	
		(D) examine the body's compensating mechanisms occurring under various conditions;	
	(6) The student examines a variety of human diseases. The student is expected to:	(F) investigate ways diseases affect multiple body systems.	
V. Process of Pathology			
A. Pathogenesis of Cancer B. Pathogenesis of Bacteria C. Pathogenesis of Viruses D. Pathogenesis of Parasites and Fungi E. Pathogenesis of Poisons	(1) The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations; and	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html (Contact Textbook Rep for website access)
		(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
	(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	
		(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
		(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;	
		(D) distinguish between scientific hypotheses and scientific theories;	
		(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	

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		(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	
		(G) analyze, evaluate, make inferences, and predict trends from data; and	
		(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
	(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	
		(C) draw inferences based on data related to promotional materials for products and services; and	
		(E) evaluate models according to their limitations in representing biological objects or events.	
	(4) The student analyzes the mechanisms of pathology. The student is expected to:	(B) detect changes resulting from mutations and neoplasms by examining cells, tissues, organs, and systems.	
	(5) The student examines the process of pathogenesis. The student is expected to:	(A) identify pathogenic organisms using microbiological techniques;	
		(D) evaluate the effects of chemical agents, environmental pollution, and trauma on the disease process; and	
		(E) research stages in the progression of disease.	
	(6) The student examines a variety of human diseases. The student is expected to:	(B) explore advanced technologies for the diagnosis and treatment of disease.	
	(7) The student integrates the effects of disease prevention and control. The student is expected to:	(C) evaluate treatment options for diseases.	

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VI. Epidemiology			
A. Epidemiology 1. Epidemic 2. Endemic 3. Pandemic B. Origin and Transmission 1. Defining Infected Populations 2. Identifying Infectious Agents 3. Reservoirs of agents 4. Vectors and Vehicles C. Population Characteristics 1. Age 2. Genetic Background 3. Nutrition and Cultural Factors D. Infecting Agent E. Control of Infectious Disease F. Hospital Epidemiology	(1) The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations; and	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html (Contact Textbook Rep for website access)
		(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
	(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	
		(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
		(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;	
		(D) distinguish between scientific hypotheses and scientific theories;	
		(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	
		(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	
		(G) analyze, evaluate, make inferences, and predict trends from data; and	
		(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
	(6) The student examines a variety of human diseases. The student is expected to:	(A) describe the nature of diseases according to etiology, signs and symptoms, diagnosis, prognosis, and treatment options; and	
		(D) describe and explain drug-resistant diseases.	

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	(7) The student integrates the effects of disease prevention and control. The student is expected to:	(A) evaluate public health issues related to asepsis, isolation, immunization, and quarantine; and	
		(D) investigate diseases that threaten world health and propose intervention strategies.	
VII. Pathology Across the Life Span			
A. Congenital Disorder B. Childhood Diseases C. Changes related to aging	(6) The student examines a variety of human diseases. The student is expected to:	(C) examine reemergence of diseases such as malaria, tuberculosis, and polio; and	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html
		(E) differentiate between congenital disorders and childhood diseases.	
	(7) The student integrates the effects of disease prevention and control. The student is expected to:	(B) analyze the effects of stress and aging on the body.	
VIII. Disease Prevention			
A. Wellness and Preventive Health Care 1. Physical Fitness 2. Mental Fitness and Social Well-Being B. Health Care Systems 1. Primary Care 2. Secondary Care 3. Tertiary Care 4. Extended Care C. National Health Goals 1. Increasing Life Span 2. Reduction of Disparities 3. Access to Services D. Agencies	(7) The student integrates the effects of disease prevention and control. The student is expected to:	(E) develop a plan for personal health and wellness.	Pathophysiology for the Health Professions. 3E Essentials of Pathophysiology www.texashste.com www.pathguy.com https://evolve.elsevier.com/staticPages/i_index.html

Resources: Books

Pathophysiology for the Health Professions, Elsevier Science.	1416002103
Essentials of Pathophysiology: Concepts and Applications for Health Care Professionals, McGraw-Hill Science.	697252051

Resources: Web Sites

Texas Health Science Curriculum Resources	www.texashste.com
The Pathology Guy	www.pathguy.com
The Internet Pathology Laboratory	http://library.med.utah.edu/WebPath/webpath.html
Morbidity and Mortality Weekly Report	http://www.cdc.gov/mmwr/
Medical Matrix	http://www.medmatrix.org/_SPages/Pathology.asp
Evolve Learning System	https://evolve.elsevier.com/staticPages/i_index.html (Contact Textbook Rep for website access)