

Career and Technical Education TEKS Review Draft Recommendations

Texas Essential Knowledge and Skills (TEKS) for Career and Technical Education Draft Recommendations

Health Science Career Cluster

Programs of Study:

Health Informatics	Medical Therapy
Healthcare Diagnostics	Nursing Science
Healthcare Therapeutics	

The document reflects draft recommendations to the career and technical education Texas Essential Knowledge and Skills (TEKS) that have been recommended by the State Board of Education’s TEKS review work groups for the following programs of study from the Health Science Career Cluster: **Health Informatics, Healthcare Diagnostics, Healthcare Therapeutics, Medical Therapy, and Nursing Science.**

Proposed additions are shown in green font with underline (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple italicized font with underlines (*new text location*). Numbering for the knowledge and skills statements in the document will be finalized when the proposal is prepared to file with the *Texas Register*.

Comments in the right-hand column provide explanations for the proposed changes. The following notations may be used as part of the explanations.

Skills Gap/Gap Analysis:	refers to gap analysis report on essential knowledge and skills aligned to in-demand high-wage occupations
CCRS:	refers to the College and Career Readiness Standards
MV:	refers to multiple viewpoints expressed by work group members

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§130.XXX. Medical Terminology (One Credit), Adopted 2021

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.	This course is appropriate as is, and the work group made only minor changes to update electronic and digital language and to include more soft professional skills based on suggestions from current industry leaders.
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, <u>industry</u> and relevant technical knowledge, and <u>college and career readiness</u> skills for students to further their education and succeed in current <u>and</u> or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostics services, health informatics, support services, and biotechnology research and development.	
(3)	The Medical Terminology course is designed to introduce students to the structure of medical terms, including prefixes, suffixes, word roots, singular and plural forms, and medical abbreviations. The course allows students to achieve comprehension of medical vocabulary appropriate to medical procedures, human anatomy and physiology, and pathophysiology.	
(4)	To pursue a career in the health science industry, students should learn to reason, think critically, make decisions, solve problems, and communicate effectively. Students should recognize that quality health care depends on the ability to work well with others.	
(5)	The health science industry is comprised of diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems that function individually and collaboratively to provide comprehensive health care. Students should identify the employment opportunities, technology, and safety requirements of each system. Students are expected to learn the knowledge and skills necessary to pursue a health science career through further education and employment.	
(6)	Professional integrity in the health science industry is dependent on acceptance of ethical and legal responsibilities. Students are expected to employ their ethical and legal responsibilities, recognize limitations, and understand the implications of their actions.	
(7)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(8)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	

(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	express ideas in a clear, concise, and effective manner; and	The work group believes that this student expectation addresses line 26 in the gap analysis.
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team; and -	
(C)	<u>exemplify professional work standards such as appearance, attire, time management, organizational skills, and responsibilities.</u>	This new student expectation was included because students are lacking soft skills. Gap analysis identified developing collaborative business and working relationships as a need. Planning activities and work schedules is also a need in the gap analysis.
(2)	The student recognizes the terminology related to the health science industry. The student is expected to:	
(A)	identify abbreviations, acronyms, and symbols related to the health science industry;	
(B)	<u>recognize the incorrect use of abbreviations, acronyms, and symbols through review of The Joint Commission's "Do Not Use List";</u>	The work group added this student expectation to address industry feedback.
(C)(B)	<u>identify and define the component parts of medical words, including root, prefix, suffix, and combining vowel;</u> identify the basic structure of medical words;	The work group amended this student expectation to address industry feedback.
(D)(G)	practice word-building skills;	CCRS: Cross-disciplinary II.A.2
(E)(D)	research the origins of eponyms;	
(F)(E)	recall directional terms and anatomical planes related to body structure;	
(G)(F)	define and accurately spell occupationally specific terms such as those relating to the body systems, surgical and diagnostic procedures, diseases, and treatment; and	
(H)(G)	use prior knowledge and experiences to understand the meaning of terms as they relate to the health science industry.	
(3)	The student demonstrates communication skills using the terminology applicable to the health science industry. The student is expected to:	

(A)	demonstrate appropriate verbal and written strategies such as correct pronunciation of medical terms and spelling in a variety of health science scenarios;	CCRS: Cross-disciplinary I.A.1; II.B.1
(B)	employ increasingly precise language to communicate; and	CCRS: Cross-disciplinary I.D.3
(C)	translate technical material related to the health science industry.	
(4)	The student examines available resources. The student is expected to:	
(A)	examine medical and dental dictionaries and multimedia resources;	
(B)	integrate resources to interpret technical materials; and	
(C)	investigate electronic <u>and digital</u> media with appropriate supervision.	Added digital to update terms and to keep up with digital publishers and online learning resources.
(5)	The student interprets medical abbreviations. The student is expected to:	
(A)	distinguish medical abbreviations used throughout the health science industry; and	
(B)	translate medical abbreviations in simulated technical material such as physician progress notes, radiological reports, and laboratory reports.	
(6)	The student appropriately translates health science industry terms. The student is expected to:	
(A)	interpret, transcribe, and communicate vocabulary related to the health science industry;	
(B)	translate medical terms to conversational language to facilitate communication;	CCRS: Cross-disciplinary II.A.3
(C)	distinguish medical terminology associated with medical specialists such as geneticists, pathologists, and oncologists;	
(D)	summarize observations using medical terminology; and	
(E)	interpret contents of medical scenarios correctly.	

§130.226. World Health and Emerging Technologies Research (One Credit), Adopted 2021 2015.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry and Principles of Health Science . Recommended prerequisite: Medical Terminology a course in the Health Science Career Cluster . Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry and relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and of emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The World Health and Emerging Technologies Research course is designed to examine major world health problems and emerging technologies as solutions to these medical concerns. It is designed to improve students' understanding of the cultural, infrastructural, political, educational, and technological constraints and inspire ideas for appropriate technological solutions to global medical care issues.	Work Group would like to change the name of the course to encourage more students to take the class. The name change better describes the course.
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and	
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team; and .	CCRS: Cross disciplinary I.B.1, I.B.3, I E.2

(C)	<u>exemplify professional work standards such as appearance, attire, time management, organizational skills, and responsibilities.</u>	This new student expectation was included because students are lacking soft skills. Gap analysis identified developing collaborative business and working relationships as a need. Planning activities and work schedules is also a need in the gap analysis.
(2)	The student explores and discusses current major human health problems in the world. The student is expected to:	
(A)	describe the pathophysiology of the three leading causes of death in developing and developed countries;	
(B)	discuss history of diseases and the evolution of medical technology over time;	
(C)	contrast health problems in developing and developed countries;	
(D)	<u>compare the functions of public health organizations at the local; state; national, including the Centers for Disease Control and Prevention (CDC); and international, including the World Health Organization (WHO), levels;</u> describe the function of the World Health Organization;	Change in verb is a reflection of added rigor in the student expectation. Added other health organizations to give students a better understanding of the functions besides the WHO and CDC. Added language to connect this SE to Principles of Health 11(A). Gap analysis includes updating job-related medical knowledge and skills.
(E)	define and calculate incidence, morbidity, and mortality; and	
(F)	identify and describe the challenges in global health that can have the greatest impact on health in developing nations; and -	
(G)	<u>investigate various social determinants of health such as food insecurity, homelessness, or financial insecurities.</u>	Added this student expectation because there is a growing industry recognition for the need for this skill. Gap analysis identified risk assessments as a needed skill.
(3)	The student explains who pays for health care in the world today. The student is expected to:	
(A)	compare the availability of health care in developing and developed countries;	
(B)	discuss and contrast the four basic health care system models, including the Beveridge Model, Bismarck Model, National Health Insurance Model, and the Out-of-Pocket Model, <u>and compare these models to existing payment mechanisms in the United States of America;</u>	Added language to help focus the topic to center more on the lives of students taking the course. This is a real-world application to current social norms.

(C)	explain how countries <u>that have different health care systems</u> such as <u>Canada</u> , the United Kingdom, Japan, Germany, Taiwan, Switzerland, and the United States of America pay for health care <u>and compare their patient outcomes such as infant mortality rates, rate of cancer, or rate of heart disease</u> ;	Added language to being context to the countries; added Canada because there is a huge influx of medical staff coming to the US because of Canada's system; added "compare their patient outcomes" to allow for the concept of value-based care. Gap analysis identified monitoring and controlling resources.
(D)	describe how health care expenditures have changed over time; and	
(E)	identify the major contributors to the rising health care science industry costs.	Changed health science to health care to be more consistent with industry terminology.
(4)	The student describes the engineering technologies developed to address clinical needs. The student is expected to:	
(A)	describe technologies that support the prevention and treatment of infectious diseases;	
(B)	explain the implication of vaccines on the immune system <u>and on public health</u> ;	Added student expectation to address concerns that the health science industry is trying to combat.
<u>(C)</u>	<u>discuss the dangers of antibiotic overuse and misuse</u> ;	Added student expectation to address concerns that the health science industry is trying to combat.
<u>(D)</u> (E)	investigate technologies <u>such as genetics and molecular diagnostics</u> used for the early detection and <u>treatments of several types of cancers</u> of cancer ;	Merged with (4)(D). Added language to provide a more timely and industry-specific example.
(D)	investigate technologies used for the <u>treatment of several different types of cancers</u> ;	Moved and merged (4)(D) and (4)(C) to make parallel with (4)(E).
(E)	<u>describe and discuss</u> explain the cardiovascular system and the technologies used in the diagnosis and treatment of heart disease; and	Changed verb to add rigor for the level of the course. Deleted the cardiovascular system because this skill is covered in Biology and Principles of Health Science 130.222(c)(2)(G).
(F)	describe and discuss technologies developed to support vital organ failure; and ;	
<u>(G)</u>	<u>investigate emerging digital technology such as telehealth and remote monitoring and its impact on healthcare delivery</u> .	Added a new student expectation to address one of the new normal process for healthcare delivery.

(5)	The student explores how human clinical trials are designed, conducted, and evaluated. The student is expected to:	
(A)	<u>describe and discuss</u> identify types of clinical trials, <u>including the role of the institutional review board;</u>	Changed verb to increase rigor. Added the role of the institutional review board to align with industry standards. Gap analysis identified updating job-related medical knowledge and skills. CCRS: Cross disciplinary II.D.1; II.D.2
(B)	define and calculate a sample size; and	CCRS: Cross disciplinary II.D.1; II.D.2
(C)	<u>identify</u> analyze quantitative <u>and qualitative</u> methods used <u>in</u> to describe clinical trials; <u>and</u> ;	Added qualitative research methods are considered in the discussion. Changed verb to align with rigor and student expectation. CCRS: Cross disciplinary II.D.1; II.D.2
<u>(D)</u>	<u>compare and contrast different phases of pharmaceutical trials.</u>	Emphasized the scope of pharmaceutical trials in real world practice.
(6)	The student recognizes the <u>ethical and legal aspects</u> ethics involved in clinical research. The student is expected to:	
(A)	define informed consent;	
(B)	explain who can give informed consent;	
(C)	identify issues in research that influence the development of ethical principles and legal requirements currently governing research with human subjects; and	
<u>(A)(D)</u>	<u>identify issues</u> and explain the ethical <u>and legal</u> guidelines for the conduct of research involving human subjects, <u>including informed consent and patient confidentiality.</u>	Combined all student expectations for (6) into one student expectation, the new (6)(A). Added patient confidentiality to recognize the key aspect of patient rights. CCRS: Cross disciplinary I.F.4
(7)	The student explains how <u>research guides the development of new</u> medical technologies are managed . The student is expected to:	Clarified language in the knowledge and skill language.
(A)	describe how health science research is funded;	CCRS: Cross disciplinary II.C.1, II.C.2
(B)	explain the role of the U.S. Food and Drug Administration in approving new drugs and medical devices; and	CCRS: Cross disciplinary II.C.1, II.C.2
(C)	analyze factors that affect the dissemination of new medical technologies.	CCRS: Cross disciplinary II.C.1, II.C.2

(8)	The student applies research principles to create a project that addresses a major health <u>topic</u> problem . The student is expected to:	Changed word from problem to topic to provide more flexibility. Gap analysis: “analyzing impact of legal or regulatory changes” and “determine project implementation and procedures” are covered in these student expectations.
(A)	facilitate data analysis and communicate experimental results clearly <u>by</u> and effectively using technology <u>such as creating visual aids</u> by constructing charts and graphs ; and	Language changed to provide more flexibility for both students and teachers. CCRS: Cross disciplinary II.C.1, II.C.2
(B)	present the project to classmates, health professionals, parents, or instructors.	CCRS: Cross disciplinary I.F.2; II.D.3

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§130.228. Health Informatics (One Credit), Adopted ~~2021~~ 2015.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Business Information Management I and Medical Terminology. <u>Recommended prerequisite: Principles of Health Science and Business Information Management I.</u> Students shall be awarded one credit for successful completion of this course.	This change was made to prepare students with a well grounded working knowledge while still providing flexibility in scheduling.
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, <u>industry</u> and relevant technical knowledge, and <u>college and career readiness</u> skills for students to further their education and succeed in current <u>and</u> or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Health Informatics course is designed to provide knowledge of one of the fastest growing areas in both academic and professional fields. <u>Healthcare</u> The large gap between state-of-the-art computer technologies and the state of affairs in health care information technology has <u>increased</u> generated demand for information and health professionals who can effectively design, develop, and use technologies such as electronic medical records, patient monitoring systems, and digital libraries, while managing the vast amount of data generated by these systems. <u>This course will include a focus on billing and coding.</u>	
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	demonstrate verbal and non-verbal communication in a clear, concise, and effective manner;	CCRS cross disciplinary II.B.1
(B)	demonstrate adaptability skills such as problem solving and <u>critical and</u> creative thinking;	
(C)	develop a career plan;	CCRS: Cross disciplinary I.E.1
(D)	<u>exhibit</u> employ teamwork;	CCRS: Cross disciplinary I.E.2

(E)	create a job-specific resume; and	CCRS cross disciplinary II.B.1
(F)	<u>exemplify professional work standards such as appearance, attire, time management, organizational skills, and responsibilities.</u> appraise the characteristics desired by employers such as work ethics and professionalism.	This student expectation was edited because students are lacking soft skills. Gap analysis identified developing collaborative business and working relationships as a need. Planning activities and work schedules is also a need in the gap analysis.
(2)	The student interprets fundamental knowledge of concepts of health information systems technology and the tools for collecting, storing, and retrieving health care data. The student is expected to:	
(A)	discuss, and define, <u>and differentiate</u> the common <u>health</u> information systems <u>such as electronic medical records and electronic health records, practice management software, master patient index (MPI), patient portals, remote patient monitoring, and clinical decision support; and</u>	Added a such as statement to clear up confusion of information systems pertinent to the health care industry. CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4
(B)	differentiate between the six types of information systems;	Combined with student expectation above.
(B)(C)	explain how <u>various health</u> each of the six information systems support the administrative, financial, clinical, and research needs of a health care enterprise. ;	Clarification of health care information systems currently being used in the industry.
(D)	describe the components of an information system; and	Removed this student expectation because it is duplicative of (2)(A).
(E)	implement the concepts of health informatics by creating a culminating project.	Removed this student expectation because it now provides more flexibility to teachers because there is no specification on the true end product of the project.
(3)	The student employs the various types of databases in relation to health informatics. The student is expected to:	
(A)	define the function of a database management system;	CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4
(B)	identify the purpose of data modeling;	CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4
(C)	define the customary steps in the data modeling process;	CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4
(D)	differentiate between entities, attributes, and relationships in a data model; and	CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4

(E)	explain various types of organizational databases.	CCRS: Cross disciplinary II.E.1; II.E.2; II.E.4
(4)	The student distinguishes between data and information. The student is expected to:	
(A)	discuss the importance of data security, accuracy, integrity, <u>reliability</u> , and validity; and	Added the concept of reliability because it is an important concept that was left off.
(B)	demonstrate an understanding of data information concepts for health information systems, and electronic health records, <u>and patient registries</u> .	Added patient registries to encompass the concept of quality improvement and patient health. CCRS: Cross disciplinary II.C.1, II.C.4. II.D.2
(5)	The student examines the evolution of the health information system. The student is expected to:	
(A)	evaluate the growing role of the electronic health record;	
(B)	review the progress of the development of the electronic health record; and	
(C)	explain functional requirements for electronic health records; and	
<u>(D)</u>	<u>explain the concept and importance of the interoperability of electronic health records and other health information systems.</u>	New industry expectation of transferability of information. (For example, transferring information from Fitbit to a healthcare provider.) Overall concept of sharing patient information from one provider to another.
(6)	The student examines the process of medical diagnostic and coding concepts as well as current procedural practices. The student is expected to:	
(A)	examine Health Insurance Portability and Accountability Act (HIPAA) guidelines for confidentiality, privacy, and security of a patient's information within the medical record;	
(B)	differentiate between insurance fraud and insurance abuse;	CCRS: Cross disciplinary I.F.4
(C)	discuss the linkage between current procedural <u>terminology</u> technology (CPT) codes, International Classification of Diseases, 10th revision, clinical modification (ICD-10-CM) codes, and medical necessity for reimbursement for charges billed;	Changed the wording to reflect the correct term.
(D)	search ICD-10-CM code system for correct diagnosis code using patient information;	
(E)	identify the two types of codes in the health care common procedure coding system (HCPCS); and	
(F)	explain how medical coding affects the payment process.	

(7)	The student identifies agencies involved in the health insurance claims process. The student is expected to:	
(A)	<u>define fiscal intermediary;</u>	Students should understand how government plans are processed.
(B)(A)	define Medicaid and Medicare;	
(C)(B)	discuss health care benefit programs such as TRICARE and CHAMPVA;	
(D)(C)	explain how to manage a worker's compensation case;	CCRS: Cross disciplinary I.C.2, I.F.2
(E)(D)	complete a current health insurance claim form such as the Centers for Medicare and Medicaid Service (CMS-1500) form; and	
(F)(E)	identify three ways to transmit electronic claims.	

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§130.XXX Healthcare Administration and Management (One Credit), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Medical Terminology and Business Information Management I. Recommended prerequisite: Principles of Health Science. Students shall be awarded one credit for successful completion of this course.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards, industry relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>Healthcare Administration and Management is designed to familiarize students with the concepts related to healthcare administration as well as the functions of management, including planning, organizing, staffing, leading, and controlling. Students will also demonstrate interpersonal and project-management skills.</u>	The name of this course aligns with industry language and ties to postsecondary education because industry is looking for the language when hiring professionals. Information systems was eliminated as a title for the course because the majority of the unassigned skills in the gap analysis. The term information systems is restricted more to technology and IT.
(4)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</u>	
(5)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student demonstrates professional standards/employability skills required by the healthcare industry. The student is expected to:</u>	
(A)	<u>role play examples of effective written and oral communication in various scenarios such as customer service, marketing, and public relations;</u>	CCRS: Cross disciplinary I.A.1; I.C.2; II.B.1; II.A.6

(B)	<u>demonstrate collaboration skills through teamwork;</u>	Gap analysis: Collaborate with organizational members on business or operational matters. CCRS: Cross disciplinary I.E.2
(C)	<u>demonstrate professionalism by conducting oneself in a manner appropriate for the profession and workplace;</u>	CCRS: Cross disciplinary I.A.1
(D)	<u>demonstrate a positive, productive work ethic by performing assigned tasks as directed;</u>	CCRS: Cross disciplinary I.F.4
(E)	<u>comply with all applicable rules, laws, and regulations; and</u>	Gap analysis: Ensure compliance with polices or regulations and follow safety procedures and regulations in medical or medical support environments CCRS: Cross disciplinary I.F.4
(F)	<u>demonstrate time-management skills by prioritizing tasks, following schedules, and tending to goal-relevant activities in a way that uses time wisely and optimizes efficiency and results.</u>	Gap analysis: Develop organizational and program goals or objectives CCRS: Cross disciplinary I.E.1; I.C.2
(2)	<u>The student demonstrates an understanding of the healthcare management concept. The student is expected to:</u>	
(A)	<u>define the term healthcare management;</u>	
(B)	<u>explain the roles and responsibilities of healthcare professionals, including the management functions of planning, organizing, staffing, leading, and controlling;</u>	
(C)	<u>explain how organizational behavior and teamwork in healthcare impact patient outcomes and effective day-to-day operations;</u>	Gap analysis: Collaborate with organizational members on business or operational matters and Coordinate operational activities. CCRS: Cross disciplinary I.E.2; I.F.3
(D)	<u>explore and discuss the factors that influence healthcare management such as governmental regulations, payment models, employee turnover, and work force shortages;</u>	Gap analysis: Coordinate operational activities CCRS: Cross disciplinary I.B.3; I.C.2
(E)	<u>define ethical workplace behavior and role play how to make ethical decisions; and</u>	CCRS: Cross disciplinary I.F.4

(F)	<u>explain how socially responsible management policies such as health equity, inclusion, and diversity policies are initiated and implemented.</u>	
(3)	<u>The student recognizes the business functions of healthcare systems. The student is expected to:</u>	
(A)	<u>differentiate among the major healthcare delivery systems such as hospitals, outpatient care facilities, community-based organizations, insurance companies, and pharmaceutical companies;</u>	Gap analysis: Compile data or information related to social service or health programs. CCRS: Cross disciplinary I.B.3
(B)	<u>define and discuss healthcare quality and quality improvement;</u>	Gap analysis: Judge quality of services
(C)	<u>specify various types of health information technology and discuss barriers to health information technology adoption;</u>	Gap analysis: Maintain operational records, files, or reports. CCRS: Cross disciplinary II.E.2, II.E.4
(D)	<u>investigate healthcare financing models;</u>	Gap analysis: Calculate financial data, analyze administrative, financial, and operational budgets, and analyze business or financial data and information.
(E)	<u>explain the difference between and provide examples of healthcare revenues and healthcare expenses;</u>	
(F)	<u>define revenue-cycle management; and</u>	
(G)	<u>describe the roles of customer service and marketing in health care.</u>	
(4)	<u>The student evaluates ethical behavioral standards and legal responsibilities. The student is expected to:</u>	
(A)	<u>research and describe the role of professional associations and regulatory agencies;</u>	Gap analysis: Update job related medical knowledge or skills. CCRS: Cross disciplinary II.C.1, II.C.2, II.C.4
(B)	<u>examine legal and ethical behavior standards such as Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act;</u>	CCRS: Cross disciplinary I.F.4
(C)	<u>investigate the legal and ethical ramifications of unacceptable behavior;</u>	CCRS: Cross disciplinary I.F.4
(D)	<u>identify examples of conflicts of interest; and</u>	CCRS: Cross disciplinary I.F.4
(E)	<u>differentiate among the concepts of fraud, waste, and abuse.</u>	CCRS: Cross disciplinary I.F.4

§130.XXX Medical Billing and Coding (One credit), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Medical Terminology. Students shall be awarded one credit for successful completion of this course.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards, industry relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development. The program is designed to prepare students for employment in a variety of health care settings as entry level coder, medical billing specialist and patient access representative.</u>	
(3)	<u>Medical billing and coding classes familiarize students with the process, the language, medical procedure codes, Health Insurance Portability and Accountability Act (HIPAA) compliance, and other skills they will need to make accurate records. Students will develop an understanding of the entire process of the revenue cycle and how to effectively manage it.</u>	The work group believes that this course is already being taught in many school districts under the heading of Project-Based Research or embedded in other courses. The group thinks there is a desire from school districts to have a TEKS-based course. In addition, there is labor market demand for employees in this area who have received training and education in billing and coding.
(4)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</u>	
(5)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student demonstrates professional standards/employability skills required by the healthcare industry. The student is expected to:</u>	
(A)	<u>demonstrate the ability to communicate and use interpersonal skills effectively;</u>	

(B)	<u>compose written communication, including emails using correct spelling, grammar, formatting, and confidentiality;</u>	
(C)	<u>use appropriate medical terminology and abbreviations; and</u>	
(D)	<u>model courtesy and respect for patients and team members in the multi-disciplinary healthcare setting and maintain good interpersonal relationships.</u>	
(2)	<u>The student explores career opportunities in revenue cycle management. The student is expected to:</u>	
(A)	<u>identify professional opportunities within the medical billing and revenue cycle management professions;</u>	
(B)	<u>demonstrate ethical billing and coding practices as outlined by professional associations guidelines; and</u>	CCRS: Cross disciplinary I.F.4
(C)	<u>investigate professional associations applicable to the field of health informatics such as American Academy of Professional Coders (AAPC), American Health Information Management Association (AHIMA), Healthcare Billing and Management Association (HBMA), and American Association of Healthcare Administrative Management (AAHAM).</u>	
(3)	<u>The student explains the ethical and legal responsibilities of personnel in medical billing and coding. The student is expected to:</u>	
(A)	<u>identify major administrative agencies that affect billing and coding such as Centers for Medicare and Medicaid Services (CMS) and the Office of the Inspector General (OIG);</u>	
(B)	<u>identify major laws and regulations that impact health information, including the Health Insurance Portability and Accountability Act (HIPAA), the Stark Law, the Fair Debt Collection Practices Act, and the False Claims Act;</u>	CCRS: Cross disciplinary I.F.2
(C)	<u>analyze legal and ethical issues related to medical billing and coding, revenue cycle management, and documentation within the medical record;</u>	
(D)	<u>research compliance laws;</u>	
(E)	<u>identify appropriate documentation required for the release of patient information;</u>	
(F)	<u>differentiate between informed and implied consent;</u>	
(G)	<u>compare and contrast use of information and disclosure or information; and</u>	
(H)	<u>evaluate cases for insurance fraud and abuse.</u>	

(4)	<u>The student identifies the body systems to support proficiency in billing and coding. The student is expected to:</u>	
(A)	<u>explain the sections and organizations of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Clinical Modification (ICD-10) and Current Procedural Terminology (CPT) coding manuals by identifying the anatomy and physiology of body systems and how they apply to medical billing and coding, including:</u>	
(i)	<u>the integumentary system;</u>	
(ii)	<u>the skeletal system;</u>	
(iii)	<u>the muscular system;</u>	
(iv)	<u>the cardiovascular system;</u>	
(v)	<u>the respiratory system;</u>	
(vi)	<u>the digestive system;</u>	
(vii)	<u>the endocrine system;</u>	
(viii)	<u>the urinary system;</u>	
(ix)	<u>the reproductive system; and</u>	
(x)	<u>the nervous system and special senses; and</u>	
(B)	<u>identify mental, behavioral, and neurodevelopmental disorders and how they apply to medical billing and coding.</u>	
(5)	<u>The student demonstrates proficiency in the use of the ICD-10, CPT and Healthcare Common Procedure Coding System (HCPCS) coding systems. The student is expected to:</u>	
(A)	<u>apply coding conventions and guidelines for appropriate charge capture;</u>	
(B)	<u>describe the process to update coding resources;</u>	
(C)	<u>assign and verify diagnosis and procedure codes to the highest level of specificity, and, as applicable, HCPCS level II codes and modifiers in accordance with official guidelines;</u>	CCRS: Cross-disciplinary I.D.3; II.A.5
(D)	<u>describe the concepts of disease groupings and procedure-code bundling; and</u>	

(E)	<u>identify coding compliance, including medical necessity.</u>	
(6)	<u>The student understands revenue cycle management. The student is expected to:</u>	
(A)	<u>define revenue cycle management;</u>	
(B)	<u>differentiate between various types of employer-sponsored and government-sponsored insurance models, including health maintenance organization (HMO), preferred-provider organization (PPO), Medicare, Medicaid, TRICARE, high deductible health plans, and workers' compensation;</u>	
(C)	<u>define Medicare Administrative Contractors (MACs) and investigate the administrative services provided by the MAC for Texas;</u>	
(D)	<u>describe the patient scheduling and check-in process, including verifying insurance eligibility, obtaining pre-authorization, and processing appropriate patient authorization and referral forms;</u>	CCRS: Cross-disciplinary II.B.1; II.E.1, II.E.2, II.E.4
(E)	<u>describe the sections of the CMS-1500 form to prepare and submit mock clean claims electronically or manually;</u>	
(F)	<u>differentiate between primary and secondary insurance plans to initially process crossover claims;</u>	
(G)	<u>interpret remittance advice to determine financial responsibility of insurance company and patient, including a cash-paying patient;</u>	
(H)	<u>analyze reason for insurance company denials or rejections and determine corrections or appeals required; and</u>	
(I)	<u>analyze an aging report and how it relates to the revenue cycle.</u>	

§130.224. Anatomy and Physiology (One Credit), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Biology and a second science credit. Recommended prerequisite: a course from the Health Science Career Cluster. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry and relevant technical knowledge, and <u>college and career readiness</u> skills for students to further their education and succeed in current and of emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Anatomy and Physiology course is designed for students to conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Anatomy and Physiology will study a variety of topics, including the structure and function of the human body and the interaction of body systems for maintaining homeostasis.	
(4)	<p><u>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 currently scientifically testable.</u></p> <p>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.</p>	

(5)	<p><u>Scientific hypotheses and theories. Students are expected to know that:</u> 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.</p>	
(A)	<p><u>hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and</u></p>	
(B)	<p><u>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.</u></p>	
(6)	<p><u>Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.</u> 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).</p>	
(A)	<p><u>Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.</u></p>	
(B)	<p><u>Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.</u></p>	

(7)	<p><u>Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. 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).</u></p> <p>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.</p>	
(8)	<p><u>Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. 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, while models allow for boundary specification and provide a tool for understanding the ideas presented. 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.</u></p>	
(9)(8)	<p>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p>	
(10)(9)	<p>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</p>	
(c)	<p>Knowledge and skills.</p>	
(1)	<p>The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:</p>	
(A)	<p>demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and</p>	
(B)	<p>exhibit the ability to cooperate, contribute, and collaborate as a member of a team; and-</p>	
(C)	<p><u>investigate necessary skills for health careers related to anatomy and physiology.</u></p>	<p>Group added additional SE here to emphasize skills needed for careers pertaining to anatomy and physiology.</p>

(2)	<u>Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena, or design solutions using appropriate tools and models. The student is expected to:</u>	Scientific and engineering practices approved by the SBOE in November 2020 for science high school courses.
(A)	<u>ask questions and define problems based on observations or information from text, phenomena, models, or investigations;</u>	
(B)	<u>apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;</u>	
(C)	<u>use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;</u>	
(D)	<u>use appropriate tools such as lab notebooks or journals, calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, meter sticks, electronic balances, micro pipettors, hand lenses, Celsius thermometers, hot plates, timing devices, Petri dishes, agar, lab incubators, dissection equipment, models, diagrams, or samples of biological specimens or structures, reflex hammers, pulse oximeters, stethoscope, otoscope, sphygmomanometers, pen lights, and ultrasound equipment;</u>	
(E)	<u>collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;</u>	
(F)	<u>organize quantitative and qualitative data using lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports;</u>	
(G)	<u>develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and</u>	
(H)	<u>distinguish among scientific hypotheses, theories, and laws.</u>	
(3)	<u>Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:</u>	
(A)	<u>identify advantages and limitations of models such as their size, scale, properties, and materials;</u>	
(B)	<u>analyze data by identifying significant statistical features, patterns, sources of error, and limitations;</u>	
(C)	<u>use mathematical calculations to assess quantitative relationships in data; and</u>	
(D)	<u>evaluate experimental and engineering designs.</u>	

(4)	<u>Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:</u>	
(A)	<u>develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;</u>	
(B)	<u>communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and</u>	
(C)	<u>engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.</u>	
(5)	<u>Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:</u>	
(A)	<u>analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;</u>	
(B)	<u>relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content; and</u>	
(C)	<u>research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) or health science field in order to investigate STEM careers.</u>	
(2)	The student, for at least 40% of instructional time, conducts field and laboratory investigations 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:	Replaced scientific process skills with new scientific and engineering practices above.
(A)	demonstrate safe practices during laboratory and field investigations; and	
(B)	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
(3)	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)(4) 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 that have been tested over a wide variety of conditions are incorporated into theories;	
(C)	know that 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 are created and new technologies emerge;	
(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, gel electrophoresis apparatuses, micropipettors, 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.	
(4)	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;	
(B)	communicate and apply scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, and marketing materials;	
(C)	draw inferences based on data related to promotional materials for products and services;	
(D)	evaluate the impact of scientific research on society and the environment;	

(E)	evaluate models according to their limitations in representing biological objects or events; and	
(F)	research and describe the history of science and contributions of scientists.	
(6)	<u>Human Body Organization. The student will demonstrate an understanding of the anatomic and physiological basis of life and the ability to explain the interdependence of structure and function in biological systems. The student is expected to:</u>	
(A)	<u>distinguish between the six levels of structural organization in the human body and explain their interdependence, including chemical, cellular, tissue, organ, system, and organism;</u>	
(B)	<u>identify and use appropriate directional terminology when referring to the human body, including directional terms, planes, body cavities, and body quadrants;</u>	
(C)	<u>list and describe the major characteristics of living organisms, including response to stimuli, growth and development, homeostasis, cellular composition, metabolism, reproduction, and the ability to adapt to the environment;</u>	
(D)(7)(A)	research investigate and describe negative and positive feedback loops as they apply to homeostasis; and, the integration of the chemical and physical processes, including equilibrium, temperature, pH balance, chemical reactions, passive transport, active transport, and biofeedback, that contribute to homeostasis; and	Standard reordered (7A) and reworded 5D to better reflect how homeostasis is impacted by disease and disorder in body systems Both 7A 5D were moved to new KS reorganized under body organization.
(E)(5)(D)	research and identify analyze the effects of energy excess in disorders as they relate to the failure to maintain homeostasis as it relates to common diseases in each of the body systems,; such as cardiovascular, endocrine, muscular, skeletal, and pulmonary.	Verb changed to address appropriate cognitive demand of the content in the standard.
(7)	<u>Histology. The students will demonstrate the ability to analyze the structure and function of eukaryotic cells in relation to the formation of tissue. The student is expected to:</u>	
(A)	<u>define tissue and list the four primary tissue types, their subdivisions, and functions;</u>	
(B)	<u>compare epithelial tissue with connective tissue in terms of cell arrangement and interstitial materials;</u>	
(C)	<u>describe the process of tissue repair involved in the normal healing of a superficial wound; and</u>	
(D)	<u>describe the general metabolic pathways of carbohydrates, lipids, and proteins.</u>	
(8)	<u>Skeletal system. The student analyzes the relationships between the anatomical structures and physiological functions of the skeletal system. The student is expected to:</u>	Language taken from 11A to craft first SE in the new KS surrounding body and support systems.
(A)	<u>identify and differentiate between the axial and appendicular skeleton;</u>	

(B)	<u>identify the types of joints and describe the movements of each, including gliding, hinge, pivot, saddle, and ball and socket;</u>	
(C)	<u>identify and locate the anatomy of spongy and compact bone, including epiphysis, diaphysis, medullary cavity, periosteum, bone marrow, and endosteum;</u>	
(D)	<u>explain the major physiological functions of the skeletal system;</u>	
(E)	<u>describe the role of osteoblasts, osteocytes, and osteoclasts in bone growth and repair;</u>	
(F)	<u>identify and discuss the different types of fractures such as compound, complete, simple, spiral, greenstick, hairline, transverse, and comminuted; and</u>	
(G)	<u>identify and describe common diseases and disorders of the skeletal system such as scoliosis, osteoporosis, and bone cancer.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(9)	<u>Integumentary System. The student analyzes the relationships between the anatomical structures and physiological functions of the integumentary system. The student is expected to:</u>	
(A)	<u>identify and describe the structures of the integumentary system, including the layers of the skin, the accessory organs within each layer and the glandular components in each layer;</u>	
(B)	<u>describe the factors that can contribute to skin color;</u>	
(C)	<u>describe and explain the process of tissue repair and scar formation; and</u>	
(D)	<u>identify and describe common diseases and disorders of the integumentary system such as skin cancer and psoriasis.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(10)	<u>Muscular System. The student analyzes the relationships between the anatomical structures and physiological functions of the muscular system. The student is expected to:</u>	
(A)	<u>explain the major physiological functions of the muscular system, including voluntary movement, involuntary movement, heat production, and maintaining posture;</u>	
(B)(6)(A)	<u>explain the coordination of muscles, bones, and joints that allows movement of the body, including the methods of attachment of ligaments and tendons;</u>	
(C)	<u>examine the common characteristics of muscle tissue, including excitability, contractibility, extensibility, and elasticity;</u>	Incorporated science reviewer feedback to change verbs to examine
(D)	<u>identify and describe the appearance, innervation, and function of the three muscle types, including cardiac, skeletal, and smooth;</u>	
(E)	<u>examine the microscopic anatomy of a muscle fiber, including sarcomere, actin, and myosin;</u>	
(F)	<u>describe the mechanisms of muscle contraction at the neuromuscular junction;</u>	

(G)	<u>name, locate, and describe the action of major voluntary muscles in regions of the body, including the head and neck, trunk, upper extremity, and lower extremity;</u>	
(H)	<u>identify and describe common diseases and disorders of the muscular system such as muscle strains and muscular dystrophy; and</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(I)(6)(D)	analyze and describe the effects of pressure, movement, torque, tension, and elasticity on the human body.	
(11)	<u>Nervous System. The student analyzes the relationships between the anatomical structures and physiological functions of the nervous system. The student is expected to:</u>	
(A)	<u>summarize and distinguish the major physiological functions of the nervous system, including sensation, integration, and motor response;</u>	
(B)	<u>interpret the senses and their relationship to nervous system;</u>	
(C)	<u>investigate the interdependence between the cranial and spinal nerves with the special senses of vision, hearing, smell, and taste;</u>	Science reviewer feedback incorporated to specify special senses in the SE.
(D)	<u>describe the anatomy of the structures associated with the senses, including vision, hearing, smell, taste and touch;</u>	Science reviewer feedback incorporated to reword language surrounding “special” senses.
(E)	<u>identify the anatomical and physiological divisions of the peripheral and central nervous system;</u>	
(8)(A)	illustrate conduction systems such as nerve transmission or muscle stimulation;	Group felt the standard was addressed by newly crafted standard pertaining to mechanisms of muscular contraction at the neuromuscular junction.
(F)	<u>explain the glial cells within the CNS and PNS and their associated functions;</u>	
(G)	<u>analyze the functional and structural differences between gray and white matter relative to the neurons;</u>	
(H)	<u>distinguish between the types of neurons and explain the initiation of a nerve impulse during resting and action potential;</u>	
(I)	<u>categorize the major neurotransmitters by chemical and physical mechanisms; and</u>	
(J)	<u>identify and describe common diseases and disorders of the nervous system such as epilepsy, neuralgia, Parkinson and Alzheimer disease.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.

(12)	<u>Endocrine System. The student analyzes the relationships between the anatomical structures and physiological functions of the endocrine system. The student is expected to:</u>	
(A)	<u>identify and locate the nine glands associated with the endocrine system, including ovaries, testes, pineal, pituitary, thyroid, parathyroid, thymus, pancreas, and adrenal glands;</u>	
(B)	<u>compare and contrast endocrine and exocrine glands and identify the glands associated with each;</u>	
(C)	<u>describe the hormones associated with each endocrine gland;</u>	
(D)	<u>research the impact of the endocrine systems on homeostatic mechanisms and other body systems such as the integration between the hypothalamus and the pituitary gland;</u>	
(E)	<u>explain how the endocrine glands are regulated, including neural, hormonal, and humoral control; and</u>	
(F)	<u>identify and describe common diseases and disorders of the endocrine system such as hypothyroidism, pancreatic cancer, and diabetes.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(13)	<u>Urinary System. The student analyzes the relationships between the anatomical structures and physiological functions of the urinary system. The student is expected to:</u>	
(A)	<u>identify and describe the anatomical structures and functions of the urinary system, including the kidney, ureters, bladder, and urethra;</u>	
(B)	<u>compare and contrast the anatomical structures and describe the functions of the male and female urinary system;</u>	
(C)	<u>summarize and illustrate the structures, functions, and types of nephrons;</u>	
(D)	<u>examine the methods of fluid balance and homeostasis in the urinary system, including fluid intake and output;</u>	
(E)	<u>analyze the composition and process of urine formation, including filtration, reabsorption, and secretion;</u>	
(F)	<u>describe the relationship between the nervous system, renal system, and muscular system before and during micturition; and</u>	
(G)	<u>identify and describe common diseases and disorders of the urinary system such as chronic kidney disease, kidney stones, urinary tract infections, and renal cancer.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(9)(A)	analyze the physical, chemical, and biological properties of transport systems, including circulatory, respiratory, and excretory;	Group felt newly crafted standards and reorganization of the course cover this material well enough to delete these SE's.

(9)(B)	determine the factors that alter the normal functions of transport systems; and	Group felt newly crafted standards and reorganization of the course cover this material well enough to delete these SE's.
(9)(C)	contrast the interactions among the transport systems.	Group felt newly crafted standards and reorganization of the course cover this material well enough to delete these SE's.
(14)	<u>Cardiovascular system. The student analyzes the relationships between the anatomical structures and physiological functions of the cardiovascular system. The student is expected to:</u>	
(A)	<u>identify the major functions of the cardiovascular system, including transport, maintaining homeostasis and immune response;</u>	
(B)	<u>compare and contrast the anatomical structure of arteries, arterioles, capillaries, venules, and veins;</u>	
(C)	<u>investigate and illustrate how systemic circulation transports blood, gasses, and nutrients from the heart to the internal and external anatomy of the heart, including tissue layers, chambers, valves, coronary vessels;</u>	
(D)	<u>describe the relationship between blood flow and pressure, including systolic and diastolic pressure, pulse pressure, and mean arterial pressure;</u>	
(E)	<u>compare and contrast coronary, pulmonary, and systemic circulation, and describe the major vessels of each;</u>	Science review feedback incorporated to include verbs compare, contrast, and describe in the SE.
(F)	<u>illustrate how the PQRST waves of an EKG demonstrate the conduction of electricity through the structures of the heart;</u>	
(G)	<u>describe the relationship between the cardiovascular system, nervous system, and muscular system in regulating cardiac output; and</u>	
(H)	<u>identify and describe common diseases and disorders of the cardiovascular system such as heart disease, myocardial infarction, ischemia, and hypertrophic cardiomyopathy.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(15)	<u>Lymphatic system. The student analyzes the relationships between the anatomical structures and physiological functions of the lymphatic system and understands the immune response. The student is expected to:</u>	
(A)	<u>evaluate the interaction of the lymphatic system with other body systems such as the circulatory system;</u>	
(B)	<u>describe the structure and function of the lymphatic organs and explain how lymph moves through the body;</u>	

(C)	<u>identify and describe the role/function of the immune cells within the lymphatic system structures, including T cells and B cells;</u>	
(D)	<u>identify and determine antigens associated with ABO blood typing, including Rh factor;</u>	
(E)	<u>summarize the ways the body protects and defends against disease, including inflammation, barrier defenses, and active and passive immunity;</u>	
(F)	<u>define the role of antigens and antibodies in the immune response; and</u>	
(G)	<u>identify and describe common diseases and disorders associated with the lymphatic and immune systems such as inherited or acquired immunodeficiencies, autoimmune diseases, and lymphomas.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(16)	<u>Digestive system. The student analyzes the relationships between the anatomical structures and physiological functions of the digestive system. The student is expected to:</u>	
(A)	<u>examine the anatomical structures and function of the alimentary canal and accessory organs;</u>	
(B)	<u>compare and contrast mechanical and chemical digestive processes;</u>	
(C)(5)(B)	evaluate the modes, including the structure and function of the digestive system, by which energy is processed and stored within the body, <u>including ingestion, propulsion, absorption, and elimination;</u> and	Group felt new standards crafted better explained deleted portion of the SE and wanted to be specific about which modes of digestion should be included in instruction.
(D)	<u>identify and describe common diseases and disorders of the digestive system such as gallstones, Crohn's, irritable bowel syndrome, and gastroesophageal reflux disorder.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(5)(C)	analyze the effects of energy deficiencies in malabsorption disorders as they relate to body systems such as Crohn's disease and cystic fibrosis; and	Group felt newly created SEs sufficiently covered the same content expressed 5.C and 5.A
(5)(A)	analyze the chemical reactions that provide energy for the body;	
(9)(A)	analyze the physical, chemical, and biological properties of transport systems, including circulatory, respiratory, and excretory;	Standard deleted. Existed in both two places in the document from reorganization.
(17)	<u>Respiratory system. The student analyzes the relationships between the anatomical structures and physiological functions of the respiratory system. The student is expected to:</u>	
(A)	<u>identify and sequence the anatomical structures and functions of the respiratory system;</u>	
(B)	<u>compare and contrast the functions of upper and lower respiratory tract;</u>	

(C)	<u>describe the physiology of respiration, including internal and external respiration and gas exchange;</u>	
(D)	<u>describe the relationship between respiratory and cardiovascular system during pulmonary circulation;</u>	
(E)	<u>identify and describe common diseases of the respiratory system such as asthma, emphysema, pneumonia, viruses, and allergies; and</u>	
(F)	<u>investigate factors that affect respiration, including exercise and environmental changes such as altitude.</u>	
(18)	<u>Reproductive system. The student analyzes the relationships between the anatomical structures and physiological functions of the reproductive system. The student is expected to:</u>	
(A)(12)(A)	<u>explain embryological development of cells, tissues, organs, and systems;</u>	
(12)(B)	<u>identify the functions of the male and female reproductive systems; and</u>	New standards crafted by group cover this information
(12)(C)	<u>summarize the human growth and development cycle.</u>	New standards crafted by group cover this information
(B)	<u>describe and examine the location, structure, and functions of the internal and external female and male reproductive organs and accessory glands;</u>	
(C)	<u>describe and compare the process of oogenesis to spermatogenesis;</u>	
(D)	<u>research and discuss the physiological effects of hormones on the stages of the menstrual cycle;</u>	
(E)	<u>identify and distinguish the hormones involved in the maturation and development throughout the life cycle, including puberty, gestation, and menopause; and</u>	
(F)	<u>identify and describe common diseases and disorders of the reproductive system such as sexually transmitted diseases and cancers of the female and male reproductive system.</u>	Incorporated science reviewer feedback to change verbs to identify and describe.
(7)(B)	<u>determine the consequences of the failure to maintain homeostasis</u>	Part of standard moved to 5(D) to include in the new language while the other part was deleted as it was not important to be included in the new language above as determined by the group.
(19)	<u>Emerging Technologies. The student identifies emerging technological advances in science and healthcare treatment and delivery. The student is expected to:</u>	
(A)	<u>research advances in science and medicine at the organ and tissue level such as bionics and wearable monitoring technologies; and</u>	

(B) (13)(A)	research recognize advances in <u>science and medicine at the cellular level such as stem cells research and gene therapy, such as cord blood use; and</u>	
(6)(B)	investigate and report the uses of various diagnostic and therapeutic technologies;	Standards deleted because they were either already covered in newly crafted standards or not considered relevant to the KS.
(8)(B)	investigate the therapeutic uses and effects of external sources of electricity on the body system; and	Standards deleted because they were either already covered in newly crafted standards or not considered relevant to the KS.
(8)(C)	evaluate the application of advanced technologies—such as electroencephalogram, electrocardiogram, bionics, transectaneous electrical nerve stimulation, and cardioversion.	Standards deleted because they were either already covered in newly crafted standards or not considered relevant to the KS.
(11)(C)	research technological advances and limitations in the treatment of system disorders; and	Standard deleted because disorders are addressed in each new system KS group with a new SE
(13)(B)	recognize advances in bioengineering and transplant technology.	Standard deleted because it is covered in new “macro” SE under emerging technologies KS.
(6)(C)	interpret normal and abnormal contractility conditions such as in edema, glaucoma, aneurysms, and hemorrhage;	Expectation covered in newly created diseases of the systems SEs.
(6)(E)	perform an investigation to determine causes and effects of force variance and communicate findings.	Deleted to address content advisor feedback.
(11)(A)	analyze the relationships between the anatomical structures and physiological functions of systems, including the integumentary, nervous, skeletal, muscular, cardiovascular, respiratory, digestive, urinary, immune, endocrine, and reproductive systems;	Standard already covered in newly crafted KS/SEs above.
(11)(B)	evaluate the cause and effect of disease, trauma, and congenital defects on the structure and function of cells, tissues, organs, and systems;	Deleted due to coverage in newly crafted system KSs and SEs
(11)(D)	examine characteristics of the aging process on body systems.	Deleted, content is covered in pathophysiology course.
(10)(A)	identify the effects of environmental factors such as climate, pollution, radioactivity, chemicals, electromagnetic fields, pathogens, carcinogens, and drugs on body systems; and	CA feedback is to remove.
(10)(B)	explore measures to minimize harmful environmental factors on body systems.	Removed because diseases are main topic of Pathophysiology course--but better to address how diseases are specific to a particular body system as a substrand within the body systems KSs

§130.227. Pathophysiology (One Credit), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry. Recommended prerequisite: <u>Anatomy and Physiology</u> a course from the Health Science Career Cluster . Students must meet the 40% laboratory and fieldwork. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry and relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Pathophysiology course is designed for students to conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Pathophysiology will 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.	Deleted because it's already subsumed in the course content described here.
(4)	<u>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 currently scientifically testable.</u> 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.	
(5)	<u>Scientific hypotheses and theories. Students are expected to know that:</u> 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.	

(A)	<u>hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and</u>	
(B)	<u>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.</u>	
(6)	<p><u>Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.</u></p> <p>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).</p>	
(A)	<u>Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.</u>	
(B)	<u>Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.</u>	
(7)	<p><u>Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. 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).</u></p> <p>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.</p>	

(8)	<u>Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. 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, while models allow for boundary specification and provide a tool for understanding the ideas presented. 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.</u>	
(9)(8)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(10)(9)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and	
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team.	
(2)	<u>Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena, or design solutions using appropriate tools and models. The student is expected to:</u>	Scientific and engineering practices approved by the SBOE in November 2020 for science high school courses.
(A)	<u>ask questions and define problems based on observations or information from text, phenomena, models, or investigations;</u>	
(B)	<u>apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;</u>	
(C)	<u>use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;</u>	
(D)	<u>use appropriate tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micro pipettors, hand lenses, Celsius thermometers, hot plates, timing devices, Petri dishes, lab incubators, biochemical media and stains dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;</u>	

(E)	<u>collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;</u>	
(F)	<u>organize quantitative and qualitative data using lab notebooks or journals, lab reports, labeled drawings, graphic organizers, peer reviewed medical journals, summaries, oral reports, and technology-based reports;</u>	
(G)	<u>develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and</u>	
(H)	<u>distinguish among scientific hypotheses, theories, and laws.</u>	
(3)	<u>Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:</u>	
(A)	<u>identify advantages and limitations of models such as their size, scale, properties, and materials;</u>	
(B)	<u>analyze data by identifying significant statistical features, patterns, sources of error, and limitations;</u>	
(C)	<u>use mathematical calculations to assess quantitative relationships in data; and</u>	
(D)	<u>evaluate experimental and engineering designs.</u>	
(4)	<u>Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:</u>	
(A)	<u>develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;</u>	
(B)	<u>communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and</u>	
(C)	<u>engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.</u>	
(5)	<u>Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:</u>	
(A)	<u>analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;</u>	

(B)	<u>relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content; and</u>	
(C)	<u>research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) or health science field in order to investigate STEM careers.</u>	
(2)	The student, for at least 40% of instructional time, conducts field and laboratory investigations 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:	Replaced with scientific and engineering practices
(A)	demonstrate safe practices during laboratory and field investigations; and	
(B)	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
(3)	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)(4) 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 that have been tested over a variety of conditions are incorporated into theories;	
(C)	know that 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 are created and new technologies emerge;	
(D)	distinguish and differentiate between scientific hypothesis 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, gel electrophoresis apparatuses, micropipettors, 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.	
(4)	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;	
(B)	communicate and apply scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, and marketing materials;	
(C)	draw inferences based on data related to promotional materials for products and services;	
(D)	evaluate the impact of scientific research on society and the environment;	
(E)	evaluate models according to their limitations in representing biological objects or events; and	
(F)	research and describe the history of science and contributions of scientists.	
(6)(5)	The student analyzes the mechanisms of pathology. The student is expected to:	
(A)	<u>describe abnormal</u> identify biological and chemical processes at the cellular level;	Normal physiology is a topic in A&P, Change made here to emphasize abnormal function. CCRS (VI.A.1)
(B)	<u>examine and analyze</u> detect changes resulting from mutations and neoplasms by examining cells, tissues, organs, and systems;	Verb change made to incorporate science reviewer feedback.

(C)	<u>investigate</u> identify factors that contribute to disease, <u>including such as</u> age, gender, environment, lifestyle, and heredity; <u>and</u>	Verb changed to investigate to better reflect the rigor associated with the course. Such as was changed including because the group felt that age, gender, environment, lifestyle and heredity should be required as part of instruction.
(D)	examine the body's compensating mechanisms occurring under various conditions; and	5(D) deleted and combined with 5(E) because both standards relate to the same topic.
(D) (E)	analyze <u>and describe how the body's compensating mechanisms attempt</u> how the body attempts to maintain homeostasis when changes occur.	“describe” added to address science reviewer feedback. CCRS (VI.F.1)
(7) (6)	The student examines the process of pathogenesis. The student is expected to:	
(A)	<u>differentiate and</u> identify pathogenic organisms using microbiological techniques <u>such as gram staining, biochemical identification, microscopic observation;</u>	Such as list created to clarify boundary of instruction with respect to microbiological techniques. Verb differentiate added to clarify the need to know the difference between pathogenic organisms. Group felt verb order best reflected actual practice in microbiological identification techniques. CCRS (I.C3) (I.D.3)
(B)	<u>research and summarize</u> differentiate the stages of pathogenesis, including incubation period, prodromal period, and exacerbation or remission;	Verbs changed to research and summarize to better clarify instruction.
(C)	analyze the body's natural defense systems against infection, <u>including such as</u> barriers, the inflammatory response, and the immune response;	List changed to including as the group felt the constituents of the list should be required instruction.
(D)	<u>analyze other mechanisms of disease prevention and treatment such as vaccinations, antibiotics, chemotherapy, immunotherapy; and</u>	New standard created to contrast natural defense systems with artificial mechanisms.
(E) (D)	evaluate the effects of chemical agents, environmental pollution, and trauma on the disease process; and	
(E)	research stages in the progression of disease.	6E deleted as it is subsumed in 6B
(8) (7)	The student examines a variety of human diseases <u>throughout the body's systems</u> . The student is expected to:	
(A)	<u>investigate</u> describe the nature of diseases; including the etiology, signs and symptoms, diagnosis, prognosis, and treatment options of for diseases;	
(B)	explore <u>and describe</u> advanced technologies for the diagnosis and treatment of disease;	Verb added per science advisor feedback.

(C)	<u>research and describe</u> examine reemergence of diseases such as malaria, tuberculosis, and polio, <u>and measles</u> ;	Verbs changed per science advisor feedback
(D)	<u>research and</u> differentiate between <u>the causes, prevention and impact of nosocomial</u> hospital- acquired infections and <u>versus</u> community-acquired infections;	Verbs changed per science advisor feedback
(E)	<u>research and describe</u> examine antibiotic-resistant diseases such as methicillin resistant Staphylococcus aureus;	Verbs changed per science advisor feedback
(F)	differentiate between <u>various types of diseases and disorders, including hereditary</u> congenital disorders and childhood diseases <u>infectious, and auto-immune</u> ; and	Group made changes to ensure a broader coverage of different disease types were included.
(G)	investigate ways diseases <u>such as diabetes, Parkinson's, lupus, and congestive heart failure</u> affect multiple body systems.	Specific disorders included to illustrate appropriate examples for instruction.
(9) (8)	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;	
(B)	analyze the effects of stress and aging on the body;	
(C)	evaluate treatment options for diseases;	Duplicative of content in 7A and 7B
(C)	<u>analyze patient medical data and interpret medical laboratory test results to inform diagnosis and treatment</u> ;	Standard added to address identified skills gap in the gap study pertaining to examining test data to inform diagnosis and treatment Verbs changed per science advisor feedback.
(D)	<u>analyze and interpret epidemiological data to determine common trends and predict outcomes in disease progression</u> ;	New standard crafted to encourage broader research centered on epidemiology.
(E) (D)	<u>research and summarize</u> investigate diseases that threaten world health and propose intervention strategies; and	Verbs changed per science advisor feedback
(F) (E)	<u>develop a prevention plan that considers how behaviors contribute to lifestyle diseases.</u> develop a plan for personal health and wellness	Language modified to better focus plans on behavior that contributes to lifestyle diseases.

§130.231. Health Science Theory (One Credit), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 10-12. Prerequisite: <u>one credit from a level one course or level two course within a health science program of study.</u> Biology. <u>Recommended prerequisite: Medical Terminology.</u> Recommended corequisite: Health Science Clinical. Students shall be awarded one credit for successful completion of this course.	Courses were added as prerequisites and recommended prerequisites to provide foundational knowledge needed for the course.
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, <u>industry and</u> relevant technical knowledge, and <u>college and career readiness</u> skills for students to further their education and succeed in current <u>and</u> or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Health Science Theory course is designed to provide for the development of advanced knowledge and skills related to a wide variety of health careers. Students will employ hands-on experiences for continued knowledge and skill development.	
(4)	To pursue a career in the health science industry, students should recognize, learn to reason, think critically, make decisions, solve problems, and communicate effectively. Students should recognize that quality health care depends on the ability to work well with others.	
(5)	The health science industry is comprised of diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems that function individually and collaboratively to provide comprehensive health care. Students should identify the employment opportunities, technology, and safety requirements of each system. Students are expected to apply the knowledge and skills necessary to pursue a health science career through further education and employment.	
(6)	Professional integrity in the health science industry is dependent on acceptance of ethical and legal responsibilities. Students are expected to employ their ethical and legal responsibilities, recognize limitations, and understand the implications of their actions.	
(7)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(8)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	

(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	express ideas in a clear, concise, and effective manner; and	
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team; and ;	
(C)	<u>model industry expectations of professional conduct such as attendance, punctuality appropriate professional dress, personal appearance, hygiene, and time management;</u>	Standard was moved and revised from original k/s for improved alignment.
(2)	<u>The student demonstrates patient centered skills and interactions that foster trust and lead to a quality customer service experience. The student is expected to:</u>	New KS and SE's added to emphasize the importance of behaviors related to customer service skills
(A)	<u>demonstrate care, empathy and compassion;</u>	
(B)	<u>communicate medical information accurately and efficiently in language that patients can understand; and</u>	
(C)	<u>comply with Health Insurance Portability and Accountability Act (HIPAA) policy standards.</u>	
(3)(2)	The student applies mathematics, science, English language arts, and social studies in health science. The student is expected to:	
(A)	solve mathematical calculations appropriate to situations in a health-related environment;	
(B)	communicate using medical terminology;	Language deleted because content is covered in KS 9
(B)(C)	express ideas in writing and develop skills in documentation	CCRS III (A) 1
(C)(D)	interpret complex technical material related to the health science industry;	
(D)(E)	summarize biological and chemical processes <u>such as</u> that maintain <u>ing</u> homeostasis;	Group added "such as" to make the example illustrative rather than required.
(F)	<u>explain the changes in structure and function due to trauma and disease; and</u>	Group is considering moving/changing to KS13 for improved alignment.
(E)(G)	research <u>topics related to health science such as</u> the global impact of disease prevention and cost containment.	Make the expectation accessible to a broader range of topics related to health science. Group may come back and revise standard to closer tie it to learning in social studies. CCRS: III(D)1
(4)(3)	The student demonstrate displays verbal and non-verbal, <u>and electronic</u> communication skills. The student is expected to:	

(A)	demonstrate therapeutic communication appropriate to the situation;	
(B)	execute verbal and nonverbal skills when communicating with persons with sensory loss and language barriers in a simulated setting; and	
(C)	<u>appropriately</u> use electronic communication devices with appropriate supervision in the classroom <u>or clinical</u> setting. such as facsimile, scanner, electronic mail, and telephone.	Group felt illustrative examples not necessary given the ubiquitous nature of electronic communication currently and to include both classroom or clinical environments.
(5) (4)	The student analyzes and evaluates communication skills for maintaining healthy relationships throughout the life span. The student is expected to:	
(A)	evaluate how healthy relationships influence career goals;	
(B)	demonstrate communication skills in building and maintaining healthy relationships;	
(C)	demonstrate strategies for communicating needs, wants, and emotions; and	
(D)	evaluate the effectiveness of conflict resolution techniques in various simulated situations.	
(5)	The student relates appropriate information to the proper authority in a simulated classroom setting. The student is expected to:	Group felt the KS and associated SE's were confusing and potentially duplicative of expectations already related to communication.
(A)	identify and retrieve reportable information; and	
(B)	report simulated information according to facility policy.	
(6)	<u>The student documents and records medical information into a permanent health record. The student identifies documents integrated into the permanent record of the health informatics system.</u> The student is expected to:	
(A)	research document formats <u>such as dental or medical records;</u>	Language added to provide illustrative examples of different kinds of document formats related to the field. CCRS: III(D)1
(B)	<u>prepare official health documents or records</u> compile, retrieve and record data according to industry-based standards; <u>and</u>	Language was added to make clear the distinction between preparing both records and documents which are separate constructs related to record keeping in the field. CCRS: III(A)1, IV(B)1
<u>(C)</u>	<u>record health information on paper and electronic formats such as patient history, vital statistics, and test results.</u>	New standard crafted by the group to address gap analysis study that recommended including, documenting and recording information. CCRS: III(A)1

(7)	The student describes industry academic requirements necessary for employment in the health science occupations industry . The student is expected to:	
(A)	research specific health science careers <u>education, certification, licensing, continuing education requirements, and salary related to specific health science careers</u> ; and	Group included new language to specify characteristics relevant to health science careers. CCRS: III(D)1
(B)	<u>practice</u> examine -employment procedures for a specific health science career <u>such as resume building, application completion, and interviewing</u> ;	Language added by the group to identify specific procedures related to industry requirements for employment
(8)	The student identifies problems and participates in the decision-making process. The student is expected to:	
(A)	<u>apply critical thinking, adaptability, and consensus building skills to solve problems relevant to health science</u> ; analyze systematic procedures for problem solving ;	Standard revised to include specific skills related to problem solving in health science occupations and also to address skills identified in the gap study.
(B)	evaluate the impact of decisions; and	
(C)	suggest modifications based on decision outcomes.	
(9)	The student <u>demonstrates</u> implements <u>comprehension and proficiency of clinical skills</u> the knowledge and skills of a health science professional in <u>a</u> the classroom or <u>clinical</u> setting. The student is expected to:	
(A)	comply with specific industry standards related to safety <u>requirements</u> ; and substance abuse ;	Group felt that substance abuse is already an expectation of students in public school and wasn't necessary to be emphasized again here.
(B)	<i>model industry expectations of professional conduct such as attendance, punctuality, personal appearance, hygiene, and time management</i> ;	
(C)	articulate comprehension of assignment ;	Group felt standard was no longer relevant after making changes to the KS to emphasize demonstrated proficiency.
(B) (D)	employ medical vocabulary specific to the health care setting;	CCRS I(E)2
(C) (E)	perform admission, discharge, and transfer functions in a simulated setting;	
(D) (F)	demonstrate skills related to <u>assisting patients with</u> activities of daily living in rehabilitative care such as <u>dressing, undressing, grooming, bathing, and feeding</u> ; range of motion, positioning, and ambulation according to the health science industry standards, regulatory agency standards, and professional guidelines ;	Group defined additional expectations related to clinical skills students need to practice related to patient care for emphasis, and mobility E and F. CCRS: I(C)3
(E)	<u>determine proper equipment needed for patient ambulation such as gait belts, wheelchairs, crutches, or walkers</u> ;	CCRS: I(C)3

(F)	<u>demonstrate skills related to assessing range of motion and assisting with mobility, including positioning, turning, lifting, and transferring patients for treatment or examination;</u>	CCRS: I(C)3
(G)	role play techniques used in stressful situations such as trauma and chronic and terminal illness;	
(H)	demonstrate first aid, vital signs, cardiopulmonary resuscitation, and automated external defibrillator skills in a laboratory setting ; and	Laboratory setting was removed because the group felt it restricted opportunities for students to learn the skills in the SE. CCRS I(C)3, III(B)2
(I)	perform skills specific to a health science professional s such as medical assistant, dental assistant, emergency medical technician-basic, phlebotomy technician, and pharmacy technician.	Change made to better underscore the need to center practiced skills on a specific profession. CCRS: I(C)3
(10)	The student evaluates ethical behavioral standards and legal responsibilities <u>of a health science professional</u> . The student is expected to:	Language added to KS to focus learning expectation to be more directed toward what is expected of health science professionals.
(A)	research and describe the role of professional associations and regulatory agencies;	CCRS: III (D) 1, CCRS I (A) 1
(B)	examine legal and ethical behavior standards such as Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act; and	CCRS: I (A) 1
(C)	investigate the legal, and ethical, <u>and professional</u> ramifications of unacceptable <u>or discriminatory</u> behavior.	Group felt it was important to emphasize that discrimination is unacceptable behavior and should be included in the standard as such. CCRS: I(A)1, IV(B) 1, IV(B)2
(11)	The student exhibits the leadership skills necessary to function in a democratic society. The student is expected to:	
(A)	identify leadership skills of health science professionals;	
(B)	participate in group dynamics; and	
(C)	integrate consensus-building techniques.	
(12)	The student maintains a safe environment. The student is expected to:	
(A)	conform to governmental regulations and guidelines from entities such as the World Health Organization, Centers for Disease Control and Prevention, Occupational Safety and Health Administration, U.S. Food and Drug Administration, Joint Commission, and National Institute of Health;	
(B)	explain protocol related to hazardous materials and situations <u>such as personal protective equipment and blood borne pathogen exposure</u> ;	Language added to address content identified from the gap analysis appropriate to be included in the course.

(C)	observe and report unsafe conditions; and	
(D)	support recycling and waste management for cost containment and environmental protection; <u>and</u>	
<u>(E)</u>	<u>demonstrate proper body mechanics to reduce the risk of injury.</u>	Group wanted to emphasize this skill to protect the long term safety of the physical demands placed on workers in the health care profession.
(13)	The student assesses wellness strategies for the prevention of disease. The student is expected to:	
(A)	research wellness strategies for the prevention of disease;	CCRS: III (D) 1
(B)	evaluate positive and negative effects of relationships on physical and emotional health;	
(C)	explain the benefits of positive relationships among community health professionals in promoting a healthy community;	
(D)	research and analyze the effects of access to quality health care; and	CCRS: III (D) 1
(E)	research alternative health practices and therapies; <u>and</u>	CCRS: III (D) 1
<u>(F)</u>	<u>explain the changes in structure and function due to trauma and disease. ;and</u>	

§130.230. Pharmacology (One Credit), Adopted 2021 ~~2015~~.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry. Recommended prerequisite: a course from the Health Science Career Cluster. Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, <u>industry</u> and relevant technical knowledge, and <u>college and career readiness</u> skills for students to further their education and succeed in current <u>and</u> or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Pharmacology course is designed to study how natural and synthetic chemical agents such as drugs affect biological systems. Knowledge of the properties of therapeutic agents is vital in providing quality health care. It is an ever-changing, growing body of information that continually demands greater amounts of time and education from health care workers.	
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student <u>applies</u> demonstrates professional standards/employability skills as required by <u>the healthcare system</u> business and industry . The student is expected to:	Easier to evaluate with the use of the verb applies and changing to healthcare systems encompasses the full realm of the healthcare profession.
(A)	<u>apply appropriate</u> demonstrate verbal and non-verbal communication in a clear, concise, and effective manner;	Easier to evaluate and emphasizes positive outcomes.
(B)	<u>apply appropriate</u> demonstrate adaptability skills such as problem solving and creative thinking;	Easier to evaluate and emphasizes positive outcomes.
(C)	<u>create and evaluate</u> develop a career plan <u>using method such as educational pathways, career goals, and individual aptitudes</u> ;	Verb addition to allow use throughout the career cluster and provided examples.
(D)	employ teamwork;	No changes

(E)	<u>compare, contrast, and</u> create an <u>occupation-specific</u> job-specific resume; and	Additional verbs added for understanding of developmental process and difference between occupation skills.
(F)	<u>demonstrate</u> appraise the <u>soft skills</u> characteristics desired by employers.	Verb changed to emphasize the use of skills in a classroom setting and including the use of soft skills vs characteristics.
(2)	The student explores the field of pharmacology and foundation of pharmacology. The student is expected to:	
(A)	<u>differentiate between</u> define pharmacology and its major subdivisions, including pharmacodynamics, pharmacokinetics, <u>pharmaceutics,</u> and pharmacotherapeutics;	Verb change increase rigor and pharmaceutics to complete the list of major subdivisions.
(B)	explain the difference between therapeutic effects, side effects, and toxic effects;	Moved to KS 7
(C)	identify a drug receptor in the human body;	Moved to KS 7
(D)	trace the interaction and antagonist receptors;	Moved to KS 7
(E)	explain the relationship among drug dosage, drug response, and time;	Moved to KS 7
(F)	explain drug safety and therapeutic index;	Moved to KS 7
(G)	describe three names by which drugs are known; and	Moved to KS 7
(B) ^(H)	<u>employ</u> list two -common drug <u>information materials such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, textbooks, and marketing materials</u> reference books;	Verb changed to increase rigor and added examples of drug information resources.
(C)	<u>list examples of primary, secondary, and tertiary drug information references;</u>	
(D)	<u>research and describe the history of pharmacy and contributions of the field;</u>	
(E)	<u>draw inferences based on data related to promotional materials for products and services; and</u>	
(F)	<u>evaluate the impact of scientific research on society and the natural environment, including drug development and drug disposal.</u>	Not a group consensus to add second recommendation “evaluate the influence of drug development on society outcomes and environmental impact”.
(3)	The student identifies individuals and careers associated with <u>pharmacology</u> manufacturing, dispensing, and administering pharmaceuticals. The student is expected to:	Changed to provide clarity to the KS.
(A)	<u>evaluate</u> identify career pathways <u>utilizing</u> related to pharmacology;	Verb changed to increase rigor.
(B)	define the role of the pharmacy team;	
(C)	research and describe emerging <u>opportunities within the pharmacy profession</u> pharmacy career opportunities;	Use of consistent terminology within the course sequence.

(D)	analyze the <u>societal</u> impact of <u>medication costs</u> pharmaceuticals on the costs of health care; and	Move to new KS. Changed to include a broader view and consistent course sequence terminology.
(E)	evaluate the impact of pharmaceuticals on the costs of society.	Covered in a different SE.
(4)	The student explains the ethical and legal responsibilities <u>associated with pharmacology of</u> pharmacists and pharmacy technicians. The student is expected to:	Changed to be inclusive of other healthcare professions.
(A)	<u>explain the causes, effects, and consequences associated with medical errors, including medication errors;</u> describe the legal terms and consequences associated with prescription errors;	Verb changed to increase rigor and language changed to provide consistent terminology and clarity.
(B)	<u>define legal terminology associated with medical errors such as negligence</u> differentiate between negligence product liability, contributory negligence, and regulatory law;	Clarity of language use to define scope of practice for healthcare professionals.
(C)	evaluate the effect of medication errors related to the pharmacy and the industry;	Covered as well as combined in a different SE in the course.
(D)	<u>analyze the medical and ethical principles, including beneficence, autonomy, maleficence, and justice</u> discuss the elements of a lawsuit; and	Changed to add ethical terms to SE and define scope of practice for healthcare professionals.
(E)	<u>evaluate</u> define professional liability.	Changed the verb to increase rigor.
(5)	The student uses a comprehensive medical <u>terminology vocabulary in order</u> to communicate effectively with other health care professionals <u>or patients and caregivers.</u> The student is expected to:	Changed to use consistent terminology within the sequence of courses and add patient and caregivers.
(A)	identify the various routes of drug medication;	Moved to KS 7
(A)(B)	<u>use the appropriate medical terminology to identify different</u> differentiate among the various classes of drugs;	Changed the intent of the SE to include the use of medical terminology and align to the KS.
(B)(C)	<u>communicate</u> properly use <u>using medical terminology</u> common terms associated with pharmacology; and	Changed to utilize consistent terminology and alignment to the KS.
(C)(D)	analyze unfamiliar terms using the knowledge of word roots, suffixes, and prefixes; and	
(D)	<u>interpret medical terminology to communicate with patients and care givers.</u>	Added SE to include communication with patients and caregivers as identified in the gap analysis.
(6)	The student demonstrates mathematical knowledge and skills to solve problems with systems of measurement used in the pharmacy. The student is expected to:	
(A)	<u>calculate</u> analyze medication <u>dosages using formulas, ratios, proportions, and alligations;</u> calculations, including metric, apothecary, and household systems;	Changed to address an unassigned skill in the gap analysis and align to a Math CCRS.

(B)	convert a measurement expressed in one standard unit within a system to a measurement expressed in another unit within the same system;	
(C)	convert a measurement expressed in one system to a unit of the same measurement in a different system, <u>including metric, apothecary, avoirdupois system, and household systems; and</u>	Added the different systems encountered in prescription documentation.
<u>(D)</u>	<u>evaluate statistical data according to their limitations in representing biological objects or events such as inventory control, patient compliance, and pharmacoeconomics.</u>	SE added to address an unassigned skill from the gap analysis report and CCRS Social Studies recommendation.
(7)	The student <u>evaluates</u> recognizes the effectiveness of a pharmaceutical agents, their <u>dosage</u> form, and its <u>routes</u> of administration. The student is expected to:	Changed for clarity and increase the rigor of the KS.
(A)	<u>analyze the availability of different dosage forms such as solid, liquid, patch, and IV solution; differentiate between solid, semi-solid, and liquid dosage forms;</u>	Clarified the standard and increased the rigor of the student expectation.
(B)	name forms in which drugs are manufactured, including their subcategories;	Removed because the standard was duplicative of 7A.
(B) <u>(C)</u>	<u>give list</u> examples of <u>the brand or generic names of</u> drugs in each dosage form <u>and routes of drug administration such as the top 200 drugs;</u>	Changed to provide clarity and increase rigor.
(C) <u>(D)</u>	define medical <u>terminology terms</u> associated with drug <u>dosage</u> forms;	Changed to include consistent use of verbiage through out the program of study.
(D) <u>(B)</u>	<u>explain the difference between therapeutic effects, side effects, and toxic effects;</u>	No Change.
(E) <u>(C)</u>	<u>identify the mechanism of action of different drug classifications such as drug receptors, agonists, and antagonist relationships; identify a drug receptor in the human body;</u>	Moved from KS 2. Combined with 7F. Changed to provide clarity.
(D)	trace the interaction and antagonist receptors;	Moved from KS 2. Combined with 7E.
(F) <u>(E)</u>	<u>explain and understand the dose response relationship concept such as the difference between oral and IV administration of drugs and explain the relationship among drug dosage, drug response, and time; and</u>	Changed to include common pharmacy concepts and clarity.
(G) <u>(F)</u>	<u>explain drug safety</u> such as monitoring expiration dates and drug disposal. and therapeutic index;	Moved to KS 9.
(G)	describe three names by which drugs are known; and	Removed due to duplication.
(H)	identify the various routes of drug medication;	Removed and added to and added to 7B.
(8)	The student <u>demonstrates knowledge and use of</u> must be able to select appropriate equipment, <u>and</u> instruments, and <u>use</u> technology. for specific tasks. The student is expected to:	KS statement changed for clarity.
(A)	identify technology components used in the pharmacy <u>workflow such as ordering, entering, filling, and dispensing;</u>	Include examples for clarification and workflow to encompass activities in a pharmacy setting.

(B)	describe how technology applications improve efficiency in the pharmacy; and	Not changed.
(C)	<u>identify and demonstrate proper use and maintenance of equipment and instruments used in a pharmacy setting such as IV drop sets, scales, glucose supplies, dispensing units or cabinets, and various laboratory supplies.</u> analyze the use of technology in the pharmacy.	Removed due to duplication of 8B. Included SE to cover equipment and instruments.
(9)	The student is expected to practices <u>safety protocols</u> in dispensing and administering pharmaceutical agents and preventing personal and client illness or injury. The student is expected to:	KS changed to align with the SE to provide clarity.
(A)	employ safety standards <u>such as workplace standards;</u>	Included workplace standards for clarity
(B)	interpret <u>and apply pharmacy laws and standards to enhance safety according to local, state, and federal regulations;</u> rules associated with pharmacy standards;	Changed to increase clarity and provide examples.
(C)	examine <u>the consequences of</u> unsafe practices; <u>and</u>	Changed to increase clarity.
(D)	<u>demonstrate</u> observe safe procedures in the administration of <u>client</u> care <u>such as in a simulated clinical setting.</u>	Changed to include a measurable verb and increased rigor.
(E)	demonstrate these safe procedures in the clinical setting.	Covered in SE 9D.

§130.XXX Pharmacy II (Two Credits), Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry. Recommended prerequisite: Algebra I, Introduction to Pharmacy Science, and Pharmacy Science I. Students shall be awarded two credits for successful completion of this course.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards, industry relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>The Pharmacy II course is designed to apply the knowledge and skills taught in the Pharmacy I course. The goal of this course is to provide students with the knowledge and skills to explore various careers in the pharmacy field. Knowledge would include pharmacology, pharmacy law, medication errors, inventory pharmacy calculations, compounding, and workflow expectations in a pharmacy setting. Pharmacy II is designed to be the third course in the pathway leading to college and career readiness in the healthcare therapeutics professions. The course content aligns with the competencies of pharmacy technician certification exams.</u>	
(4)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</u>	
(5)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student exhibits personal and interpersonal knowledge and skills. The student is expected to:</u>	
(A)	<u>apply appropriate verbal and non-verbal communication in a clear, concise, and effective manner;</u>	
(B)	<u>apply appropriate adaptability skills such as problem solving and creative thinking;</u>	
(C)	<u>create or evaluate a career plan using method such as educational pathways, career goals, and individual aptitudes;</u>	
(D)	<u>employ teamwork;</u>	

(E)	<u>compare, contrast, and create an occupation-specific resume; and</u>	
(F)	<u>demonstrate the soft skills desired by employers.</u>	
(2)	<u>The student communicates effectively with diverse populations. The student is expected to:</u>	
(A)	<u>practice a respectful and professional attitude when interacting with diverse patient populations, colleagues, and professionals, such written, oral, and electronic communications;</u>	
(B)	<u>demonstrate communication techniques that are effective for typical versus special population clients such as terminally ill, intellectually disabled, visually/hearing impaired, and elderly/pediatric populations; and</u>	
(C)	<u>demonstrate communication skills using various modalities between various stakeholders in a pharmacy setting such as liaison between the nurse and the patient.</u>	
(3)	<u>The student demonstrates the use of medical terminology and abbreviations in a pharmacy setting. The student is expected to:</u>	
(A)	<u>interpret and translate prescription and medication orders according to pharmacy settings such as community and hospital environments;</u>	
(B)	<u>create pharmacy correspondence using medical terminology and abbreviations such as prescriptions, medication administration records (MARs), and patient order sheets;</u>	
(C)	<u>use medical terminology found in various pharmacy settings to communicate appropriately; and</u>	
(D)	<u>translate sig codes and abbreviations used in the pharmacy to communicate instructions to patients.</u>	
(4)	<u>The student applies the strictest requirements using the laws of local, state, and federal agencies. The student is expected to:</u>	
(A)	<u>demonstrate the proper handling and disposal of non-hazardous, hazardous, and pharmaceutical substances and waste;</u>	
(B)	<u>apply the requirements for controlled substance prescriptions, including new, refill, and transfer in a dispensing pharmacy settings;</u>	
(C)	<u>apply the requirements for controlled substances, including receiving, storing, ordering, labeling, dispensing, reverse distribution, take-back programs, and loss or theft of;</u>	
(D)	<u>classify controlled substances according to their Drug Enforcement Administration (DEA) schedules such as cocaine, heroin, marijuana, fentanyl, dextroamphetamine, amphetamine salts, benzodiazepines, and anabolic steroids;</u>	

(E)	<u>identify the federal requirements for restricted drug programs such as pseudoephedrine and related medication processing, such as Risk Evaluation and Mitigation Strategies (REMS) and iPLEDGE;</u>	
(F)	<u>demonstrate the process for Food and Drug Administration (FDA) recalls based on classification for medications, devices, supplies, and supplements; and</u>	
(G)	<u>explain pharmacy compliance with professional standards such as scope of practice and relevant legal, regulatory, formulary, contractual, and safety requirements.</u>	
(5)	<u>The student interprets drug information. The student is expected to:</u>	
(A)	<u>apply knowledge of brand name, generic name, classification, and indication of use for common medications with automaticity in a pharmacy setting such as the top 200 drugs;</u>	
(B)	<u>analyze the common and life-threatening drug interactions and contraindications such as drug-disease, drug-drug, drug-lab, and drug-food;</u>	
(C)	<u>apply knowledge of the narrow therapeutic index (NTI) to drug use evaluations; and</u>	
(D)	<u>integrate the use of digital and hard copy references, such as United States Pharmacopeia (USP) standards, drug reference books, and clinical information sources as needed to perform job duties.</u>	
(6)	<u>The student demonstrates the dispensing process in various pharmacy settings. The student is expected to:</u>	
(A)	<u>analyze a prescription and medication order for completeness, including strength, form, directions, quantity, date, and refills, and obtain missing information if needed;</u>	
(B)	<u>communicate with patients or care givers using the appropriate modality to obtain information, including demographics, medication history, health conditions, allergies, and insurance, for the patient profile;</u>	
(C)	<u>collect, organize, and record demographic and clinical information accurately for patient continuity of care;</u>	
(D)	<u>identify the required steps in preparing sterile compounded products, including donning personal protective equipment (PPE), cleaning the vertical or horizontal flow hoods, selecting correct supplies, and preparing the product for dispensing;</u>	
(E)	<u>select the appropriate equipment and supplies, including package size, unit dose, diabetic supplies, spacers, and oral/injectable syringes for drug administration;</u>	
(F)	<u>apply lot numbers, expiration dates, and National Drug Codes (NDC) on drug packaging for the dispensing of medication; and</u>	

(G)	<u>differentiate between the use of effective infection control procedures such as sterile and non-sterile compounding in various pharmacy related settings.</u>	
(7)	<u>The student analyzes common medication errors, practices error prevention strategies. The student is expected to:</u>	
(A)	<u>use knowledge of high alert/risk and look-alike/sound-alike (LASA) medications to reduce medication errors;</u>	
(B)	<u>applies knowledge of current error prevention strategies such as Tall Man lettering, separating inventory, trailing/leading zeros, barcode usage, limiting use of error-prone abbreviations to reduce medication errors;</u>	
(C)	<u>apply the knowledge of various prescription errors such as abnormal doses, early refill, incorrect quantity, incorrect patient, and incorrect drug for improved accuracy;</u>	
(D)	<u>assist pharmacists in recognizing issues that require intervention such as adverse drug events, drug utilization review (DUR), and use of equipment and devices; and</u>	
(E)	<u>demonstrate knowledge of event reporting procedures such as MedWatch, near miss, vaccine adverse event reporting system (VAERS), and route-cause analysis (RCA).</u>	
(8)	<u>The student applies pharmacy workflow procedures according to federal, state, local, and facility guidelines. The student is expected to:</u>	
(A)	<u>describe the process for creating a prescription or medication order in compliance with pharmacy standards such as patient rights, completeness of a prescription or medication order, and authorization;</u>	
(B)	<u>discuss the steps in verifying a prescription or medication order such as right patient, right drug, right dosage, right time, and right route;</u>	
(C)	<u>identify the proper procedures for entering a prescription or medication order, including workstation, use of technology, validation with drug enforcement administration (DEA) calculations, and transcribing such as use of military time and Roman numerals;</u>	
(D)	<u>apply the proper techniques for filling a prescription or medication order such as use of technology, counting, and selecting the correct medication;</u>	
(E)	<u>explain the proper procedure for the administration of prescription or medication orders such as ear drops, eye drops, inhalations, parenteral, and enteral;</u>	
(F)	<u>demonstrate knowledge of the workflow process for prescriptions and medication orders such as creation of the order, order entry, adjudication, verification, filling, labeling, billing, dispensing, and administration; and</u>	

(G)	<u>describe the elements of third-party billing for out-patient dispensing, including prescription insurance ID cards, group numbers, BIN numbers, prior authorization, quantity limits, patient co-pays, maximum out of pocket costs, and deductibles.</u>	
(9)	<u>The student evaluates mathematical process standards related to the practice of pharmacy. The student is expected to:</u>	
(A)	<u>use conversions, ratios, and dimensional analysis to perform duties in a pharmacy setting, including dosage calculations for adults and special populations;</u>	CCRS Science II – Foundational Skills D1- Scientific application of mathematics
(B)	<u>apply conversions to systems of measurements, including apothecary, metric, and household to perform duties in a pharmacy setting;</u>	CCRS Science II.A.3.
(C)	<u>calculate the flow rate (or rate of administration) for an IV solution using ratios and conversions, such as milliliters to drops, weight, or hours to minutes;</u>	
(D)	<u>calculate days supply for a prescription order given a dose and sig;</u>	
(E)	<u>calculate volume or mass of each of the total parenteral nutrition (TPN) components such as lipids, amino acids, dextrose, calcium, and magnesium;</u>	
(F)	<u>calculate volume or mass of ingredients needed for compounding both sterile and non-sterile products;</u>	
(G)	<u>calculate amount needed for percent of weight to volume, volume to volume, and weight to weight based on stock concentration; and</u>	
(H)	<u>use calculations related to business math in a pharmacy setting, including profit, net profit, discounts, mark-ups, dispensing fee, average wholesale price, depreciation, and third-party.</u>	
(10)	<u>The student demonstrates the use of technology in a pharmacy setting. The student is expected to:</u>	
(A)	<u>identify the types and uses of automated dispensing technology such as cabinets, units, and carousels;</u>	
(B)	<u>demonstrate knowledge and components of pharmacy dispensing software used in the out-patient setting, in-patient setting, and for in-office use dispensing;</u>	
(C)	<u>apply professional standards using communication technology such as telephone, emails, fax usage, electronic prescriptions, and social media in a pharmacy setting;</u>	CCRS Science I.D.1 and I.D.2 CCRS ELA II.A.1, II.B.1, and IV.A.2, IV.A.3, IV.B.2
(D)	<u>apply knowledge of technology hardware devices for input and output such as computers, scanners, printers, interface devices, and other devices; and</u>	
(E)	<u>select and use appropriate technology tools to search for drug information such as pill identification, adverse events, and contraindications.</u>	

(11)	<u>The student uses critical thinking, scientific reasoning, research, or problem solving to make informed decisions and communicate within and outside the classroom. The student is expected to:</u>	
(A)	<u>critique the validity and reliability of scientific research such as bias, conflict of interest, and study-design;</u>	CCRS ELA V.B.2, CCRS Science II.D.2
(B)	<u>demonstrates the ability to independently find valid and reliable sources such as primary, secondary, and tertiary literature;</u>	CCRS ELA V.B.1, CCRS Science II.D.1
(C)	<u>analyze online resources used in scientific research, including privacy or confidentiality;</u>	Consensus not reached 5 out of 6 group members polled did not vote to add the SE.
(D)	<u>describe the recent innovations and advances in pharmacy;</u>	
(E)	<u>identify opportunities for extended learning experiences such as community services, career and technical service organizations (CTSOs), and professional organizations; and</u>	
(F)	<u>evaluate scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, and marketing and promotional materials.</u>	
(12)	<u>The student performs inventory procedures according to federal, state, local, and facility guidelines. The student is expected to:</u>	
(A)	<u>identify components of medication and supply storage such as temperature, light sensitivity, product demand, cost, and restricted access;</u>	
(B)	<u>analyze therapeutic substitutions and product selection using the knowledge of formularies or preferred product list;</u>	
(C)	<u>practice procedures for inventory control such as removal of expired/recalled drug products, rotating inventory, performing a physical inventory, and ordering medications/supplies;</u>	
(D)	<u>explain how just-in-time or drop ship ordering and periodic automatic replenishment (PAR) levels are used to maintain pharmacy inventory;</u>	
(E)	<u>analyze how the laws affect the procedures for purchasing or ordering medications, devices, and supplies; and</u>	
(F)	<u>analyze lot numbers, expiration dates, and National Drug Codes (NDC) on drug packaging for inventory accuracy.</u>	
(13)	<u>The student demonstrates knowledge of safety procedures in a pharmacy setting. The student is expected to:</u>	
(A)	<u>apply appropriate hygiene and cleaning standards, including hand washing, cleaning counting trays, countertops, and equipment;</u>	

(B)	<u>perform basic safety and emergency preparedness procedures such as basic life support (BLS) and first aid applicable to pharmacy services;</u>	
(C)	<u>explain the potential sources for drug diversion and the risks such as inventory controls and “red flags” to employees, patients, and the community;</u>	
(D)	<u>explain the potential solutions to minimize drug diversion such as inventory controls and the prescription drug monitoring program (PDMP);</u>	
(E)	<u>explain the types and uses of personal protective equipment (PPE) and the steps for donning and doffing; and</u>	
(F)	<u>explain why collecting and documenting patient allergies are important steps in medication safety.</u>	

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§130.XXX Medical Assistant, Adopted 2021		
TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 11 and 12. Required Corequisite: Anatomy and Physiology. Recommended prerequisite: Medical Terminology. Students shall be awarded one credit for successful completion of this course.</u>	Vote not unanimous.
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostics services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>The Medical Assistant course provides students with the knowledge and skills to pursue a career as a medical assistant and to improve college and career readiness. The students will obtain communication skills, clinical ethics knowledge, safety awareness, and information related medical assisting career opportunities.</u>	
(4)	<u>To pursue a career in the health science industry, students should learn to reason, think critically, make decisions, solve problems, and communicate effectively. Students should recognize that quality health care depends on the ability to work well with others.</u>	
(5)	<u>Professional integrity in the health science industry is dependent on acceptance of ethical and legal responsibilities. Students are expected to employ their ethical and legal responsibilities, recognize limitations, and understand the implications of their actions.</u>	
(6)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</u>	
(7)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student applies professional standards/employability skills as required by business and industry. The student is expected to:</u>	
(A)	<u>apply appropriate verbal and non-verbal communication in a clear, concise, and effective manner;</u>	CCRS Social Studies IV.C.1, V.A.1, and V.A.1; CCRS ELA III.A.1, 2, 3, 4, and 5.
(B)	<u>apply appropriate adaptability skills such as problem solving and creative thinking;</u>	

(C)	<u>create or evaluate a career plan using method such as educational pathways, professional organizations, career goals, continuing education, and individual aptitudes;</u>	
(D)	<u>employ teamwork;</u>	
(E)	<u>compare, contrast, and create an occupation-specific resume; and</u>	
(F)	<u>demonstrate the soft skills desired by employers.</u>	
(2)	<u>The student evaluates the roles and responsibilities of the medical assistant as a member of the health care team. The student is expected to:</u>	
(A)	<u>explain the role of the medical assistant in various healthcare settings;</u>	
(B)	<u>discuss the scope of practice, including responsibilities and limitations of a medical assistant;</u>	
(C)	<u>explain the level of authority within the health care professional hierarchy;</u>	
(D)	<u>identify the members of an interdisciplinary healthcare team and their roles, such as licensed vocation nurse, registered nurse, primary care provider, specialists, and other allied health professionals;</u>	
(3)	<u>The student applies professional communication skills to provide information to patients and team members in a healthcare setting. The student is expected to:</u>	
(A)	<u>demonstrate the ability to report abnormal results in writing and orally to the patient's provider;</u>	
(B)	<u>demonstrate how to communicate with patients, caregivers, and the interdisciplinary team to assist in the planning, delivery, and coordination of patient-centered care;</u>	CCRS ELA II.A.1; CCRS Science III.C.1
(C)	<u>evaluate different communication techniques for responding to the needs of individuals in a diverse society;</u>	CCRS Social Studies IV.C.1, V.A.1, and V.A.; CCRS ELA III.B.1
(D)	<u>practice conflict-resolution techniques, such as cooperation, contribution, compromising, and collaboration in various situations;</u>	
(E)	<u>practice providing patient education on health-related topics, such as clean catch urine collection, the risks and benefits of vaccinations, use of a peak-flow, and nebulizer treatments;</u>	CCRS ELA III.A.2; CCRS Science III.C.1
(4)	<u>The student demonstrates knowledge of the health care ethical principles in their practice of medical assisting</u>	
(A)	<u>evaluate principles of ethical behavior, including beneficence, non-maleficence, justice, and autonomy;</u>	
(B)	<u>debate ethical issues related to technological advances in healthcare, such as stem cells, robotics in healthcare, and immunologic therapies;</u>	CCRS Science IV, B, 1 and CCSR Science IV. A.1; CCRS ELA IV.A.2
(C)	<u>evaluate ethical issues and legal ramifications related to malpractice, negligence, and liability;</u>	CCRS Science IV, B, 2

(D)	<u>summarize legal and ethical standards, including Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act;</u>	
(5)	<u>The student demonstrates knowledge of the administrative duties of a medical assistant in a healthcare setting. The student is expected to:</u>	
(A)	<u>identify the components of scheduling a patient, such as availability of test results, availability of staff, patient flow, triage, and coordination of care;</u>	
(B)	<u>discuss managing an office schedule, such as types of scheduling, under booking, over booking, cancellations, add-ons, and no-shows;</u>	
(C)	<u>define the terms used in medical billing, such as diagnosis codes, billing codes, billing cycle, co-pay, deductibles, maximum out-of-pocket, and time of service;</u>	
(D)	<u>describe the elements of completing patient registration, such as demographics, emergency contact, and insurance information;</u>	
(E)	<u>analyze different types of health insurance coverage, including Medicare, Medicaid, Tricare, CHAMPVA, private insurance, employer-based insurance, and workers compensation;</u>	
(F)	<u>identify the components of an insurance card such as, plan name, group number, ID number, patient co-pay, co-insurance, and phone numbers;</u>	
(G)	<u>define insurance plan terminology, such as prior authorization, formulary, explanation of benefits, denial, appeal, and referrals;</u>	
(H)	<u>define electronic health records systems and their components, such as demographics, financial insurance information, orders and referrals, correspondence, and results; and</u>	CCRS Science I.D.1
(I)	<u>analyze the benefits and risks of electronic health records systems.</u>	CCRS Science I.D.1
(6)	<u>The student will use appropriate medical terminology as a medical assistant.</u>	
(A)	<u>use directional terms and anatomical planes related to body structure;</u>	
(B)	<u>use occupationally specific terms such as those relating to the body systems, surgical and diagnostic procedures, diseases, and treatment; and</u>	
(C)	<u>apply knowledge of prefixes, suffixes, and root words to translate medical terms to conversational language to facilitate communication.</u>	CCRS ELA II.B.1, 2, and 3; CCRS Science III.B.3;
(7)	<u>The student will practice or model patient intake skills as a medical assistant. The student is expected to:</u>	
(A)	<u>collect and document patient information during an intake interview, including chief complaint, patient care team, past medical, surgical, social, and family histories, patient allergies, and comprehensive medication list;</u>	CCRS ELA III.B.1; CCRS ELA IV.B.2; CCRS Social Studies V.A.1; CCRS Cross Disc. I.3.D

(B)	<u>explain how to use a medical chart to identify patient care needs;</u>	
(C)	<u>identify normal ranges for vital signs per age group, including blood pressure, temperature, heart rate, respiratory rate, and oxygen saturation;</u>	
(D)	<u>measure and record accurate vital signs, including manual blood pressure, temperature, heart rate, respiratory rate, and pain scale;</u>	
(E)	<u>measure and record accurate anthropometric measurements, including height, weight, and head circumference;</u>	CCRS Math IV. A.1.; Math IV. A.1.; CCRS Science I.D.3
(F)	<u>calculate accurate conversions between different units of measurement, such as kilograms to pounds, centimeters to inches, and Fahrenheit to Celsius; and</u>	CCRS Math IV. A.1. and Math IV. B.1. and 2.
(8)	<u>The student demonstrates knowledge and application of point of care testing as a medical assistant. The student is expected to:</u>	
(A)	<u>define point of care testing;</u>	
(B)	<u>identify and correlate specimen types and collection methods, including throat swabs, capillary blood, and urine used in point of care testing;</u>	
(C)	<u>describe tests that might be performed as a point of care test in an office such as rapid strep, rapid flu, glucose, urine dip, urine pregnancy test, vision screening and electrocardiogram (EKG);</u>	CCRS Science I.C.3
(D)	<u>perform and document a vision screening using the Snellen eye chart; and</u>	
(E)	<u>locate landmarks for performing a 12-lead electrocardiogram (EKG);</u>	
(9)	<u>The student demonstrates knowledge of medication preparation and administration in a clinical setting specific to the role of a medical assistant. The student is expected to:</u>	
(A)	<u>apply the six rights of medication administration, including right patient, right medication, right dose, right time, right route, and right documentation;</u>	CCRS ELA II.A.1
(B)	<u>identify drug classifications and the indication for use;</u>	
(C)	<u>define drug-related terms, including adverse event, therapeutic response, side effect, drug interactions, and allergic reaction;</u>	
(D)	<u>calculate the amount of medication to administer based on the dosage ordered and the strength on hand;</u>	CCRS Math VIII.C.1; CCRS Math X.B.1 and X.B.3
(E)	<u>evaluate a patient for known allergies and contraindications prior to administering any medication;</u>	

(F)	<u>identify routes of medication administration, including oral, buccal, sublingual, inhaled, intranasal, otic, ophthalmic, intravaginal, anal, topical, transdermal, intradermal, subcutaneous, intramuscular, intravenous, and intrathecal;</u>	
(G)	<u>use proper technique when preparing medications for administration, including injections, oral, sublingual, inhaled, otic, ophthalmic, and topical;</u>	
(H)	<u>use proper technique when administering medications, including injections, oral, sublingual, inhaled, otic, ophthalmic, and topical;</u>	
(I)	<u>identify appropriate muscle groups for intramuscular injections including deltoid, vastus lateralis, and ventrogluteal;</u>	
(J)	<u>explain the factors that influence intramuscular injection site selection, including patient size, patient age, viscosity of medication, and muscular density;</u>	
(K)	<u>explain the factors that affect needle size and gauge selection, including medication viscosity, patient size, muscular density;</u>	
(L)	<u>demonstrate knowledge of syringe styles and markings on various size syringes, such as Luer Lock, oral, insulin, TB, 1ml, 3ml, 5ml, and 10ml syringes</u>	
(10)	<u>The student demonstrates knowledge of collecting, labeling, storing, and transferring lab specimens. The student is expected to:</u>	
(A)	<u>identify how to properly store and transfer lab specimens, such as blood, urine, fecal, and sputum samples;</u>	
(B)	<u>list the proper order of draw for blood collection tubes;</u>	
(C)	<u>select the proper collection tubes for specific types of blood tests, such as complete blood count (CBC), comprehensive metabolic panel (CMP), and lipid panel;</u>	
(D)	<u>locate veins used for blood draws;</u>	
(E)	<u>demonstrate proper technique and post procedural care for venous blood draws; and</u>	
(F)	<u>demonstrate proper labeling of lab specimens, including patient name, date-of-birth, source, date, time, and initials of collector.</u>	
(11)	<u>The student demonstrates knowledge of patient populations and their specific care considerations. The student is expected to:</u>	
(A)	<u>discuss and identify stages of development throughout a patient's lifespan;</u>	
(B)	<u>describe coping and defense mechanisms exhibited by patients, such as emotion-focused behaviors, problem-focused behaviors, denial, displacement, intellectualization, projection, rationalization, and regression;</u>	

(C)	<u>identify and discuss end-of-life considerations, such as advanced directives, power of attorney, stages of grief, and family support;</u>	
(D)	<u>practice appropriate methods of care for working with patients with mental, physical, and developmental disabilities;</u>	
(E)	<u>explain how socioeconomic factors, such as income, transportation, access to community resources, employment, and education level can influence patient outcomes; and</u>	
(F)	<u>explain how various multicultural values can affect patient care decisions.</u>	
(12)	<u>The student demonstrates knowledge of safety practices and procedures as related to medical assisting. The student is expected to:</u>	
(A)	<u>employ standard precautions in a healthcare scenario;</u>	
(B)	<u>identify various modes of disease transmission, including vector borne, air borne, direct or indirect contact, and vehicle;</u>	
(C)	<u>distinguish between the types of isolation precaution signage used to address modes of disease transmission, such as contact, droplet, and airborne;</u>	
(D)	<u>identify personal protective equipment (PPE);</u>	
(E)	<u>apply the knowledge of PPE in various situations, such as venipuncture, collecting a throat swab, or dipping urine;</u>	CCRS Science I.C.3;
(F)	<u>demonstrate proper donning and doffing of PPE;</u>	
(G)	<u>define the use of a sharps container, biohazard container, shredding bin, and trash receptacle;</u>	
(H)	<u>practice safe handling of sharps, such as not recapping after injection and prompt disposal in a sharps container;</u>	
(I)	<u>identify symptoms of anaphylaxis and the proper emergency response;</u>	
(J)	<u>explain storage requirements for medications, vaccines, and lab specimens;</u>	CCRS ELA III.B.1, 2, and 3;
(K)	<u>locate and use the safety data sheets (SDS) to retrieve information, such as proper storage, clean up, and exposure response; and</u>	
(L)	<u>define and apply knowledge of medical asepsis.</u>	

§130.XXX Respiratory Therapy I, Adopted 2021.

TEKS with edits		Work Group Comments/Rationale
(a)	<u>General Requirements. This course is recommended for 11-12 grade students. Prerequisite or corequisite: Anatomy and Physiology. Recommended prerequisite: a course from the Health Science Career Cluster.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards, industry relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>Respiratory Therapy I is a technical lab course that addresses knowledge and skills related to cardiopulmonary medicine. Respiratory Therapists are specialized healthcare practitioners trained in cardiopulmonary medicine to work therapeutically with people suffering from cardiopulmonary diseases. Students will learn basic knowledge and skills performed by respiratory therapists using equipment such as: stethoscopes, sphygmomanometers, thermometers, pulse oximeters, oxygen delivery devices (nasal cannula, masks of various types), nebulizers, and airway clearance and hyperinflation therapy devices.</u>	The equipment may require additional funds for purchase or donations from hospitals or home healthcare companies.
(4)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations:</u>	
(i)	<u>Work-based experiences/learning</u>	
(ii)	<u>Volunteering/shadowing</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student demonstrates professional standards and employability skills required by the respiratory therapy profession. The student is expected to:</u>	
(A)	<u>model professionalism associated with respiratory therapy such as adaptability, time management, punctuality, appreciation for diversity, decision-making, dedication, and organizational and leadership skills;</u>	CCRS: Science I.A.1 Cross disciplinary 1.A.2 and 1.E.1,2
(B)	<u>demonstrate effective verbal and non-verbal communication in a clear and concise manner;</u>	CCRS: Science I.E.1; ELA III.A.1, 4; ELA IV.A.1;
(C)	<u>demonstrate therapeutic communication appropriate to the situation, including individuals with language differences/barriers and sensory loss;</u>	

(D)	<u>evaluate the effectiveness of conflict resolution techniques in various situations; and</u>	CCRS: Cross-Disciplinary I.A.2
(E)	<u>exhibit the ability to cooperate, contribute, and collaborate as a member of a team.</u>	CCRS: Science I.C.1
(2)	<u>The student applies mathematics, science, English language arts, and social studies in respiratory therapy. The student is expected to:</u>	
(A)	<u>interpret complex technical material related to respiratory therapy;</u>	CCRS: Science III.B.1, 3; ELA II.B.1
(B)	<u>identify the impact of cultural diversity on patient care such as differences in race, culture, and religion;</u>	CCRS: Science III.C.1; Cross-Disciplinary I.B.1
(C)	<u>solve mathematical calculations related to respiratory therapy; and</u>	CCRS: Math: VII.D.1,2; Science II.A.4,7
(D)	<u>summarize biological and chemical processes that maintain homeostasis.</u>	CCRS: Science VI.F.1
(3)	<u>The student investigates the history and profession of respiratory therapy, including education and licensure. The student is expected to:</u>	
(A)	<u>analyze the advancement of respiratory therapy practices over time;</u>	CCRS: Science IV.A.1
(B)	<u>summarize the roles of respiratory therapists in various settings; and</u>	
(C)	<u>identify academic requirements for respiratory therapist and professional advancement such as professional organizations, credentials, certifications, registrations, licensure, continuing education, and advanced degrees.</u>	
(4)	<u>The student applies regulatory and safety standards in a respiratory therapy setting. The student is expected to:</u>	
(A)	<u>identify and conform to governmental regulations and guidelines from entities such as the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), Occupational Safety and Health Administration (OSHA), the U.S. Food and Drug Administration (FDA), The Joint-Commission (TJC), and the National Institute of Health (NIH); Texas Commission of Environmental Quality (TCEQ), Department of State and Health Services (DSHS), and American Association for Respiratory Care (AARC);</u>	CCRS: Science I.C.2,3
(B)	<u>identify infection control standard and transmission-based precautions in the patient care setting, including hand hygiene, equipment sterilization, and personal protective equipment (PPE); and</u>	CCRS: Science I.C.2.3
(C)	<u>identify industry safety standards, including body mechanics, fire prevention, electrical safety, oxygen safety, and the handling of hazardous materials.</u>	CCRS: Science I.C.2,3
(5)	<u>The student will investigate the structure and function of cardiopulmonary anatomy. The student is expected to:</u>	

(A)	<u>analyze the cardiovascular system, including ventricles, atrium, valves, blood vessels, nerves, blood flow, and cardiac conduction system;</u>	CCRS: Science VI.F.2
(B)	<u>explain the respiratory system, including airways, trachea, lungs, pulmonary vessels which aid the body in the exchange of gases;</u>	CCRS: Science VI.F.2
(C)	<u>trace the blood flow through the cardiopulmonary system; and</u>	CCRS: Science VI.F.2
(D)	<u>examine a variety of human diseases and disorders affecting the cardiopulmonary system such as chronic obstructive pulmonary disease (COPD), asthma, pneumonia, Cystic fibrosis, and lung cancer.</u>	
(6)	<u>The student has knowledge pertaining to respiratory therapy procedures. The student is expected to:</u>	
(A)	<u>demonstrate the use of breathing exercises for patients with cardiopulmonary disease such as pursed lipped breathing and diaphragmatic breathing;</u>	CCRS: Science I.C.3
(B)	<u>explain the use of hyperinflation and airway clearance therapies;</u>	CCRS: Science I.C.3; Cross Disciplinary II.E.1,2,4
(C)	<u>explain the use of tracheostomy and endotracheal tubes, and oral/nasal airway devices for assisted breathing;</u>	CCRS: Science I.C.3; Cross Disciplinary II.E.1,2,4
(D)	<u>identify anatomy of heart and lungs and proper endotracheal tube placement on X-ray;</u>	
(E)	<u>explain the use of oximetry and arterial blood-gases for patient assessment;</u>	CCRS: Science I.C.3 Cross Disciplinary II.E.1,2,4
(F)	<u>identify and explain the use of the equipment for oxygen therapies such as nasal cannula, high flow nasal cannula, simple masks, air-entrainment masks, partial rebreather, and non-rebreather; and</u>	CCRS: Science I.C.3, VI.B.5
(G)	<u>demonstrate the administration of oxygen therapy using oxygen concentrators and portable cylinders.</u>	CCRS: Science I.C.3

(7)	<u>The student recognizes cardiopulmonary pharmaceutical agents, safety and protocol measures. Student is expected to:</u>	
(A)	<u>identify medications used in respiratory therapy, including bronchodilators and inhaled corticosteroids;</u>	
(B)	<u>summarize indications, contraindications, and side effects of respiratory medications;</u>	CCRS: Cross Disciplinary I.C.1
(C)	<u>discuss delivery of respiratory medications such as nebulizers and meter dose inhalers (MDI); and</u>	CCRS: Science I.C.3
(D)	<u>assess the impact of cardiopulmonary agents on vital signs.</u>	CCRS: Science I.A.2
(8)	<u>The student implements the knowledge and skills of respiratory therapy professionals in a laboratory setting. Student is expected to:</u>	
(A)	<u>demonstrate patient assessment of vital signs, including blood pressure, pulse, respiratory rate, temperature, oxygenation, and ventilation status;</u>	CCRS: Science I.A.4; Cross Disciplinary I.D.3:
(B)	<u>demonstrate patient positioning for respiratory comfort and procedures;</u>	
(C)	<u>role play patient care techniques used in high stress respiratory therapy settings such as non-compliant, combative, and distressed patients; and</u>	CCRS: Science I.C.1; Cross Disciplinary I.E2 I.F.4: I.C.1,2
(D)	<u>demonstrate high quality cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) skills.</u>	CCRS: Cross Disciplinary I.E.2, I.F.4, I.C.1,2
(9)	<u>The student evaluates ethical behavioral standards and legal responsibilities in the respiratory therapy profession. Student is expected to:</u>	
(A)	<u>examine legal and ethical behavior standards such as Patient’s Bill of Rights, advanced directives, and the Health Insurance Portability and Accountability Act (HIPAA);</u>	CCRS: Cross Disciplinary I.F.4
(B)	<u>investigate the legal and ethical ramifications of unacceptable behavior;</u>	CCRS: Cross Disciplinary I.F.4
(C)	<u>research and describe role of professional associations, and regulatory agencies; and</u>	CCRS: English V.B.1; Cross Disciplinary I.F.3
(D)	<u>describe ethical dilemmas in health care.</u>	CCRS: Cross Disciplinary I.F.4; Science IV.B.1

§130.XXX Respiratory Therapy II, Adopted 2021

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for 12th grade students. Prerequisite: Respiratory Therapy I.	
(b)	(b) Introduction.	
(1)	Career and technical education provides content aligned with the challenging academic standards, industry relevant technical knowledge and college and career readiness skills for students to further their education and succeed in current and emerging professions.	
(2)	The Health Science Cluster focuses on preparing individuals for employment in career pathways that addresses knowledge and skills related to cardiopulmonary medicine.	
(3)	Respiratory Therapy II is a technical lab course that addresses knowledge and skills related to critical care and cardiopulmonary medicine. Respiratory Therapists are specialized healthcare practitioners trained in cardiopulmonary medicine to work therapeutically with people suffering from cardiopulmonary diseases. Students will learn advanced knowledge and skills performed by respiratory therapists using equipment such as: stethoscopes, sphygmomanometers, thermometers, pulse oximeters and monitors, oxygen delivery devices (nasal cannula, masks of various types), nebulizers, airway clearance and hyperinflation therapy devices, spirometers, and intubation mannequin heads and equipment (endotracheal tubes, laryngoscopes, stylets).	The equipment may require additional funds for purchase or donations from hospitals or home healthcare companies.
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations:	
(i)	Work-based experiences/learning	
(ii)	Volunteering/shadowing	
(5)	Statements that contain the word “including” reference content that must be mastered while those containing the phrase “such as” are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards and employability skills required by the respiratory therapy profession. The student is expected to:	
(A)	<u>model professionalism associated with respiratory therapy such as adaptability, time management, punctuality, appreciation for diversity, decision-making, dedication; and organizational and leadership skills;</u>	CCRS: Science I.A.1; Cross-Disciplinary I.A.2, I.E.1,2
(B)	<u>demonstrate effective verbal and non-verbal communication in a clear and concise manner;</u>	CCRS: Science I.E.1; ELA III.A.1, 4; ELA IV.A.1;

(C)	<u>demonstrate therapeutic communication appropriate to the situation including individuals with language differences/barriers and sensory loss;</u>	
(D)	<u>evaluate the effectiveness of conflict resolution techniques in various situations;</u>	CCRS: Cross-Disciplinary I.A.2
(E)	<u>exhibit the ability to cooperate, contribute, and collaborate as a member of a team; and</u>	CCRS: Science I.C.1
(F)	<u>explore career options for respiratory therapy and preparation necessary for employment such as creating a cover letter, and resume, completing an application, and conducting mock interviews.</u>	CCRS: ELA I.A.5; Cross-Disciplinary I.D.3
(2)	<u>The student applies mathematics, science, English language arts, and social studies in respiratory therapy. The student is expected to:</u>	
(A)	<u>analyze complex technical material related to respiratory therapy;</u>	CCRS: Science III.B.1, 3; ELA II.B.4
(B)	<u>research the impact of cultural diversity on patient care such as differences in race, culture, and religion;</u>	CCRS: Science III.C.1; Cross-Disciplinary I.B.1
(C)	<u>apply mathematical calculations related to respiratory therapy; and</u>	CCRS: Math: VII.D.1,2; Science II.A.4,7
(D)	<u>analyze biological and chemical processes that affect homeostasis in relation to cardiopulmonary diseases.</u>	CCRS: Science VI.F.1
(3)	<u>The student applies safety standards in a respiratory therapy setting. The student is expected to:</u>	
(A)	<u>evaluate and apply standards and guidelines from entities including the American Association for Respiratory Care (AARC), World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), and Texas Commission for Environmental Quality (TCEQ) as they apply to cardiopulmonary diseases;</u>	CCRS: Science I.C.2,3
(B)	<u>demonstrate infection control standard and transmission-based precautions in the laboratory setting including hand hygiene, equipment sterilization, and personal protective equipment (PPE); and</u>	CCRS: Science I.C.2.3
(C)	<u>model industry safety standards including body mechanics, fire prevention, electrical safety, oxygen safety, and the handling of hazardous materials.</u>	CCRS: Science I.C.2,3
(4)	<u>The student will explain the interactions between the cardiopulmonary and other body systems as they relate to wellness and diseases. The student is expected to:</u>	
(A)	<u>analyze the role of the autonomic nervous system in the regulation of the cardiopulmonary system as it pertains to health and illness;</u>	CCRS: Science VI.F.2
(B)	<u>analyze the role of the urinary system in the regulation of the acid-base and fluid balance in cardiopulmonary health and illness;</u>	CCRS: Science VI.F.2

(C)	<u>investigate the interactions between body systems and cardiopulmonary diseases and disorders such as Guillain-Barre’ syndrome, Myasthenia Gravis, SARS-CoV-2 (Covid), Idiopathic Pulmonary Fibrosis (IPF), Adult Respiratory Distress syndrome (ARDS), and congestive heart failure (CHF); and</u>	CCRS: Science VI.F.2
(D)	<u>differentiate between normal heart rhythms and common cardiac dysrhythmias such as ventricular fibrillation, ventricular tachycardia, and asystole attributed to malfunctions in other body systems; and</u>	CCRS: Science VI.F.1
(E)	<u>discuss the role of the respiratory therapists in the use of mechanical systems when the cardiopulmonary system fails, including non-invasive and invasive mechanical ventilators, and extracorporeal membrane oxygenation (ECMO).</u>	
(5)	<u>The student implements the knowledge and skills of a respiratory therapy professional in a laboratory setting. Student is expected to:</u>	
(A)	<u>demonstrate breathing exercises commonly used for patients with cardiopulmonary disease;</u>	CCRS: Science I.C.3; Cross Disciplinary II.E.1,2,4
(B)	<u>demonstrate airway management skills in a laboratory setting using equipment for intubation and airway maintenance such as endotracheal and tracheostomy tubes, endotracheal/tracheal suction catheters, laryngoscopes, bag valve mask device, oral and nasal airways, tube fasteners, or tape;</u>	CCRS: Science I.C.3; Cross Disciplinary II.E.1,2,4
(C)	<u>demonstrate airway clearance and hyperinflation therapies in a laboratory setting using equipment such as oscillating positive end pressure devices, high frequency chest wall oscillation devices, and incentive spirometer;</u>	CCRS: Science I.C.3; Cross Disciplinary II.E.1,2,4
(D)	<u>differentiate between normal lung and pathology in a chest X-ray;</u>	CCRS: Science I.C.3
(E)	<u>recognize typical and atypical arterial blood-gas values related to patient oxygenation and ventilation status;</u>	CCRS: Science I.C.3, VI.F.2; Cross Disciplinary II.E.1,2,4
(F)	<u>demonstrate the use of the oxygen therapy equipment such as nasal cannula, high flow nasal cannula, simple masks, air-entrainment masks, partial rebreather, non-rebreather, non-invasive ventilator;</u>	CCRS: Science I.C.3
(G)	<u>demonstrate physical patient assessment including inspection, auscultation, palpitation, and percussion;</u>	CCRS: Science I.C.3
(H)	<u>interpret and create a basic care plan for asthma and chronic obstructive pulmonary disease (COPD);</u>	Cross-Disciplinary II.B.1; ELA I.A.2
(I)	<u>role play respiratory therapists’ role during emergency situations such as rapid response team and advanced cardiac life support; and</u>	CCRS: Cross-Disciplinary I.C.1-3, I.E.2

(J)	<u>role play the respiratory therapists' role in patient education regarding the disease process, proper use of medication, and respiratory equipment.</u>	CCRS: Cross-Disciplinary I.C.1-3, I.E.2
(6)	<u>The student understands cardiopulmonary pharmaceutical agents, safety, and application. Student is expected to:</u>	
(A)	<u>research the application of medications used in respiratory therapy, including bronchodilators, inhaled corticosteroids, mucolytics, biologics, inhaled antibiotics, inhaled pulmonary vasodilators and antivirals;</u>	CCRS: Cross Disciplinary II.C.2
(B)	<u>evaluate indications, contraindications, and side effects of respiratory medications;</u>	CCRS: Cross Disciplinary I.C.1; Science VI.F.1
(C)	<u>demonstrate delivery methods of medication such as nebulizers and meter dose inhalers (MDI); and</u>	CCRS: Science I.C.3
(D)	<u>evaluate patient response to therapy before, during, after respiratory treatments such as heart rate, blood pressure, respiration, and breath sounds.</u>	CCRS: Science I.A.2
(7)	<u>The student evaluates ethical behavioral standards and legal responsibilities in the respiratory therapy profession. Student is expected to:</u>	
(A)	<u>analyze legal and ethical scenarios as it relates to Patient's Bill of Rights, and the Health Insurance Portability and Accountability Act (HIPAA);</u>	CCRS: Cross Disciplinary I.F.4;
(B)	<u>evaluate the legal and ethical ramifications of unacceptable behavior; and</u>	CCRS: Cross Disciplinary I.F.4;
(C)	<u>describe ethical dilemmas in respiratory therapy such as advanced directives, palliative care, hospice, and end-of-life care.</u>	CCRS: Cross Disciplinary I.F.4; Science IV.B.1
(8)	<u>The student identifies academic preparation and skills necessary for employment in the field of respiratory therapy. The student is expected to:</u>	
(A)	<u>research academic requirements for professional advancement such as credentials, certifications, licensure, registration, continuing education, and advanced degrees; and</u>	CCRS: Cross Disciplinary I.D.2
(B)	<u>research the path to obtain and maintain licensure and credentialing.</u>	

§130.225. Medical Microbiology.

TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 10-12. Prerequisites: Biology and Chemistry. Recommended prerequisite: a course from the Health Science Career Cluster. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry and relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and or emerging professions.	
(2)	The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.	
(3)	The Medical Microbiology course is designed to explore the microbial world, studying topics such as pathogenic and non-pathogenic microorganisms, laboratory procedures, identifying microorganisms, drug resistant organisms, and emerging diseases.	
(4)	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 currently scientifically testable. 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.	
(5)	Scientific hypotheses and theories. Students are expected to know that: 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.	

(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	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.	
(6)	<p>Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.</p> <p>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).</p>	
(A)	Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.	
(B)	Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.	
(7)	<p>Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. 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).</p> <p>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.</p>	

(8)	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. 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, while models allow for boundary specification and provide a tool for understanding the ideas presented. 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.	
(9)(8)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(10)(9)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and	
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team.	
(C)	<u>locate, evaluate, and interpret career options, opportunities and postsecondary transitions relating to the field of Microbiology.</u>	
(2)	<u>Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena, or design solutions using appropriate tools and models. The student is expected to:</u>	Scientific and engineering practices approved by the SBOE in November 2020 for science high school courses.
(A)	<u>ask questions and define problems based on observations or information from text, phenomena, models, or investigations;</u>	
(B)	<u>apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;</u>	
(C)	<u>use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;</u>	

(D)	<u>use appropriate tools such as microscopes, slides, streak plates, inoculating loops, bunsen burners, striker, hot plate, petri dish, agar and other growth mediums, reactive agents, Personal Protective Equipment, disposable pipettes, lab glassware and instruments, bacterium, enzymes, live microbial agents, computer software and probes, incubator, and autoclave;</u>	
(E)	<u>collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;</u>	
(F)	<u>organize quantitative and qualitative data using equipment such as graphing calculator, computer software and probes, graphic organizers;</u>	
(G)	<u>develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and</u>	
(H)	<u>distinguish among scientific hypotheses, theories, and laws.</u>	
(3)	<u>Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:</u>	
(A)	<u>identify advantages and limitations of models such as their size, scale, properties, and materials;</u>	
(B)	<u>analyze data by identifying significant statistical features, patterns, sources of error, and limitations;</u>	
(C)	<u>use mathematical calculations to assess quantitative relationships in data; and</u>	
(D)	<u>evaluate experimental and engineering designs.</u>	
(4)	<u>Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:</u>	
(A)	<u>develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;</u>	
(B)	<u>communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and</u>	
(C)	<u>engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.</u>	

(5)	<u>Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:</u>	
(A)	<u>analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;</u>	
(B)	<u>relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content; and</u>	
(C)	<u>research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) or health science field in order to investigate STEM careers.</u>	
(2)	The student, for at least 40% of instructional time, conducts field and laboratory investigations 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:	Replaced with scientific and engineering practices
(A)	demonstrate safe practices during laboratory and field investigations; and	
(B)	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
(3)	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)(4) 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 that have been tested over a wide variety of conditions are incorporated into theories;	
(C)	know that 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 are created and new technologies emerge;	

(D)	distinguish between scientific hypothesis 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, gel electrophoresis apparatuses, micropipettors, 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;	
(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;	
(I)	dispose of all biological material in the proper biohazard containers; and	
(J)	employ standard precautions, including proper protective equipment during all laboratory exercises.	
(4)	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;	
(B)	communicate and apply scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, and marketing materials;	
(C)	draw inferences based on data related to promotional materials for products and services;	
(D)	evaluate the impact of scientific research on society and the environment;	

(E)	evaluate models according to their limitations in representing biological objects or events; and	
(F)	research and describe the history of science and contributions of scientists.	
(6)(5)	The student describes the relationships between microorganisms and health and wellness in the human body. The student is expected to:	
(A)	<u>examine</u> research and describe the historical development of microbiology as it relates to health care of an individual <u>in modern medicine</u> ; and	CCRS, IV,C-1; III,C
(B)	<u>compare the</u> research roles, functions, and responsibilities of agencies governing infectious disease control.	(already in Principles of Health Science); III, D, 1-2
(7)(6)	The student is expected to perform and analyze results in the microbiology laboratory. The student is expected to:	
(A)	classify microorganisms using a dichotomous key;	VI, E-1; V, D-1 (classify)
(B)	<u>prepare slides and discuss</u> explain the difference between Gram positive and Gram negative bacteria <u>such as</u> regarding the bacterial cell wall, <u>and the use of oxygen</u> ;	VI, E-1; VI, E-1; VI, A-6; VI, A-1; III, B-3 Need lab experience in this SE
(C)	<u>prepare and</u> identify chemical processes of microorganisms <u>such as enzyme catalyst and osmotic potential</u> ;	VI, A-6;
(D)	<u>identify and discuss technologies used in a laboratory setting such as Polymerase Chain Reaction (PCR), Serological, Enzyme-Linked Immunoassay (ELISA) and Electrophoresis.</u>	
(E)(4)	<u>prepare plates or active mediums</u> create <u>recognize the factors required for and to</u> differentiate the factors required for microbial reproduction and growth; such as using a streak plate, a broth, or other active medium ;	VI, A-1, 2, 4 & 5; VI, E-1; V, D-1
(F)(E)	identify the normal flora microorganisms of the human body;	VI, F-1; V, D-1
(G)(F)	<u>differentiate and identify</u> distinguish between examine the <u>different</u> pathogens, <u>including</u> opportunistic pathogens, hospital-acquired infections, <u>community acquired infections</u> , and colonizing microorganisms;	VI, E-1
(H)(G)	<u>isolate colonies and</u> describe the morphology of microorganisms; <u>and</u>	VI, E-1; A-1; V, D-1
(H)	interpret Gram stain results ;	VI, A-6; I, D-3; I, E-2

(H)	discuss the results of laboratory procedures such as biochemical reactions that are used to identify microorganisms; and	I, E,1-2; VI, B-2; VI, B-5; VII, E 1-6; VI, F-1-2 Duplicative of 7B
(I)(H)	<u>interpret and</u> explain the role of the <u>culture and</u> sensitivity report provided to the clinician by the microbiology department.	I, E-2; III, B-3; III, C-1 Removed the old H
(8)(7)	The student examines the role of microorganisms in infectious diseases. The student is expected to:	
(A)	outline <u>and explain</u> the infectious process, including how pathogenic microorganisms affect human body systems;	VI, G-3; VI, C-1; VI, F-1,2; V, C-1
(B)	categorize diseases caused by bacteria, fungi, viruses, protozoa, rickettsia, arthropods, and helminths;	VI, E-1; V, D-1
(C)	explain <u>and interpret</u> the body's immune response and defenses against infection;	I, E-1&2; V, C-1; VI, B-4, 6; VI, F-1; VII, E-4-5; VII, H-2
(D)	<u>prepare a bacterial colony and</u> evaluate the effects of anti-microbial agents such as narrow and broad spectrum antibiotics;	VI, E-1; VI, A-6; VI, A-1; III, B-3
(E)	examine <u>the environmental and social causes of the emerging and</u> reemergence of diseases such as <u>corona viruses, Ebola</u> , malaria, tuberculosis, and polio;	X, A-5; C-1; E-1, 2, 4 &5; VI, G-1, 3; D, 4;C-1-2
(F)	identify common bacterial infections from hospital-acquired infection and community-acquired infections such as Clostridium difficile and Staphylococcus aureus;	VI, E-1 Moved hospital acquired to 6 F
(F)(G)	<u>research and discuss</u> investigate drug-resistant microorganisms, <u>including such as</u> carbapenem-resistant <i>Enterobacteriaceae</i> , methicillin-resistant <i>Staphylococcus aureus</i> , vancomycin-intermediate/resistant <i>Staphylococci aureus</i> , vancomycin-resistant enterococci, and emergent antibiotic-resistant superbugs; and	VI, E-1; VI, A-6; VI, A-1; III, B-3
(G)(H)	outline the role of the governing agencies in monitoring and establishing guidelines based on the spread of infectious diseases.	III, D, 1-2; IV, B-1
(9)	<u>The student recognizes the importance of maintaining a safe environment and eliminating hazardous situations. The student is expected to:</u>	
(A)	<u>identify and relate microbiological safety practices in the industry standards, including proper disposal, handling, and disinfecting biological waste, and containment levels;</u>	
(B)	<u>identify and apply the appropriate personal protection equipment and transmission-based precautions, including droplet, contact, and airborne;</u>	
(C)	<u>identify and apply standard precautions;</u>	

(D)	<u>sterilize laboratory, medical equipment, and instruments in accordance with industry standards; and</u>	
(E)	<u>define and select the different mechanisms of decontamination such as antiseptics, disinfection, and sterilization.</u>	

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§130.XXX Leadership and Management in Nursing		
TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 10-12. Prerequisites: Biology and Chemistry. Recommended prerequisite: a course from the Health Science Career Cluster.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>This course is designed to explore leadership and management in nursing, studying topics such as ethics, educational levels, career paths, regulatory bodies, and personal and professional leadership skills.</u>	
(4)	<u>Students are encouraged to participate in extended learning experiences such as Health Occupations Students of America (HOSA), Skills USA, career and technical student organizations, and other leadership or extracurricular organizations.</u>	
(5)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	
(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:</u>	
(A)	<u>demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and</u>	
(B)	<u>exhibit the ability to cooperate, contribute, and collaborate as a member of a team.</u>	
(2)	<u>The student understands the different educational levels of licensed nurses and applicable careers and career pathways. The student will be expected to:</u>	
(A)	<u>compare the differences between the educational requirements and roles of a licensed vocational nurse and a registered nurse;</u>	

(B)	<u>diagram the educational requirements of a registered nurse, including diploma, associate degree, bachelor degree, masters degree, and doctoral degree;</u>	
(C)	<u>identify the different specializations of the masters educated nurse such as family nurse practitioner, nurse informaticist, nurse midwife, and nurse educator;</u>	
(D)	<u>differentiate the roles of the Doctor of Philosophy (PhD) and the Doctor of Nursing Practice (DNP) prepared nurse; and</u>	
(E)	<u>develop a six-year career plan.</u>	
(3)	<u>The student understands the functions of leadership in nursing. The student will be expected to:</u>	
(A)	<u>create a concept map that includes the relationship and progression within the hierarchy of nursing leadership;</u>	
(B)	<u>identify critical skills and competencies for each level in the hierarchy of nursing leadership;</u>	
(C)	<u>present and debate the impact of each level of nursing in the hierarchy leadership; and</u>	
(D)	<u>investigate different leadership styles and how they are used in different situations.</u>	
(4)	<u>The student demonstrates personal and professional leadership qualities and competencies. The student is expected to:</u>	
(A)	<u>identify different personal growth practices such as self-reflection, introspection, self-care, and journaling;</u>	
(B)	<u>demonstrate intrapersonal skills such as empathy, patience, risk-taking, confidence, integrity, personal values and ethics, punctuality, and goal setting;</u>	
(C)	<u>debate personal and professional values and ethics;</u>	
(D)	<u>research and develop a plan to coach and mentor others; and</u>	
(E)	<u>evaluate decision making and problem-solving processes such as conflict management, delegation, patient satisfaction, patient safety, and patient advocacy.</u>	
(5)	<u>The student demonstrates the appropriate use of communication techniques. The student is expected to:</u>	
(A)	<u>examine communication platforms and apply the appropriate professional response in different scenarios such as telephone, email, text, electronic health records, and face-to-face;</u>	

(B)	<u>demonstrate professional written and verbal communication skills for individuals, teams, and systems such as Situation Background Assessment and Recommendation (SBAR) and Acknowledge Introduce Duration Explanation and Thank you (AIDET);</u>	
(C)	<u>determine appropriate communication methods for urgent, emergent, non-urgent situations, and team strategies and tools to enhance performance and patient safety (TeamSTEPPS); and</u>	
(D)	<u>demonstrate receiving and giving constructive criticism.</u>	
(6)	<u>The student understands the definition and application of time management. The student is expected to:</u>	
(A)	<u>create a daily task list that includes duties and responsibilities which must be completed and a prioritized agenda that includes required meetings, and communications;</u>	
(B)	<u>differentiate goals that advance professional growth and responsibility and non-professional goals;</u>	
(C)	<u>identify factors that inhibit the good use of time and apply strategies that mitigate the loss of time; and</u>	
(D)	<u>manage long- and short-term personal and professional schedules by creating and updating a yearly calendar.</u>	
(7)	<u>The student understands how to build and manage interdisciplinary teams and facilitate teamwork. The student is expected to:</u>	
(A)	<u>define and explain the purpose of a team and the role of each member;</u>	
(B)	<u>develop a plan for creating a team through team building exercises, culture and climate awareness, and interpersonal skills;</u>	
(C)	<u>define and apply techniques to manage personal conflict within teams; and</u>	
(D)	<u>describe the stages of team evolution such as forming, storming, norming, performing, and transforming.</u>	
(8)	<u>The student understands regulatory agencies and boards and their related requirements. The student is expected to:</u>	
(A)	<u>identify the role and responsibility of the Board of Nursing, including graduation and licensure requirements;</u>	

(B)	<u>identify federal, state, and local regulatory agencies such as a local hospital, Health and Human Services, The Joint Commission, and Center for Medicare and Medicaid Services;</u>	
(C)	<u>define and identify the nursing scope of practice;</u>	
(D)	<u>compare the difference between a certification and licensure; and</u>	
(E)	<u>compare the role of the Board of Nursing and professional nursing organizations.</u>	

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§130.XXX Practicum in Nursing		
TEKS with edits		Work Group Comments/Rationale
(a)	<u>General requirements. This course is recommended for students in Grades 11-12. Required prerequisites: Biology, Chemistry, and at least one course from the Health Science Cluster. Recommended prerequisites: Science of Nursing, Medical Terminology, and Anatomy and Physiology. Students shall be awarded two credits for successful completion of this course.</u>	
(b)	<u>Introduction.</u>	
(1)	<u>Career and technical education instruction provides content aligned with challenging academic standards, industry relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.</u>	
(2)	<u>The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.</u>	
(3)	<u>Practicum in Nursing course is designed to give students practical applications of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.</u>	<u>Flexibility to accomplish the student expectations as observable, simulation, or hands-on experiences.</u>
(4)	<u>To pursue a career in the nursing industry, students should learn to reason, think critically, make decisions, solve problems, and communicate effectively. Students should recognize that quality health care depends on the ability to work well with others.</u>	
(5)	<u>The health care industry is comprised of diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems that function individually and collaboratively to provide comprehensive health care. Students recognize the employment opportunities, technology, and safety requirements of each system. Students are expected to apply the knowledge and skills necessary to pursue a health science certification or licensure through further education and employment.</u>	
(6)	<u>Professional integrity in the health care industry is dependent on acceptance of ethical and legal responsibilities. Students are expected to employ their ethical and legal responsibilities, recognize limitations, and understand the implications of their actions.</u>	
(7)	<u>Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</u>	
(8)	<u>Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.</u>	

(c)	<u>Knowledge and skills.</u>	
(1)	<u>The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:</u>	
(A)	<u>demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and</u>	
(B)	<u>exhibit the ability to cooperate, contribute, and collaborate as a member of a team.</u>	
(2)	<u>The student applies mathematics, science, English language arts, and social sciences in nursing. The student is expected to:</u>	
(A)	<u>solve mathematical calculations appropriate to situations in a health-related environment;</u>	
(B)	<u>communicate using medical terminology;</u>	
(C)	<u>express ideas in writing and develop skills in documentation;</u>	
(D)	<u>interpret complex technical material related to the health science industry;</u>	
(E)	<u>summarize biological and chemical processes that maintain homeostasis;</u>	
(F)	<u>explain changes in structure due to trauma and disease; and</u>	
(G)	<u>research the global impact of disease prevention and cost containment.</u>	
(3)	<u>The student models ethical behavior standards and legal responsibilities. The student is expected to:</u>	
(A)	<u>apply facility and industry standard policies and procedures, including HIPAA;</u>	
(B)	<u>research or present case studies related to legal and ethical issues in health care;</u>	
(C)	<u>recognize and maintain professional boundaries of patient relationships; and</u>	
(D)	<u>model safe practices, including infection control, proper body mechanics and patient handling.</u>	
(4)	<u>The student explores the knowledge and skills of the nursing process for assessment. The student is expected to:</u>	
(A)	<u>perform and assess subjective data during a patient intake in a clinical or simulated setting by:</u>	
(i)	<u>performing a complete health history, including family and social data; and</u>	
(ii)	<u>assessing the chief complaint, history of present illness, past medical history, and a review of systems; and</u>	

(B)	<u>perform and assess objective data during a patient intake in a clinical or simulated setting by:</u>	
(i)	<u>demonstrating the skill of obtaining core vital signs;</u>	
(ii)	<u>demonstrating the skill of obtaining and assessing height and weight, and weight fluctuations; and</u>	
(iii)	<u>demonstrating the performance of a head-to-toe physical assessment.</u>	
(5)	<u>The student explores the knowledge and skills of the nursing process for implementation or intervention. The student is expected to:</u>	
(A)	<u>demonstrate the proper use and application of medical equipment related to oxygen therapy, glucometer, pulse oximeter, catheter, incentive spirometer, mobility devices, patient handling devices, and electric hospital beds and chairs;</u>	
(B)	<u>perform patient care, including activities of daily living (ADL), patient positioning, range of motion, basic first aid, patient transfers, patient transport;</u>	
(C)	<u>acquire basic life support (BLS) certification as required by industry standards; and</u>	
(D)	<u>demonstrate the skills necessary to track nutrition and elimination such as input and output (I&O) and types of diets.</u>	
(6)	<u>The student explores the knowledge and skills of the nursing process of evaluation and re-evaluation. The student is expected to:</u>	
(A)	<u>compare normal and abnormal data;</u>	
(B)	<u>report trends and abnormal findings to appropriate personnel according to facility protocols; and</u>	
(C)	<u>explain the significance of abnormal findings.</u>	
(7)	<u>The student explores the knowledge and skills of the nursing process of documentation. The student is expected to:</u>	
(A)	<u>document the objective data using medical terminology;</u>	
(B)	<u>document the subjective data using medical terminology; and</u>	
(C)	<u>record documentation using various models such as Situation Background Assessment and Recommendation (SBAR), Acknowledge Introduce Duration Explanation and Thank you (AIDET), and Subjective, Objective, Assessment Plan (SOAP).</u>	

(8)	<u>The student is expected to provide care for diverse populations such as varying age groups and persons with physical limitations and mental health needs in clinical or simulated environment. The student is expected to:</u>	
(A)	<u>demonstrate appropriate usage of verbal and non-verbal communication techniques; and</u>	
(B)	<u>apply appropriate techniques for assessments and care.</u>	
(9)	<u>The student is expected to provide culturally appropriate care. The student is expected to:</u>	
(A)	<u>apply appropriate verbal and non-verbal communication skills; and</u>	
(B)	<u>demonstrate patient interaction strategies for assessments and care.</u>	

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