Chapter 127. Texas Essential Knowledge and Skills for Career Development and Career and Technical Education

Subchapter J. Health Science

Statutory Authority: The provisions of this Subchapter J issued Texas Education Code, §§7.102(c)(4), 28.002(a) and (c), and 28.025, unless otherwise noted.

§127.461. Principles of Health Science (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9 and 10. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Principles of Health Science course is designed to provide an overview of the therapeutic, diagnostic, health informatics, support services, and biotechnology research and development systems of the health care industry.

(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) 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.

(6) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(7) 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.

(d) Knowledge and skills.

(1) The student applies mathematics, science, English language arts, and social studies in health science. The student is expected to:

(A) convert units between systems of measurement;

(B) apply data from tables, charts, and graphs to provide solutions to health-related problems;

(C) interpret technical material related to the health science industry;

(D) organize, compile, and write ideas into reports and summaries;

(E) plan and prepare effective oral presentations;

(F) formulate responses using precise language to communicate ideas;

(G) describe biological and chemical processes that maintain homeostasis;

(H) identify and analyze principles of body mechanics and movement such as forces and the effects of movement, torque, tension, and elasticity on the human body;

(I) identify human needs according to Maslow's Hierarchy of Human Needs;

(J) describe the stages of development related to the life span;

(K) identify the concepts of health and wellness throughout the life span;

(L) analyze and evaluate communication skills for maintaining healthy relationships throughout the life span;

(M) research the historical significance of health care;

(N) describe the impact of health services on the economy;

(O) analyze the impact of local, state, and national government on the health science industry;

(P) identify diverse and cultural influences that have impacted contemporary aspects of health care delivery; and

(Q) research and compare practices used by various cultures and societies to solve problems related to health.

(2) The student uses verbal and nonverbal communication skills. The student is expected to:

(A) identify components of effective and non-effective communication;

(B) demonstrate effective communication skills for responding to the needs of individuals in a diverse society;

(C) evaluate the effectiveness of conflict-resolution techniques in various situations; and

(D) accurately interpret, transcribe, and communicate medical vocabulary using appropriate technology.

(3) The student implements the leadership skills necessary to function in a democratic society. The student is expected to:

(A) identify traits of a leader;

(B) demonstrate leadership skills, characteristics, and responsibilities of leaders such as goal-setting and team building; and

(C) demonstrate the ability to effectively conduct and participate in meetings.

(4) The student assesses career options and the preparation necessary for employment in the health science industry. The student is expected to:

(A) locate, evaluate, and interpret career options and employment information; and

(B) recognize the impact of career decisions, including the causes and effects of changing employment situations.

(5) The student identifies academic preparation and skills necessary for employment as defined by the health science industry. The student is expected to identify academic requirements for professional advancement such as certification, licensure, registration, continuing education, and advanced degrees.

(6) The student identifies the career pathways related to health science. The student is expected to:

(A) compare health science careers within the diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems; and

(B) identify the collaborative role of team members between systems to deliver quality health care.

(7) The student examines the role of the multidisciplinary team in providing health care. The student is expected to:

(A) explain the concept of teaming to provide quality health care; and

(B) examine the role of professional organizations in the preparation and governance of credentialing and certification.

(8) The student interprets ethical behavior standards and legal responsibilities. The student is expected to:

(A) compare published professional codes of ethics and scope of practice;

(B) explain principles of ethical behavior and confidentiality, including the consequences of breach of confidentiality;

(C) discuss ethical issues related to health care, including implications of technological advances;

(D) examine issues related to malpractice, negligence, and liability; and

(E) research laws governing the health science industry.

(9) The student recognizes the rights and choices of the individual. The student is expected to:

(A) identify situations related to autonomy;

(B) identify wellness strategies for the prevention of disease;

(C) evaluate positive and negative effects of relationships on physical and emotional health such as peers, family, and friends in promoting a healthy community;

(D) review documentation related to rights and choices; and

(E) demonstrate an understanding of diversity and cultural practices influencing contemporary aspects of health care.

(10) The student recognizes the importance of maintaining a safe environment and eliminating hazardous situations. The student is expected to:

(A) identify governing regulatory agencies 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) identify industry safety standards such as standard precautions, fire prevention and safety practices, and appropriate actions to emergency situations; and

(C) relate safety practices in the health science industry.

(11) The student identifies the technology used in the diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems. The student is expected to:

(A) research and identify technological equipment used in the diagnostic, therapeutic, health informatics, support services, and biotechnology research and development systems;

(B) identify potential malfunctions of technological equipment; and

(C) recognize and explain the process for reporting equipment or technology malfunctions.

Source: The provisions of this §127.461 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.462. Principles of Bioscience (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9 and 10. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) Principles of Bioscience provides an overview of biotechnology, bioengineering, and related fields. Topics related to genetics, proteins, and nucleic acids reinforce the applications of Biology content. Students will further study the increasingly important agricultural, environmental, economic, and political roles of bioenergy and biological remediation; the roles of nanoscience and nanotechnology in biotechnology medical research; and future trends in biological science and biotechnology.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student explores biotechnology career opportunities. The student is expected to:

(A) determine interests in the field of biotechnology through explorations such as career assessments, interactions with biotechnology professionals, media, and literature;

(B) identify career options in the field of biotechnology;

(C) identify reliable sources of career information;

(D) research and communicate interests, knowledge, educational level, abilities, and skills needed in a biotechnology-related occupation;

(E) identify conventional and non-conventional career opportunities that match interests and aptitudes;

(F) research applications of biotechnology in medicine, the environment, and settings such as pharmaceutical, agricultural, and industrial;

(G) use technology to research biotechnology topics, including identifying and selecting appropriate scholarly references; and

(H) analyze and discuss professional publications such as academic and peer-reviewed journals and technical reports.

(2) The student evaluates ethical and legal issues in biotechnology. The student is expected to:

(A) identify current ethical and legal issues;

(B) describe the history of biotechnology and related ethical and legal issues;

(C) discuss legal and technology issues for at least two biotechnology-related areas; and

(D) analyze examples of biotechnology views supported by objective and subjective sources such as scientific data, economic data, and sociocultural contexts.

(3) The student examines federal, state, local, and industry regulations as applied to biotechnological processes through researching credible sources. The student is expected to:

(A) identify local, state, and federal agencies responsible for regulating the biotechnology industry such as the U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the U.S. Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC);

(B) identify professional organizations participating in the development of biotechnology policies;

(C) identify and define terms related to biotechnology regulations such as Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP), and Globally Harmonized System (GHS); and

(D) outline the methods and procedures used in biotechnology laboratories to follow local, state, and federal regulations such as those in the agricultural and health areas.

(4) The student demonstrates knowledge of the business climate for biotechnology industry sectors in the current market. The student is expected to:

(A) identify professional publications;

(B) identify the various biotechnology industry sectors;

(C) investigate and report on career opportunities in the biotechnology industry sectors; and

(D) identify professional organizations such as those at the local, state, and national levels.

(5) The student researches and exhibits employability skills that support a career in the biotechnology industry. The student is expected to:

(A) demonstrate verbal, non-verbal, written, and electronic communication skills;

(B) demonstrate skills used to secure and maintain employment;

(C) demonstrate appropriate workplace etiquette;

(D) display productive work habits and attitudes; and

(E) identify appropriate safety equipment and practices as outlined in Texas Education Agency-approved and industry-approved safety standards such as the use of personal protective equipment (PPE) and safety data sheets (SDS).

(6) The student investigates how biotechnology impacts the origins of waste and resource recovery. The student is expected to:

(A) identify biotechnology manufacturing processes and their end products, including waste and marketable products;

(B) explore the impacts of waste on biotic and abiotic factors in the environment such as effects on biological life cycles and pollution from nonbiodegradable single-use materials and microplastics;

(C) analyze the results of manufacturing refuse;

(D) explain the negative impacts of waste with respect to the individual, society, and the global population;

(E) investigate solutions to waste through bioremediation; and

(F) investigate evidence supporting waste management through regulations, public policy, and technology development.

(7) The student examines the relationship of biotechnology to the development of commercial products. The student is expected to:

(A) identify applications of agricultural biotechnology such as selective breeding of livestock and plants, aquaculture, horticultural products, and genetically modified organisms;

(B) identify applications of industrial biotechnology such as fermented food and beverages, genetically engineered proteins for industry, biocatalysts, bio polymers, biosensors, bioremediation, and biofuels;

(C) identify applications of medical and pharmaceutical biotechnology such as genetically modified cells, antibodies, vaccine and gene therapy, genetic testing for human disease/disorders, three-dimensional bio-printing, and medicines from plants, animals, fungi, and bacteria;

(D) identify applications of research and development in biotechnology such as deoxyribonucleic acid (DNA) and protein synthesis and sequencing, genetic testing and screening, DNA identification, RNAi, siRNA, miRNA, the CRISPR/Cas9 system, and synthetic biology;

(E) identify the applications of biotechnology in the fields of forensics, law enforcement, nanotechnology, and bioinformatics;

(F) research ethical considerations, laws, and regulations for biotechnological applications such as bioinformatics, genetic engineering, and nanotechnology; and

(G) identify the function of laboratory equipment, including a microscope, thermocycler, pH meter, hot plate stirrer, electronic balance, autoclave, centrifuge, transilluminator, micropipette, incubator, electrophoresis unit, vortex mixer, water bath, laboratory glassware, biosafety cabinet, and chemical fume hood.

Source: The provisions of this §127.462 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.472. Introduction to Pharmacy Science (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2026-2027 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9 and 10. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Introduction to Pharmacy Science course is designed to provide an overview of the history of the pharmacy profession, legal and ethical aspects of pharmacy, and the skills necessary to work

in the field of pharmacy. The course addresses certifications/registration and state and federal regulations and rules pertaining to the field. Students acquire a foundational understanding of medical terminology and math, anatomy and physiology, pathophysiology, pharmacology, and wellness as they pertain to pharmacy sciences.

(A) 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 healthcare depends on the ability to work well with others.

(B) Professional integrity in the health science industry is dependent on acceptance of ethical responsibilities. Students employ their ethical responsibilities, recognize limitations, and understand the implications of their actions.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student researches the history of medicine and pharmacy and how it compares to modern practices. The student is expected to:

(A) identify beliefs associated with illness and medicine from 440 BC through AD 1600;

(B) discuss supernatural explanations for illness and describe treatments, including herbal remedies, that were common prior to the Enlightenment period in Western Civilization;

(C) describe the advancements of the Enlightenment Period in Western Civilization in medical science;

(D) describe eighteenth and nineteenth century medicine, including bloodletting, purging, blistering, inoculation, amputation, and surgery and how major wars influenced medicine; and

(E) identify the pharmacological and medical advancements in the United States of America and Texas and their benefits.

(2) The student explains the ethical and legal responsibilities of pharmacists and pharmacy technicians. The student is expected to:

(A) describe basic laws and regulations that govern pharmacy at the state and federal level;

(B) describe legal terms, including medical malpractice, negligence, mislabeling, adverse drug event (ADE), and wrongful death, and consequences associated with medication errors, including civil lawsuits, professional disciplinary action, and criminal charges, related to dispensing and compounding medications;

(C) differentiate between negligence, product liability, contributory negligence, and strict liability;

(D) differentiate between the roles and responsibilities of a pharmacist and a pharmacy technician;

(E) explain the role of pharmacists in managing opioid therapies, addressing misuse, and promoting safe and effective pain management;

(F) describe why maintaining confidentiality of patient information is vital and summarize the Health Insurance Portability and Accountability Act (HIPAA);

(G) identify tort law and explain how HIPAA relates to medical negligence cases; and

(H) define professional liability.

(3) The student demonstrates professionalism and effectively communicates with healthcare workers and patients. The student is expected to:

(A) define appropriate and professional attire required for laboratory work;

(B) describe appropriate hygiene expected of pharmaceutical professionals;

(C) discuss professional attitudes and behaviors expected of pharmacy employees;

(D) identify the key characteristics of effective and ineffective communication in pharmacy practice;

(E) accurately interpret, transcribe, and communicate medical vocabulary using appropriate technologies;

(F) identify ways to eliminate barriers to effective communication in a pharmacy setting; and

(G) identify communication skills needed to work with individuals who are terminally ill, intellectually disabled or hearing and vision impaired or have other impairments in a pharmacy setting.

(4) The student examines skills, training, and certifications necessary to work in the field of pharmacy. The student is expected to:

(A) explain how time management, stress management, and change management skills can support the ability to thrive in a continuously evolving pharmacy profession;

(B) analyze applicability of interpersonal skills, including negotiation skills, conflict resolution, customer service, and teamwork within a pharmacy setting;

(C) demonstrate problem-solving skills by developing and implementing effective solutions to pharmacy challenges within a specified time frame;

(D) examine the minimum practice standards set by the Texas State Board of Pharmacy (TSBP) for retail and independent pharmacies and identify the similarities and differences between the two practices;

(E) explain methods to maintain competency in the pharmacy industry through continuing education and continuing professional development; and

(F) compare various career paths in pharmacy, including pharmacist, pharmacy technician, sales representative, and pharmaceutical research.

(5) The student uses appropriate medical vocabulary to communicate effectively with other healthcare professionals. The student is expected to:

(A) identify the various routes of drug medication administration, including oral, injection, topical, buccal, suppository, mucosal, intravenous, interosseous, nebulization, and intrathecal;

(B) differentiate between the various classes of drugs;

(C) define prefixes, roots, suffixes, and abbreviations common to the pharmacy profession;

(D) define common terms associated with pharmacology; and

(E) apply knowledge of word roots, prefixes, and suffixes to comprehend unfamiliar terms in pharmacy science.

(6) The student uses mathematical calculations and systems of measurement to solve problems in pharmacy. The student is expected to:

(A) perform medication calculations using different systems of measurement, including metric, apothecary, and household systems;

(B) convert units within and between the metric and imperial measurement systems;

(C) convert measurements between the metric, apothecary, and avoirdupois systems; and

(D) perform multistep ratio and proportion drug concentration problems.

(7) The student understands the fundamental principles of human anatomy, physiology, pathophysiology, and basic pharmacology. The student is expected to:

(A) describe the anatomy and physiology of the human body systems, including integumentary, musculoskeletal, nervous, immune, lymphatic, endocrine, cardiovascular, respiratory, gastrointestinal, renal, genitourinary, and hematological systems, and the senses;

(B) describe the pathophysiology of the main human body systems, including integumentary, musculoskeletal, nervous, immune, lymphatic, endocrine, cardiovascular, respiratory, gastrointestinal, renal, genitourinary, and hematological systems, and the senses; and

(C) identify the basic drug categories that affect each of the main human body systems, including integumentary, musculoskeletal, nervous, immune, lymphatic, endocrine, cardiovascular, respiratory, gastrointestinal, renal, genitourinary, and hematological systems, and the senses.

(8) The student explores the application of basic wellness concepts and disease prevention strategies. The student is expected to:

(A) describe the recommended vaccination schedule, including how to counsel on recommendations for patient populations with certain chronic illnesses;

(B) explain vaccine exemptions, including medical, religious belief, and conscientious exemptions, and patients' rights to opt out of vaccine reporting;

(C) explain standard procedures for delivery and documentation of immunizations;

(D) analyze and discuss data related to vaccine injuries and adverse impacts using the federal government's Vaccine Adverse Events Reporting System (VAERS);

(E) analyze the effectiveness and safety of complementary and alternative medicines (CAM) such as acupuncture, acupressure, cupping, and coining and CAM's potential impact on traditional medical treatments;

(F) explain the role of health screenings in maintaining a healthy population;

(G) research and describe the impact of external factors such as diet, exercise, alcohol, tobacco, vaping, and drug use on patient health; and

(H) explain the role of medication therapy management (MTM) in optimizing patient health and medication compliance.

(9) The student understands pharmaceutical regulations that are enforced by state and federal agencies. The student is expected to:

(A) define Occupational Safety and Health Administration (OSHA) requirements for prevention of exposure to hazardous substances, including risk assessment;

(B) define National Institute of Occupational Safety and Health (NIOSH) requirements for prevention of exposure to hazardous substances, including risk assessment;

(C) define United States Pharmacopeia (USP) requirements for prevention of exposure to hazardous substances, including risk assessment;

(D) identify hazardous medications and materials and how to safely handle, dispense, and dispose of them using information from Safety Data Sheets (SDS), NIOSH Hazardous Drug List, and USP;

(E) describe requirements for prevention and response to blood-borne pathogen exposure, including accidental needle stick and post-exposure prophylaxis; and

(F) explain OSHA Hazard Communication Standards.

Source: The provisions of this §127.472 adopted to be effective February 24, 2026, 51 TexReg 1124.

§127.474. Mathematics for Medical Professionals (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for student in Grades 11 and 12. Prerequisites: Geometry and Algebra II. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Mathematics for Medical Professionals course is designed to serve as the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on fluency and solid understanding in medical mathematics, students will extend and apply mathematical skills necessary for health science professions. Course content consists primarily of high school level mathematics concepts and their applications to health science professions.

(4) The mathematical process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(6) 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.

(d) Knowledge and skills.

(1) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

(A) apply mathematics to problems arising in health science professions;

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems in health science professions;

(D) communicate mathematical ideas, reasoning, and their implications to the health science field using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas in health science professions;

(F) analyze mathematical relationships to connect and communicate mathematical ideas in health science professions; and

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication as it applies to health science professions.

(2) The student generates deeper mathematical understandings through problems involving numerical data that arise in health science professions. The student extends existing knowledge and skills to analyze real-world clinical situations. The student is expected to:

(A) add, subtract, multiply, and divide rational numbers fluently in problem-solving situations related to health science professions;

(B) keep track of and manage inventory using the First In, Last Out (FILO) concept;

(C) solve health science related problems involving ratios, rates, and percentages accurately and precisely, including lab analysis, body fluid analysis, vital signs, medication dosages and administration, growth charts, body surface area, parenteral solutions and data collection related to homeostasis;

(D) learn to read and use military time fluently for health science situations, including medication administration, scheduling, and documentation;

(E) apply appropriate estimation techniques used in health science professions to estimate percent and then confirm those estimates with calculations; and

(F) read and determine accurate numerical value of Roman numerals as used in the health science professions, including cranial nerves.

(3) The student applies the process standards in mathematics to create and analyze mathematical models of health science situations to make informed decisions related to improved health care outcomes by appropriate, proficient, and efficient use of tools, including technology. The student judges the validity of a prediction and uses mathematical models to represent, analyze, and solve dynamic health care problems. The student is expected to:

(A) collect data to create a scatterplot and apply various functions to model the data in an effort to interpret results and make predictions in health science situations such as interpreting growth charts, interpreting disease and mortality rates, and diagnosing and determining treatment modalities;

(B) create, represent, and analyze appropriate mathematical functions such as linear, quadratic, exponential, logarithmic, and sinusoidal functions used to model, interpret and

predict situations that occur in health science professions such as supply and demand, inventory control, and cost analysis within clinical situations;

(C) determine or analyze an appropriate sinusoidal model for health science situations that can be modeled with periodic functions, including those related to electrocardiograms (EKG), repolarization of the heart, and medication dosage and administration;

(D) write and solve systems of equations, especially those representing mixtures, which apply to health science situations, including intravenous (IV) solutions and medication dosages;

(E) use properties of logarithmic and exponential functions to solve equations related to health science situations such as determining the pH of a solution, the concentration of hydrogen ions (H+) given the pH, calculating the absorbance and transmittance, and determining exponential growth and decay; and

(F) calculate accurate and precise unit rates used in health science situations.

(4) The student applies mathematical process standards to obtain accurate and precise measurements. The student is expected to:

(A) define each of the health science professions that require a unique set of measurement or calculation standards and explain or identify the importance of each measurement system (apothecary, metric, household systems);

(B) explain the necessity of obtaining accurate measurements in the health science professions;

(C) use dimensional analysis with precision and accuracy in performing unit conversions from one measurement system to another, including the use of proportions and unit rates in pharmacology;

(D) classify the specific system to which a given unit belongs and explain its similarity or differences to units in other measurement systems;

(E) select and use appropriate measurement tools used in health science professions such as rulers, tape measures, thermometers, syringes, scales, and sphygmomanometer gauges to obtain accurate and precise measurements; and

(F) select and use appropriate measurement techniques used in health science professions to obtain accurate and precise measurements, including determining measures for medication, nutrition, fluids, and homeostasis.

(5) The student applies mathematical process standards to analyze statistical information used in health science professions. The student is expected to:

(A) obtain and analyze lab reports to evaluate if values lie outside normal parameters;

(B) obtain and analyze vital signs by comparing to normal parameters;

(C) calculate and apply measures of central tendency in application problems in the health science field;

(D) demonstrate an understanding of the significance of the normal distribution;

(E) demonstrate an understanding of and apply the Empirical Rule to find probabilities from normal distributions;

(F) calculate and use the z-score to calculate standard deviation of a normal distribution using a formula;

(G) calculate the percentile rank for a given score using a formula;

(H) describe characteristics of well-designed and well-conducted experiments, observational studies, and surveys in the health science field, including the ethical issues associated with each;

(I) distinguish between populations and samples;

(J) explain placebo and placebo effect; and

(K) define epidemiology and its extension of statistical procedures to public health issues.

(6) The student applies mathematical process standards to solve geometric problems arising in health science professions. The student is expected to:

(A) calculate volumes of various liquids and solids encountered in health science professions, including irregularly shaped solids, using formulas and geometric reasoning;

(B) calculate surface area of various surfaces encountered in health science professions, including body surface area, using formulas and geometric reasoning;

(C) calculate appropriate angles encountered in health science professions such as medication administration, body positioning, and physical therapy using geometric reasoning; and

(D) calculate and analyze range of motion using a goniometer.

Source: The provisions of this §127.474 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.475. Biotechnology I (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: one credit in biology. Recommended prerequisites: Principles of Bioscience and one credit in chemistry. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) In Biotechnology I, students will apply advanced academic knowledge and skills to the emerging fields of biotechnology such as agricultural, medical, regulatory, and forensics. Students will have the opportunity to use sophisticated laboratory equipment, perform statistical analysis, and practice quality-control techniques. Students will conduct laboratory and field investigations and make informed decisions using critical thinking, scientific problem solving, and the engineering design process. Students in Biotechnology I will study a variety of topics that include structures and functions of cells, nucleic acids, proteins, and genetics.

(4) 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.

(5) Students are expected to know that:

(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) 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.

(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) 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).

(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) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(10) 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.

(d) Knowledge and skills.

(1) The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) use appropriate tools such as microscopes, thermocyclers, pH meters, hot plate stirrers, glass bulb thermometers, timing devices, electronic balances, vortex mixers, autoclaves, micropipettes, centrifuges, gel and capillary electrophoresis units, cameras, data collection probes, spectrophotometers, transilluminators, incubators, water baths, laboratory glassware, biosafety cabinets, and chemical fume hoods;

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(F) organize quantitative and qualitative data using laboratory notebooks, written lab reports, graphs, charts, tables, digital tools, diagrams, scientific drawings, and student-prepared models;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(2) 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:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) 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;

(B) 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

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a STEM field.

(5) The student explores the emerging field of biotechnology. The student is expected to:

(A) define biotechnology and provide examples of biotechnology products such as recombinant proteins, fermented foods, biopharmaceuticals, and genetically modified foods;

(B) compare applications of bioinformatics such as deoxyribonucleic acid (DNA) barcoding, sequencing, National Center for Biotechnology Information (NCBI) tools, ClinVar, Genemonon Mastermind, genetic testing, phylogenetic relationships, and the use of online databases;

(C) research and identify career opportunities in genetics, bioinformatics, and in fields such as molecular, forensic, medical, regulatory, and agricultural biotechnology;

(D) identify significant contributions of diverse scientists to biotechnology and explain their impact on society;

(E) define bioethics and evaluate the applications of bioethics;

(F) evaluate different points of view about issues and current events in biotechnology;

(G) identify applications in agricultural biotechnology such as genetically modified organisms (GMOs), plant propagation from tissue culturing, and aquaculture hydroponics;

(H) identify applications in medical biotechnology such as vaccines production, stem cells therapy, gene therapy, pharmaceutical production, pharmacogenetics, genomics, synthetic biology, and personalized medicine;

(I) identify applications in forensic biotechnology such as capillary electrophoresis, real-time polymerase chain reaction, DNA fingerprinting, restriction fragment length polymorphisms (RFLP) analysis, toxicology, and serology; and

(J) identify solutions to waste through bioremediation and non-biotechnological standard solutions such as landfills, incineration, absorbent materials, and catalytic materials.

(6) The student summarizes biotechnology laboratory procedures and their applications in the biotechnology industry. The student is expected to:

(A) identify the major sectors of the biotechnology industry such as medical and pharmaceutical, agricultural, industrial, forensic, and research and development;

(B) identify the biotechnology laboratory procedures used in each sector such as selective breeding, genetic engineering, DNA analysis, and protein analysis; and

(C) compare and contrast the different applications used in biotechnology laboratory procedures of each sector.

(7) The student understands the role of genetics in the biotechnology industry. The student is expected to:

(A) explain terms related to molecular biology, including nucleic acids, nitrogen bases, nucleotides, mRNA, rRNA, tRNA, ribosomes, amino acids, transcription, translation, polymerase, and protein synthesis;

(B) compare and contrast the structures and functions of DNA and ribonucleic acid (RNA), including nitrogen bases, nucleotides, the helical nature of DNA, and hydrogen bonding between purines and pyrimidines;

(C) distinguish between nuclear and mitochondrial DNA and their gamete sources;

(D) describe the DNA replication process in eukaryotic and prokaryotic cells, including leading and lagging strands and Okazaki fragments;

(E) illustrate the process of protein synthesis, including ribosomal subunits and the role of tRNA;

(F) describe the structures and functions of proteins, including three-dimensional folding, enzymes, and antibodies;

(G) explain the molecular structures of genes, including enhancers, promoters, exons, introns, and coding regions;

(H) describe the different types of mutations, including inversions, deletions, duplications, and substitutions;

(I) explain the effects of mutation types on phenotype and gene function; and

(J) describe unique elements of the molecular structure of a chromosome such as short tandem repeats (STR), transposons, and methylation and acetylation of DNA.

(8) The student analyzes the importance of recombinant DNA technology and genetic engineering. The student is expected to:

(A) describe the fundamental steps in recombinant DNA technology;

(B) explain how recombinant DNA technology such as nuclear transfer cloning is used to clone genes and create recombinant proteins;

(C) explain the role of tissue cultures in genetic modification procedures;

(D) describe plant- and animal-tissue culture procedures;

(E) compare and contrast growing conditions for plant and animal tissue cultures;

(F) explain the role of restriction enzymes; and

(G) distinguish between vectors commonly used in biotechnology for DNA insertion, including plasmids, adenoviruses, retroviruses, and bacteriophages.

(9) The student examines federal, state, local, and industry regulations as related to biotechnology. The student is expected to:

(A) discuss the relationship between the local, state, and federal agencies responsible for regulation of the biotechnology industry such as the U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the U.S. Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC); and

(B) analyze policies and procedures used in the biotechnology industry such as quality assurance, standard operating procedures (SOPs), Good Manufacturing Practices (GMPs), and International Organization for Standardization (ISO) quality systems.

(10) The student performs biotechnology laboratory procedures. The student is expected to:

(A) measure volumes and weights to industry standards with accuracy and precision;

(B) analyze data and perform calculations and statistical analysis as it relates to biotechnology laboratory experiments;

(C) demonstrate proficiency in pipetting techniques;

(D) identify microorganisms using staining methods such as the Gram stain, methylene-blue stain, and acid-fast staining;

(E) prepare a restriction digest, isolate nucleic acids, and evaluate results using techniques such as gel and capillary electrophoresis, Northern blot analysis, and Southern blot analysis;

(F) explain the importance of media components to the outcome of cultures;

(G) isolate, maintain, and store microbial cultures safely;

(H) prepare seed inoculum; and

(I) perform plating techniques such as streak plating, spread plating, and the Kirby-Bauer method.

(11) The student prepares solutions and reagents for the biotechnology laboratory. The student is expected to:

(A) demonstrate aseptic techniques for establishing and maintaining a sterile work area;

(B) prepare, dispense, and monitor physical properties of stock reagents, buffers, media, and solutions;

(C) calculate and prepare a dilution series; and

(D) determine optimum conditions of reagents for experimentation.

(12) The student conducts quality-control analysis while performing biotechnology laboratory procedures. The student is expected to:

(A) perform validation testing on laboratory reagents and equipment; and

(B) analyze data and perform calculations and statistical analysis on results of quality-control samples.

Source: The provisions of this §127.475 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.476. Biotechnology II (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in chemistry and Biotechnology I. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) Biotechnology II has the components of any rigorous scientific or bioengineering program of study. This course applies the standard skills mastered in Biotechnology I and includes additional skills related to assay design, protein analysis, applications of genetic engineering, and quality management. After taking this course, students should be prepared for entry-level lab technician jobs.

(4) 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.

(5) Students are expected to know that:

(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) 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.

(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) 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).

(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) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(10) 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.

(d) Knowledge and skills.

(1) The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) use appropriate tools such as microscopes, thermocyclers, pH meters, hot plate stirrers, glass bulb thermometers, timing devices, electronic balances, vortex mixers, autoclaves, micropipettes, centrifuges, gel and capillary electrophoresis units, cameras, data collection probes, spectrophotometers, transilluminators, incubators, water baths, laboratory glassware, biosafety cabinets, and chemical fume hoods;

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(F) organize quantitative and qualitative data using laboratory notebooks, written lab reports, graphs, charts, tables, digital tools, diagrams, scientific drawings, and student-prepared models;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(2) 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:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) 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;

(B) 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

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a STEM field.

(5) The student prepares for an entry-level career in biotechnology. The student is expected to:

(A) research and identify career opportunities in genetics, bioinformatics, and fields such as molecular, forensic, medical, regulatory, and agricultural biotechnology;

(B) identify the significance of recent advances in molecular, forensic, medical, regulatory, and agricultural biotechnology;

(C) discuss current bioethical issues related to the field of biotechnology;

(D) create a job-specific resume; and

(E) develop a career plan.

(6) The student analyzes academic and professional journals and technical reports. The student is expected to:

(A) identify the scientific methodology used by a researcher;

(B) examine a prescribed research design and identify dependent and independent variables;

(C) evaluate a prescribed protocol to determine the purpose for each of the procedures performed; and

(D) interpret data and evaluate conclusions.

(7) The student explores assay design in the field of biotechnology. The student is expected to:

(A) define assay requirements and optimizations;

(B) perform statistical analysis on assay design and experimental data such as linearity, system sustainability, limit of detection, and R2 values;

(C) determine an unknown protein concentration using a standard curve and technique such as a Bradford assay; and

(D) evaluate enzyme kinetics using a colorimetric assay.

(8) The student explores applications related to protein expression in the field of biotechnology. The student is expected to:

(A) describe the fundamental steps in recombinant deoxyribonucleic acid (DNA) technology;

(B) produce a recombinant protein such as green fluorescent protein (GFP);

(C) analyze proteins using techniques such as enzyme-linked immunosorbent assay (ELISA), spectrophotometry, and sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE); and

(D) isolate a specific protein from a biological sample using techniques such as chromatography and Western blot analysis.

(9) The student explores applications of recombinant DNA technology and genetic engineering. The student is expected to:

(A) prepare and maintain tissue cultures commonly used in genetic modification procedures;

(B) evaluate the effects of changes to growing conditions such as pH, temperature, and growth media;

(C) evaluate the results of a bacterial transformation using a restriction enzyme digest and Southern blot analysis;

(D) compare and contrast vectors commonly used in biotechnology applications, including plasmids, adenoviruses, retroviruses, and bacteriophages;

(E) explain the steps and components of the polymerase chain reaction (PCR); and

(F) explain applications of CRISPR/Cas9 technology in gene editing and diagnostics.

(10) The student prepares solutions and reagents for the biotechnology laboratory. The student is expected to:

(A) demonstrate aseptic techniques for establishing and maintaining a sterile work area;

(B) prepare, dispense, and monitor physical properties of stock reagents, buffers, media, and solutions;

(C) calculate and prepare a dilution series;

(D) determine acceptability and optimum conditions of reagents for experimentation; and

(E) prepare multi-component solutions of given molarity or concentration and volume.

(11) The student investigates the role of quality in the biotechnology industry, The student is expected to:

(A) describe the product pipeline in the biotechnology industry;

(B) describe the importance of quality assurance and quality control;

(C) explain the importance of documentation to quality assurance and quality control;

(D) describe the importance of corrective and preventive action (CAPA);

(E) describe Quality Management Systems (QMS) components, including inspection, audit, surveillance, and prevention;

(F) describe Good Manufacturing Practices (GMP), Good Clinical Practices (GCP), Good Documentation Practices (GDP), Good Lab Practices (GLP), and International Organization for Standardization (ISO);

(G) perform validation testing on laboratory reagents and equipment;

(H) analyze data and perform calculations and statistical analysis on results of quality-control samples such as standard deviation and percent error; and

(I) apply and create industry protocols such as laboratory method protocols, standard operating procedures (SOPs), and validation forms.

Source: The provisions of this §127.476 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.477. Medical Terminology (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) 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) recognize the incorrect use of abbreviations, acronyms, and symbols through review of The Joint Commission's "Do Not Use List";

(C) identify and define the component parts of medical words, including root, prefix, suffix, and combining vowels;

(D) practice word-building skills;

(E) research the origins of eponyms;

(F) recall directional terms and anatomical planes related to body structure;

(G) define and accurately spell occupationally specific terms such as those relating to the body systems, surgical and diagnostic procedures, diseases, and treatment; and

(H) use prior knowledge and experiences to understand the meaning of terms as they relate to the health science industry.

(2) The student demonstrates communication skills using the terminology applicable to the health science industry. The student is expected to:

(A) demonstrate appropriate verbal strategies such as correct pronunciation of medical terms and written strategies such as correct spelling in a variety of health science scenarios;

(B) employ increasingly precise language to communicate; and

(C) translate technical material related to the health science industry.

(3) 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 and digital media with appropriate supervision.

(4) 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.

(5) 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;

(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.

Source: The provisions of this §127.477 adopted to be effective August 1, 2025, 50 TexReg 4421.

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

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: one credit in biology and at least one credit in a course from the health science career cluster. Recommended prerequisite: Medical Terminology. Recommended corequisite: Health Science Clinical. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 become familiar with industry-based standards for documenting and maintaining medical information; research industry employment requirements, including education, certification, and licensing requirements; and evaluate ethical and legal responsibilities of health science professionals. Students will employ hands-on experiences for continued clinical knowledge and skill development.

(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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates patient-centered skills and interactions that foster trust and lead to a quality customer service experience. The student is expected to:

(A) demonstrate care, empathy, and compassion;

(B) communicate medical information accurately and efficiently in language that patients can understand; and

(C) comply with Health Insurance Portability and Accountability Act (HIPAA) policy standards.

(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 healthcare-related environment;

(B) express ideas clearly in writing and develop skills in documentation related to health science;

(C) interpret complex technical material related to the health science industry;

(D) summarize biological and chemical processes in the body such as maintaining homeostasis; and

(E) research topics related to health science such as the global impact of disease prevention.

(3) The student demonstrates verbal, non-verbal, and electronic communication skills. The student is expected to:

(A) demonstrate therapeutic communication appropriate to the situation;

(B) use appropriate verbal and non-verbal skills when communicating with persons with sensory loss and language barriers in a simulated setting; and

(C) use electronic communication devices in the classroom or clinical setting appropriately.

(4) The student analyzes and evaluates communication skills for maintaining healthy relationships in the healthcare workplace. The student is expected to:

(A) evaluate how healthy relationships influence career performance;

(B) identify the role of communication skills in building and maintaining healthy relationships;

(C) demonstrate strategies for communicating needs, wants, and emotions in a healthcare setting; and

(D) evaluate the effectiveness of conflict-resolution techniques in various simulated healthcare workplace situations.

(5) The student documents and records medical information into a permanent health record. The student is expected to:

(A) research document formats such as dental or medical records;

(B) prepare health documents or records according to industry-based standards; and

(C) record health information on paper and electronic formats such as patient history, vital statistics, and test results.

(6) The student describes industry requirements necessary for employment in health science occupations. The student is expected to:

(A) research education, certification, licensing, and continuing education requirements and salary related to specific health science careers; and

(B) practice employment procedures for a specific health science career such as resume building, application completion, and interviewing.

(7) The student identifies problems and participates in the decision-making process. The student is expected to:

(A) apply critical-thinking, adaptability, and consensus-building skills to solve problems relevant to health science;

(B) evaluate the impact of decisions in health science; and

(C) suggest modifications to a decision or plan based on healthcare outcomes.

(8) The student demonstrates comprehension and proficiency of clinical skills used by health science professionals in a classroom or clinical setting. The student is expected to:

(A) comply with specific industry standards related to safety requirements;

(B) employ medical vocabulary specific to the healthcare setting;

(C) perform admission, discharge, and transfer functions in a simulated setting;

(D) demonstrate skills related to assisting patients with activities of daily living such as dressing, undressing, grooming, bathing, and feeding;

(E) determine proper equipment needed for patient ambulation such as gait belts, wheelchairs, crutches, or walkers;

(F) demonstrate skills related to assessing range of motion and assisting with mobility, including positioning, turning, lifting, and transferring patients for treatment or examination;

(G) role play techniques used in stressful situations such as situations involving trauma and chronic and terminal illness;

(H) demonstrate first aid, vital signs, cardiopulmonary resuscitation, and automated external defibrillator skills; and

(I) identify basic skills specific to a health science profession such as medical assistant, dental assistant, emergency medical technician-basic, phlebotomy technician, and pharmacy technician.

(9) The student evaluates ethical behavioral standards and legal responsibilities of a health science professional. The student is expected to:

(A) research and describe the role of professional associations and regulatory agencies;

(B) examine legal and ethical behavior standards such as Patient Bill of Rights, advanced directives, and HIPAA; and

(C) investigate the legal, ethical, and professional ramifications of unacceptable or discriminatory behavior.

(10) The student exhibits the leadership skills necessary to function in a healthcare setting. The student is expected to:

(A) identify essential leadership skills of health science professionals;

(B) assess group dynamics in real or simulated groups; and

(C) integrate consensus-building techniques.

(11) The student maintains a safe work environment. The student is expected to:

(A) describe 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), U.S. Food and Drug Administration (FDA),

The Joint Commission, and the National Institute of Health (NIH), and Texas Department of State Health Services (DSHS);

(B) explain protocols related to hazardous materials and situations such as personal protective equipment (PPE) and blood borne pathogen exposure;

(C) describe how to assess and report unsafe conditions;

(D) identify the benefits of recycling and waste management for cost containment and environmental protection; and

(E) demonstrate proper body mechanics to reduce the risk of injury.

(12) The student assesses wellness strategies for the prevention of disease. The student is expected to:

(A) research wellness strategies for the prevention of disease;

(B) evaluate positive and negative effects of relationships on physical and emotional health;

(C) explain the benefits of positive relationships between community members and health professionals in promoting a healthy community;

(D) research and analyze the effects of access to quality health care;

(E) research alternative health practices and therapies; and

(F) explain the changes in structure and function of the body due to trauma and disease.

Source: The provisions of this §127.478 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.479. Health Science Clinical (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Biology. Corequisite: Health Science Theory. This course must be taken concurrently with Health Science Theory and may not be taken as a stand-alone course. Districts are encouraged to offer this course in a consecutive block with Health Science Theory to allow students sufficient time to master the content of both courses. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Clinical 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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) 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;

(C) express ideas in writing and develop skills in documentation;

(D) interpret complex technical material related to the health science industry;

(E) summarize biological and chemical processes that maintain homeostasis;

(F) explain the changes in structure and function due to trauma and disease; and

(G) research the global impact of disease prevention and cost containment.

(2) The student displays verbal and non-verbal 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; and

(C) use electronic communication devices with appropriate supervision such as facsimile, scanner, electronic mail, and telephone.

(3) The student analyzes and evaluates communication skills for maintaining healthy relationships throughout the life span. The student is expected to:

(A) evaluate how a healthy relationship influences 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 practical situations.

(4) The student relates appropriate information in the practical setting to the proper authority. The student is expected to:

(A) identify and retrieve reportable information; and

(B) report information according to facility policy in the practical setting.

(5) The student identifies documents integrated into the permanent record of the health informatics system. The student is expected to:

(A) research and describe document formats; and

(B) compile and record data according to industry based standards.

(6) The student describes academic requirements necessary for employment in the health science industry. The student is expected to:

(A) research specific health science careers; and

(B) review employment procedures for a specific health science career.

(7) The student identifies problems and participates in the decision-making process. The student is expected to:

(A) analyze systematic procedures for problem solving;

(B) evaluate the impact of decisions; and

(C) suggest modifications based on decision outcomes.

(8) The student implements the knowledge and skills of a health science professional in the clinical setting. The student is expected to:

(A) comply with specific industry standards related to safety and substance abuse;

(B) model industry expectations of professional conduct such as attendance, punctuality, personal appearance, hygiene, and time management;

(C) articulate comprehension of assignment;

(D) employ medical vocabulary specific to the health care setting;

(E) perform admission, discharge, and transfer functions in a simulated setting;

(F) demonstrate skills related to activities of daily living in rehabilitative care such as range of motion, positioning, and ambulation according to the health science industry standards, regulatory agency standards, and professional guidelines;

(G) role play techniques used in stressful situations such as trauma, chronic, and terminal illness;

(H) demonstrate first aid, vital signs, cardiopulmonary resuscitation, and automated external defibrillator skills in a laboratory setting; and

(I) perform skills specific to a health science professional such as medical assistant, dental assistant, emergency medical technician-basic, phlebotomy technician, and pharmacy technician.

(9) The student evaluates ethical behavioral standards and legal responsibilities. The student is expected to:

(A) research and describe the role of professional associations and regulatory agencies;

(B) examine legal and ethical behavior standards such as Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act;

(C) investigate the legal and ethical ramifications of unacceptable behavior; and

(D) perform within the designated scope of practice.

(10) 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.

(11) 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 such as material safety data sheets;

(C) observe and report unsafe conditions; and

(D) practice recycling and waste management for cost containment and environmental protection.

(12) The student assesses wellness strategies for the prevention of disease. The student is expected to:

(A) research wellness strategies for the prevention of disease;

(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 access to quality health care; and

(E) research alternative health practices and therapies.

Source: The provisions of this §127.479 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.480. World Health and Emerging Technologies (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in biology and at least one credit in a Level 2 or higher course from the health science career cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 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 cultural, infrastructural, political, educational, and technological constraints and inspire ideas for appropriate technological solutions to global medical care issues.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) 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) compare the functions of public health organizations, including the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO), at the local, state, national, and international levels;

(E) define and calculate incidence, morbidity, and mortality;

(F) identify and describe the challenges in global health that can have the greatest impact on health in developing nations; and

(G) investigate various social determinants of health such as food insecurity, homelessness, or financial insecurities.

(2) The student explains who pays for health care in the world today. The student is expected to:

(A) compare the availability and quality of health care in developing and developed countries;

(B) discuss and contrast the four basic healthcare system models, including the Beveridge Model, Bismarck Model, National Health Insurance Model, and the Out-of-Pocket Model, and compare these models to existing payment mechanisms in the United States of America;

(C) explain how countries that have different healthcare systems such as Canada, the United Kingdom, Japan, Germany, Taiwan, Switzerland, and the United States of America pay for health care and compare their patient outcomes such as infant mortality rates, rate of cancer, or rate of heart disease;

(D) describe how healthcare expenditures have changed over time; and

(E) identify the major contributors to the rising healthcare industry costs.

(3) 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 and on public health;

(C) discuss the dangers of antibiotic overuse and misuse;

(D) investigate technologies such as genetics and molecular diagnostics used for the early detection and treatments of several types of cancers;

(E) describe and discuss the technologies used in the diagnosis and treatment of heart disease;

(F) describe and discuss technologies developed to support vital organ failure; and

(G) investigate emerging digital technology such as telehealth and remote monitoring and its impact on healthcare delivery.

(4) The student explores how human clinical trials are designed, conducted, and evaluated. The student is expected to:

(A) describe and discuss types of clinical trials, including the role of the institutional review board;

(B) define and calculate a sample size;

(C) identify quantitative and qualitative methods used in clinical trials; and

(D) compare and contrast different phases of pharmaceutical trials.

(5) The student recognizes the ethical and legal aspects involved in clinical research. The student is expected to identify issues and explain the ethical and legal guidelines, including informed consent and patient confidentiality, for the conduct of research involving human subjects.

(6) The student explains how research guides the development of new medical technologies. The student is expected to:

(A) describe how health science research is funded;

(B) explain the role of the U.S. Food and Drug Administration in approving new drugs and medical devices; and

(C) analyze factors that affect the dissemination of new medical technologies.

(7) The student applies research principles to create a project that addresses a major health topic. The student is expected to:

(A) facilitate data analysis and communicate experimental results clearly by effectively using technology such as creating visual aids; and

(B) present the project to classmates, health professionals, parents, or instructors.

Source: The provisions of this §127.480 adopted to be effective August 1, 2025, 50 TexReg 4421.

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

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: one credit in biology and one credit in chemistry, Integrated Physics and Chemistry, or physics. Recommended prerequisite: a course from the Health Science Career Cluster. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) 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.

(5) Students are expected to know that:

(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) 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.

(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) 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).

(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) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(10) 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.

(d) Knowledge and skills.

(1) 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 answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) 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, reflex hammers, pulse oximeters, stethoscope, otoscope, blood pressure monitors (sphygmomanometers), pen lights, ultrasound equipment, and models, diagrams, or samples of biological specimens or structures;

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(F) organize quantitative and qualitative data using lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish among scientific hypotheses, theories, and laws.

(2) 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:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) 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:

(A) 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;

(B) 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

(C) 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 careers.

(5) Human body organization. The student demonstrates 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:

(A) distinguish between the six levels of structural organization in the human body, including chemical, cellular, tissue, organ, system, and organism, and explain their interdependence;

(B) identify and use appropriate directional terminology when referring to the human body, including directional terms, planes, body cavities, and body quadrants;

(C) identify 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;

(D) research and describe negative and positive feedback loops as they apply to homeostasis; and

(E) research and identify the effects of the failure to maintain homeostasis as it relates to common diseases in each of the body systems.

(6) Histology. The student demonstrates the ability to analyze the structure and function of eukaryotic cells in relation to the formation of tissue. The student is expected to:

(A) define tissue and identify the four primary tissue types, their subdivisions, and functions;

(B) compare epithelial tissue and connective tissue in terms of cell arrangement and interstitial materials;

(C) describe the process of tissue repair involved in the normal healing of a superficial wound; and

(D) describe the general metabolic pathways of carbohydrates, lipids, and proteins.

(7) Skeletal system. The student analyzes the relationships between the anatomical structures and physiological functions of the skeletal system. The student is expected to:

(A) identify and differentiate between the axial skeleton and appendicular skeleton;

(B) identify the types of joints, including gliding, hinge, pivot, saddle, and ball and socket, and describe the movements of each;

(C) identify and locate the anatomy of bone, including spongy and compact tissue, epiphysis, diaphysis, medullary cavity, periosteum, bone marrow, and endosteum;

(D) explain the major physiological functions of the skeletal system;

(E) describe the role of osteoblasts, osteocytes, and osteoclasts in bone growth and repair;

(F) identify and describe the different types of fractures such as compound, complete, simple, spiral, greenstick, hairline, transverse, and comminuted; and

(G) identify and describe common diseases and disorders of the skeletal system such as scoliosis, osteoporosis, and bone cancer.

(8) Integumentary system. The student analyzes the relationships between the anatomical structures and physiological functions of the integumentary system. The student is expected to:

(A) identify and describe the structures of the integumentary system, including layers of the skin, accessory organs within each layer, and glandular components in each layer;

(B) describe the factors that can contribute to skin color;

(C) describe and explain the process of tissue repair and scar formation; and

(D) identify and describe common diseases and disorders of the integumentary system such as skin cancer and psoriasis.

(9) Muscular system. The student analyzes the relationships between the anatomical structures and physiological functions of the muscular system. The student is expected to:

(A) explain the major physiological functions of the muscular system, including voluntary movement, involuntary movement, heat production, and maintaining posture;

(B) explain the coordination of muscles, bones, and joints that allows movement of the body, including the methods of attachment of ligaments and tendons;

(C) examine common characteristics of muscle tissue, including excitability, contractibility, extensibility, and elasticity;

(D) identify and describe the appearance, innervation, and function of the three muscle types, including cardiac, skeletal, and smooth;

(E) examine the microscopic anatomy of a muscle fiber, including sarcomere, actin, and myosin;

(F) describe the mechanisms of muscle contraction at the neuromuscular junction;

(G) 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;

(H) identify and describe common diseases and disorders of the muscular system such as muscle strains and muscular dystrophy; and

(I) analyze and describe the effects of pressure, movement, torque, tension, and elasticity on the human body.

(10) Nervous system. The student analyzes the relationship between the anatomical structures and physiological functions of the nervous system. The student is expected to:

(A) summarize and distinguish between the major physiological functions of the nervous system, including sensation, integration, and motor response;

(B) identify the senses and explain their relationship to nervous system;

(C) investigate and explain the interdependence between the cranial and spinal nerves with the special senses of vision, hearing, smell, and taste;

(D) describe the anatomy of the structures associated with the senses, including vision, hearing, smell, taste, and touch;

(E) identify the anatomical and physiological divisions of the peripheral nervous system and central nervous system;

(F) explain the glial cells within the central nervous system and peripheral nervous system and their associated functions;

(G) analyze the functional and structural differences between gray and white matter relative to neurons;

(H) distinguish between the types of neurons and explain the initiation of a nerve impulse during resting and action potential;

(I) categorize the major neurotransmitters by chemical and physical mechanisms; and

(J) identify and describe common diseases and disorders of the nervous system such as epilepsy, neuralgia, Parkinson's disease, and Alzheimer's disease.

(11) Endocrine system. The student analyzes the relationships between the anatomical structures and physiological functions of the endocrine system. The student is expected to:

(A) identify and locate the nine glands associated with the endocrine system, including the ovaries, testes, pineal gland, pituitary gland, thyroid gland, parathyroid glands, thymus, pancreas, and adrenal glands;

(B) compare and contrast endocrine and exocrine glands and identify the glands associated with each;

(C) describe the hormones associated with each endocrine gland;

(D) 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;

(E) explain how the endocrine glands are regulated, including neural, hormonal, and humoral control; and

(F) identify and describe common diseases and disorders of the endocrine system such as hypothyroidism, pancreatic cancer, and diabetes.

(12) Urinary system. The student analyzes the relationships between the anatomical structures and physiological functions of the urinary system. The student is expected to:

(A) identify and describe the anatomical structures and functions of the urinary system, including the kidney, ureters, bladder, and urethra;

(B) compare and contrast the anatomical structures and describe the functions of the male and female urinary system;

(C) summarize and illustrate the structures, functions, and types of nephrons;

(D) examine the methods of fluid balance and homeostasis in the urinary system, including fluid intake and output;

(E) analyze the composition of urine and the process of urine formation, including filtration, reabsorption, and secretion;

(F) describe the relationship between the nervous system, renal system, and muscular system before and during micturition; and

(G) identify and describe common diseases and disorders of the urinary system such as chronic kidney disease, kidney stones, urinary tract infections, and renal cancer.

(13) Cardiovascular system. The student analyzes the relationships between the anatomical structures and physiological functions of the cardiovascular system. The student is expected to:

(A) identify the major functions of the cardiovascular system, including transport, maintaining homeostasis, and immune response;

(B) compare and contrast the anatomical structure of arteries, arterioles, capillaries, venules, and veins;

(C) investigate and illustrate how systemic circulation transports blood, gasses, and nutrients from the heart to the internal anatomy of the heart, including tissue layers, chambers, and valves, and external anatomy of the heart, including coronary vessels;

(D) describe the relationship between blood flow and blood pressure, including systolic and diastolic pressure, pulse pressure, and mean arterial pressure;

(E) compare and contrast coronary, pulmonary, and systemic circulation, and describe the major vessels of each;

(F) illustrate how the PQRST waves of an electrocardiogram (EKG) demonstrate the conduction of electricity through the structures of the heart;

(G) describe the relationship between the cardiovascular system, nervous system, and muscular system in regulating cardiac output; and

(H) identify and describe common diseases and disorders of the cardiovascular system such as heart disease, myocardial infarction, ischemia, and hypertrophic cardiomyopathy.

(14) 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:

(A) evaluate the interaction of the lymphatic system with other body systems such as the circulatory system;

(B) describe the structure and function of the lymphatic organs and explain how lymph moves through the body;

(C) identify and describe the role and function of the immune cells, including T cells and B cells, within the lymphatic system structures;

(D) identify and determine antigens associated with ABO blood typing, including Rhesus (Rh) factor;

(E) summarize the ways the body protects and defends against disease, including inflammation, barrier defenses, and active and passive immunity;

(F) describe the role of antigens and antibodies in the immune response; and

(G) identify and describe common diseases and disorders associated with the lymphatic and immune systems such as inherited or acquired immunodeficiencies, autoimmune diseases, and lymphomas.

(15) Digestive system. The student analyzes the relationships between the anatomical structures and physiological functions of the digestive system. The student is expected to:

(A) examine the anatomical structures and function of the alimentary canal and accessory organs;

(B) compare and contrast mechanical and chemical digestive processes;

(C) evaluate the modes by which energy is processed and stored within the body, including ingestion, propulsion, absorption, and elimination; and

(D) identify and describe common diseases and disorders of the digestive system such as gallstones, Crohn's disease, irritable bowel syndrome, and gastroesophageal reflux disorder.

(16) Respiratory system. The student analyzes the relationships between the anatomical structures and physiological functions of the respiratory system. The student is expected to:

(A) identify and sequence the anatomical structures and functions of the respiratory system;

(B) compare and contrast the functions of upper and lower respiratory tract;

(C) describe the physiology of respiration, including internal and external respiration and gas exchange;

(D) describe the relationship between the respiratory and cardiovascular systems during pulmonary circulation;

(E) investigate factors that affect respiration, including exercise and environmental changes such as altitude; and

(F) identify and describe common diseases of the respiratory system such as asthma, emphysema, pneumonia, viruses, and allergies.

(17) Reproductive system. The student analyzes the relationships between the anatomical structures and physiological functions of the reproductive system. The student is expected to:

(A) explain embryological development of cells, tissues, organs, and systems;

(B) describe and examine the location, structure, and functions of the internal and external female and male reproductive organs and accessory glands;

(C) describe and compare the process of oogenesis and spermatogenesis;

(D) research and discuss the physiological effects of hormones on the stages of the menstrual cycle;

(E) identify and distinguish the hormones involved in maturation and development throughout the life cycle, including puberty, gestation, and menopause; and

(F) identify and describe common diseases and disorders of the reproductive system such as sexually transmitted diseases and cancers of the female and male reproductive systems.

(18) Emerging technologies. The student identifies emerging technological advances in science and healthcare treatment and delivery. The student is expected to:

(A) research and discuss advances in science and medicine at the organ and tissue level such as bionics and wearable monitoring technologies; and

(B) research and describe advances in science and medicine at the cellular level such as stem cells and gene therapy.

Source: The provisions of this §127.481 adopted to be effective August 1, 2025, 50 TexReg 4421.

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

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in biology, one credit in chemistry, and at least one credit in a Level 2 or higher course from the health science career cluster. Recommended prerequisite: Anatomy and Physiology. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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.

(4) 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.

(5) Students are expected to know that:

(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) 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.

(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) 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).

(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) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(10) 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.

(d) Knowledge and skills.

(1) The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) 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;

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(F) 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;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(2) 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:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) 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:

(A) 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;

(B) 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

(C) 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 careers.

(5) The student analyzes the mechanisms of pathology. The student is expected to:

(A) describe abnormal biological and chemical processes at the cellular level;

(B) examine and analyze changes resulting from mutations and neoplasms by examining cells, tissues, organs, and systems;

(C) investigate factors that contribute to disease, including age, gender, environment, lifestyle, and heredity; and

(D) analyze and describe how the body's compensating mechanisms attempt to maintain homeostasis when changes occur.

(6) The student examines the process of pathogenesis. The student is expected to:

(A) differentiate and identify pathogenic organisms using microbiological techniques such as gram staining, biochemical identification, and microscopic observation;

(B) research and summarize the stages of pathogenesis, including incubation period, prodromal period, and exacerbation or remission;

(C) analyze the body's natural defense systems against infection, including barriers, the inflammatory response, and the immune response;

(D) analyze other mechanisms of disease prevention and treatment such as vaccinations, antibiotics, chemotherapy, and immunotherapy; and

(E) evaluate the effects of chemical agents, environmental pollution, and trauma on the disease process.

(7) The student examines diseases throughout the body's systems. The student is expected to:

(A) investigate the etiology, signs and symptoms, diagnosis, prognosis, and treatment of diseases;

(B) explore and describe advanced technologies for the diagnosis and treatment of disease;

(C) research and describe reemergence of diseases such as malaria, tuberculosis, polio, and measles;

(D) research the causes, prevention, and impact of nosocomial infections and differentiate between the causes, prevention, and impact of nosocomial infections versus community-acquired infections;

(E) research and describe antibiotic-resistant diseases such as methicillin-resistant *Staphylococcus aureus*;

(F) differentiate between various types of diseases and disorders, including hereditary, infectious, and auto-immune; and

(G) investigate ways diseases such as diabetes, Parkinson's, lupus, and congestive heart failure affect multiple body systems.

(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) analyze patient medical data and interpret medical laboratory test results to inform diagnosis and treatment;

(D) analyze and interpret epidemiological data to determine common trends and predict outcomes in disease progression;

(E) research and summarize diseases that threaten world health and propose intervention strategies; and

(F) develop a prevention plan that considers how behaviors contribute to lifestyle diseases.

Source: The provisions of this §127.482 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.483. Pharmacy I (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10 and 11. Recommended prerequisites: Introduction to Pharmacy Science or Principles of Health Science and one credit in biology. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 goal of Pharmacy I is for the student to gain a strong foundation in the knowledge and skills needed to pursue a career in the pharmaceutical field (e.g., pharmacy technician, pharmacist). Knowledge includes pharmacology, pharmacy law, medication safety, the dispensing process, and inventory. Pharmacy I is designed to be the second course in a pathway leading to college and career readiness in the healthcare therapeutics professions. The course content aligns with the competencies of pharmacy technician certification examinations.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student communicates effectively with diverse populations. The student is expected to:

(A) practice a respectful and professional attitude when interacting with diverse patient populations, colleagues, and professionals; and

(B) compare communication techniques that are effective for various population clients such as terminally ill, intellectually disabled, visually/hearing impaired, and elderly/pediatric populations.

(2) The student interprets pharmacy correspondence utilizing medical abbreviations and terminology typically found in the pharmacy setting. The student is expected to:

(A) employ pharmacy terminology and abbreviations in creating and utilizing correspondence in the pharmacy such as prescriptions, medication administration records (MARs), and patient order sheets;

(B) compare terminology typically used in the community and institutional pharmacy settings; and

(C) translate sig codes and abbreviations used in the pharmacy.

(3) The student distinguishes between the requirements of various federal agencies. The student is expected to:

(A) explain the handling and disposal of non-hazardous, hazardous, and pharmaceutical substances and waste;

(B) discuss the requirements for controlled substance prescriptions, including new, refill, and transfer prescriptions, according to the Drug Enforcement Administration (DEA) controlled substances schedules;

(C) describe Food and Drug Administration (FDA) recall requirements based on classification for medications, devices, supplies, and supplements;

(D) interpret and apply state and federal laws pertaining to processing, handling, and dispensing of medications, including controlled substances;

(E) interpret state and federal laws and regulations pertaining to pharmacy technicians; and

(F) explain pharmacy compliance with professional standards and relevant legal, regulatory, formulary, contractual, and safety requirements.

(4) The student recalls drug information. The student is expected to:

(A) identify brand name, generic name, classification, and indication of use for common medications with automaticity;

(B) discuss common and life-threatening drug interactions and contraindications;

(C) identify narrow therapeutic index (NTI) medications; and

(D) access and use references such as United States Pharmacopeia (USP) standards, drug reference books, and clinical information sources as needed to perform job duties.

(5) The student explains the dispensing process. The student is expected to:

(A) identify a prescription or medication order for completeness, including drug strength, dosage form, directions, quantity, and refills, and obtain missing information if needed;

(B) communicate with patients to obtain information, including demographics, medication history, health conditions, allergies, and insurance, for the patient profile;

(C) practice assisting pharmacists in collecting, organizing, and recording demographic and clinical information for the *Pharmacists' Patient Care Process*;

(D) perform the necessary mathematical calculations required for order entry, including formulas, ratios, concentrations, percent strength, dilutions, proportions, and allegations;

(E) identify equipment and supplies, including diabetic supplies, spacers, and oral/injectable syringes, required for drug administration based on the package size and unit dose;

(F) identify and describe the importance of lot numbers, expiration dates, and National Drug Codes (NDC) on drug packaging;

(G) practice and adhere to effective infection control procedures;

(H) apply appropriate cleaning standards, including hand washing and cleaning counting trays, countertops, and equipment; and

(I) explain the state pharmacy boards' roles in the regulation of pharmacy technicians and that differences exist between states in the processing, handling, and dispensing of prescription medications.

(6) The student identifies common medication errors and explains error prevention strategies. The student is expected to:

(A) identify high-alert/risk and look-alike/sound-alike (LASA) medications;

(B) describe error prevention strategies, including using Tall Man lettering, trailing/leading zeros, and barcodes; separating inventory; and limiting use of error-prone abbreviations;

(C) describe types of prescription errors, including abnormal doses, early refill, incorrect quantity, incorrect patient, and incorrect drug;

(D) explain pharmacy professional standards for and the role of the pharmacy technician in the patient care process;

(E) identify opportunities to assist pharmacists in the identification of patients who desire or require counseling to optimize the use of medications, equipment, and devices;

(F) discuss the pharmacy technician's role in patient and medication safety practices such as how to calculate dosage of pediatric over-the-counter drugs;

(G) explain how pharmacy technicians assist pharmacists in responding safely and legally to emergent patient situations; and

(H) explain basic safety and emergency preparedness procedures applicable to pharmacy services.

(7) The student performs inventory procedures according to federal, state, local, and facility guidelines. The student is expected to:

(A) identify proper storage for medications in regard to temperature, light sensitivity, product demand, fast movers, cost, and restricted access;

(B) explain the definition and purpose of a formulary or approved/preferred product list;

(C) describe procedures for inventory control, including removal of expired and recalled drug products, rotating inventory, performing a physical inventory, ordering medications and supplies, monitoring periodic automatic replenishment (PAR) levels, and using just-in-time ordering;

(D) explain accepted procedures in purchasing pharmaceuticals, devices, and supplies; and

(E) explain accepted procedures for identifying and disposing of expired medications.

Source: The provisions of this §127.483 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.484. Pharmacy II (Two Credits), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in biology, one credit in chemistry, and Pharmacy I. Recommended prerequisite: Algebra I, Introduction to Pharmacy Science, and Pharmacy I. Students shall be awarded two credits for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Pharmacy II course provides students with the advanced knowledge and skills to explore various careers in the pharmacy field, including 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 a pathway leading to college and career readiness in the healthcare therapeutics professions. The course content aligns with the competencies of pharmacy technician certification examinations.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student communicates effectively with diverse populations. The student is expected to:

(A) practice a respectful and professional attitude in communications with diverse patient populations, colleagues, and professionals such as written, oral, and electronic communications;

(B) demonstrate communication techniques that are effective for various populations such as terminally ill, intellectually disabled, visually/hearing impaired, and elderly/pediatric populations; and

(C) demonstrate skills for supporting communication between various stakeholders such as serving as a liaison between the nurse and the patient.

(2) The student demonstrates the use of medical terminology and abbreviations in a pharmacy setting. The student is expected to:

(A) interpret and translate prescription and medication orders according to pharmacy settings such as community and hospital environments;

(B) create pharmacy correspondence such as prescriptions, medication administration records (MARs), and patient order sheets using medical terminology and abbreviations;

(C) use medical terminology found in various pharmacy settings to communicate appropriately; and

(D) translate sig codes and abbreviations used in the pharmacy to communicate instructions to patients.

(3) The student applies the strictest requirements using the laws of local, state, and federal agencies. The student is expected to:

(A) demonstrate the proper handling and disposal of non-hazardous, hazardous, and pharmaceutical substances and waste;

(B) apply the requirements for controlled substance prescriptions, including new, refill, and transfer prescriptions;

(C) apply the requirements for receiving, storing, ordering, labeling, and dispensing controlled substances and the reverse distribution, take-back, and loss or theft of controlled substances;

(D) classify controlled substances such as cocaine, heroin, marijuana, fentanyl, dextroamphetamine, amphetamine salts, benzodiazepines, and anabolic steroids according to their Drug Enforcement Administration (DEA) schedules;

(E) identify the federal requirements for restricted drugs such as pseudoephedrine and related medication processing programs such as Risk Evaluation and Mitigation Strategies (REMS) and iPLEDGE;

(F) demonstrate the process for Food and Drug Administration (FDA) recalls based on classification for medications, devices, supplies, and supplements; and

(G) explain pharmacy compliance with professional standards such as scope of practice and relevant legal, regulatory, formulary, contractual, and safety requirements.

(4) The student interprets drug information. The student is expected to:

(A) apply knowledge of brand name, generic name, classification, and indication of use for common medications such as the top 200 drugs with automaticity in a pharmacy setting;

(B) analyze the common and life-threatening drug interactions and contraindications such as drug-disease, drug-drug, drug-lab, and drug-food;

(C) apply knowledge of the narrow therapeutic index (NTI) to drug use evaluations; and

(D) 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.

(5) The student demonstrates the dispensing process in various pharmacy settings. The student is expected to:

(A) analyze a prescription and medication order for completeness, including drug strength, dosage form, directions, quantity, date, and refills, and obtain missing information if needed;

(B) 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;

(C) collect, organize, and record demographic and clinical information accurately for patient continuity of care;

(D) identify the required steps in preparing sterile compounded products, including putting on (donning) personal protective equipment (PPE), cleaning the vertical or horizontal flow hoods, selecting correct supplies, and preparing the product for dispensing;

(E) select the appropriate equipment and supplies, including diabetic supplies, spacers, and oral/injectable syringes, for drug administration based on package size and unit dose;

(F) apply lot numbers, expiration dates, and National Drug Codes (NDC) on drug packaging for the dispensing of medication; and

(G) differentiate between the use of effective infection control procedures such as sterile and non-sterile compounding in various pharmacy related settings.

(6) The student analyzes common medication errors and practices error prevention strategies. The student is expected to:

(A) use knowledge of high alert/risk and look-alike/sound-alike (LASA) medications to prevent medication errors;

(B) apply knowledge of current error prevention strategies such as using Tall Man lettering, trailing/leading zeros, and barcodes; separating inventory; and limiting use of error-prone abbreviations to prevent medication errors;

(C) apply knowledge of various prescription errors such as abnormal dose, early refill, incorrect quantity, incorrect patient, and incorrect drug for improved accuracy;

(D) demonstrate how to assist pharmacists in recognizing issues that require intervention such as adverse drug events, drug utilization review (DUR), and use of equipment and devices; and

(E) demonstrate knowledge of medication errors such as near miss and adverse events and various reporting procedures such as MedWatch, vaccine adverse event reporting system (VAERS), and route-cause analysis (RCA).

(7) The student applies pharmacy workflow procedures according to federal, state, local, and facility guidelines. The student is expected to:

(A) describe the process for creating a prescription or medication order in compliance with pharmacy standards such as standards for patient rights, completeness of a prescription or medication order, and authorization;

(B) discuss the steps in verifying a prescription or medication order such as right patient, right drug, right dosage, right time, and right route;

(C) identify the proper procedures for entering a prescription or medication order, including procedures for workstation, use of technology, validation with drug enforcement administration (DEA) calculations, and transcribing such as using military time and Roman numerals;

(D) apply the proper techniques for filling a prescription or medication order such as techniques for use of technology, counting, and selecting the correct medication;

(E) explain the proper procedure for the administration of prescription or medication orders such as ear drops, eye drops, inhalations, parenteral, and enteral;

(F) 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

(G) 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.

(8) The student evaluates mathematical process standards related to the practice of pharmacy. The student is expected to:

(A) calculate dosage calculations for adults and special populations using conversions, ratios, and dimensional analysis to perform duties in a pharmacy setting;

(B) apply conversions to systems of measurements, including apothecary, metric, and household, to perform duties in a pharmacy setting;

(C) 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;

(D) calculate days supply for a prescription order given a dose and sig;

(E) calculate volume or mass of each of the total parenteral nutrition (TPN) components such as lipids, amino acids, dextrose, calcium, and magnesium;

(F) calculate volume or mass of ingredients needed for compounding both sterile and non-sterile products;

(G) calculate amount needed for percent of weight-to-volume, volume-to-volume, and weight-to-weight based on stock concentration; and

(H) 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.

(9) The student demonstrates the use of technology in a pharmacy setting. The student is expected to:

(A) identify the types and uses of automated dispensing technology such as cabinets, units, and carousels;

(B) demonstrate knowledge and components of pharmacy dispensing software used in the out-patient setting, the in-patient setting, and in-office use dispensing;

(C) apply professional standards using communication technology such as telephone, emails, fax, electronic prescriptions, and social media appropriate for a pharmacy setting;

(D) apply knowledge of technology hardware devices for input and output such as computers, scanners, printers, interface devices, and other devices; and

(E) select and use appropriate technology tools to search for drug information such as pill identification, adverse events, and contraindications.

(10) 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:

(A) critique the validity and reliability of scientific research such as assessing for bias, conflict of interest, and study design;

(B) demonstrate the ability to independently find valid and reliable sources such as primary, secondary, and tertiary literature;

(C) identify safe use of online resources that maintain the privacy and confidentiality of the user and patient;

(D) analyze online resources used in scientific research;

(E) describe the recent innovations and advances in pharmacy;

(F) identify opportunities for extended learning experiences such as community services, career and technical service organizations (CTSOs), and professional organizations; and

(G) 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.

(11) The student performs inventory procedures according to federal, state, local, and facility guidelines. The student is expected to:

(A) analyze proper storage for medications in regard to temperature, light sensitivity, product demand, cost, and restricted access;

(B) analyze therapeutic substitutions and product selection using the knowledge of formularies or preferred product list;

(C) practice procedures for inventory control such as removal of expired/recalled drug products, rotating inventory, performing a physical inventory, and ordering medications/supplies;

(D) explain how just-in-time or drop ship ordering and periodic automatic replenishment (PAR) levels are used to maintain pharmacy inventory;

(E) analyze how laws affect the procedures for purchasing or ordering medications, devices, and supplies; and

(F) analyze lot numbers, expiration dates, and National Drug Codes (NDC) on drug packaging for inventory accuracy.

(12) The student demonstrates knowledge of safety procedures in a pharmacy setting. The student is expected to:

(A) apply appropriate hygiene and cleaning standards, including hand washing and cleaning counting trays, countertops, and equipment;

(B) perform basic safety and emergency preparedness procedures such as basic life support (BLS) and first aid applicable to pharmacy services;

(C) explain the risks of drug diversion to employees, patients, and the community;

(D) explain the potential solutions to minimize drug diversion such as identifying red flags, controlling inventory, and monitoring the prescription drug monitoring program (PDMP);

(E) explain the types and uses of PPE and the steps for putting on (donning) and removing (doffing) PPE; and

(F) explain why collecting and documenting patient allergies are important steps in medication safety.

Source: The provisions of this §127.484 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.485. Pharmacology (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in biology, one credit in chemistry, and at least one credit in a Level 2 or higher course from the health science career cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 healthcare workers.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student explores the field and foundation of pharmacology. The student is expected to:

(A) differentiate between pharmacology subdivisions, including pharmacodynamics, pharmacokinetics, pharmaceutics, and pharmacotherapeutics;

(B) use common drug information materials such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, textbooks, and marketing materials;

(C) list examples of primary, secondary, and tertiary drug information references;

(D) research and describe the history of pharmacy and contributions of the field;

(E) draw inferences based on data from promotional materials for products and services;

(F) analyze the societal impact of medication costs; and

(G) evaluate the impact of scientific research on society, including drug development and the natural environment, including drug disposal.

(2) The student identifies careers associated with pharmacology. The student is expected to:

(A) evaluate career pathways utilizing pharmacology;

(B) define the role of the pharmacy team; and

(C) research and describe emerging opportunities within the pharmacy profession.

(3) The student explains the ethical and legal responsibilities associated with pharmacology. The student is expected to:

(A) explain the causes, effects, and consequences associated with medical errors, including medication errors;

(B) define legal terminology associated with medical errors such as negligence, product liability, contributory negligence, and regulatory law;

(C) analyze the principles of medical ethics, including beneficence, autonomy, maleficence, and justice; and

(D) evaluate professional liability.

(4) The student uses medical terminology to communicate effectively with other healthcare professionals, patients, and caregivers. The student is expected to:

(A) use the appropriate medical terminology to identify different classes of drugs;

(B) communicate using medical terminology associated with pharmacology;

(C) analyze unfamiliar terms using the knowledge of word roots, suffixes, and prefixes; and

(D) interpret medical terminology to communicate with patients and caregivers.

(5) The student demonstrates mathematical knowledge and skills to solve problems with systems of measurement used in the pharmacy. The student is expected to:

(A) calculate medication dosages using formulas, ratios, proportions, and allegations;

(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, including metric, apothecary, avoirdupois, and household systems; and

(D) evaluate statistical data and its limitations such as patient compliance, study design, and controls.

(6) The student evaluates pharmaceutical agents, their dosage form, and routes of administration. The student is expected to:

(A) analyze the availability of different dosage forms such as solid, liquid, patch, and IV solution;

(B) give examples of the brand or generic names of drugs such as the top 200 drugs in each dosage form and routes of drug administration;

(C) define medical terminology associated with drug dosage forms;

(D) explain the difference between therapeutic effects, side effects, and toxic effects;

(E) identify the mechanism of action of different drug classifications such as drug receptors, agonists, and antagonist relationships;

(F) explain the dose response relationship concept such as the difference between oral and IV administration of drugs and explain the relationship between drug dosage, drug response, and time; and

(G) explain drug safety practices such as monitoring expiration dates and drug disposal.

(7) The student demonstrates knowledge and use of appropriate equipment, instruments, and technology. The student is expected to:

(A) identify technology components used in the pharmacy workflow such as ordering, entering, filling, and dispensing;

(B) describe how technology applications improve efficiency in the pharmacy; and

(C) 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 other laboratory supplies.

(8) The student practices safe protocols in preventing personal and client illness or injury. The student is expected to:

(A) employ safety standards such as workplace standards;

(B) interpret and apply pharmacy standards according to the strictest local, state, or federal regulations to enhance safety;

(C) examine the consequences of unsafe practices; and

(D) demonstrate safe procedures in the administration of client care in a simulated or clinical setting.

Source: The provisions of this §127.485 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.486. Medical Microbiology (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: one credit in biology, one credit in chemistry, and at least one credit in a course from the health science career cluster. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) 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.

(5) Students are expected to know that:

(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) 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.

(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) 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).

(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) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(10) 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.

(d) Knowledge and skills.

(1) The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) 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 (PPE), disposable pipettes, lab glassware and instruments, bacterium and other live microbial agents, enzymes, computer software and probes, incubator, and autoclave;

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(F) organize quantitative and qualitative data using equipment such as graphing calculator, computer software and probes, graphic organizers;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(2) 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:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) 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:

(A) 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;

(B) 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

(C) 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 careers.

(5) The student examines the field of microbiology in relation to medical care. The student is expected to:

(A) examine the historical development of microbiology as it relates to health care of an individual in modern medicine; and

(B) compare the roles, functions, and responsibilities of agencies governing infectious disease control.

(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;

(B) prepare slides and discuss the differences between Gram positive and Gram negative bacteria such as the bacterial cell wall and the use of oxygen;

(C) identify chemical processes such as enzyme catalyst and osmotic potential of microorganisms;

(D) identify and discuss technologies used in a laboratory setting such as polymerase chain reaction (PCR), serology, enzyme-linked immunoassay (ELISA), and electrophoresis;

(E) prepare plates or active mediums to differentiate the factors required for microbial reproduction and growth;

(F) identify the normal flora microorganisms of the human body;

(G) identify and differentiate between various pathogens, including opportunistic pathogens, hospital-acquired infections, community-acquired infections, and colonizing microorganisms;

(H) isolate colonies and describe the morphology of microorganisms; and

(I) interpret and explain the role of the culture and sensitivity report provided to the clinician.

(7) The student examines the role of microorganisms in infectious diseases. The student is expected to:

(A) outline and explain the infectious disease process, including how pathogenic microorganisms affect human body systems;

(B) categorize diseases caused by bacteria, including *Rickettsia*, fungi, viruses, protozoa, arthropods, and helminths;

(C) explain and interpret the body's immune responses and defenses against infection;

(D) prepare a bacterial colony and evaluate the effects of anti-microbial agents such as narrow and broad-spectrum antibiotics;

(E) examine the environmental and social causes of the emergence and reemergence of diseases such as corona viruses, Ebola, malaria, tuberculosis, and polio;

(F) research and discuss drug *aureus*-resistant microorganisms, including carbapenem-resistant *Enterobacteriaceae*, methicillin-resistant *Staphylococcus aureus*, vancomycin-intermediate/resistant *Staphylococci*, vancomycin-resistant enterococci, and emergent antibiotic-resistant superbugs; and

(G) outline the role of governing agencies in monitoring and establishing guidelines based on the spread of infectious diseases.

(8) The student recognizes the importance of maintaining a safe environment and eliminating hazardous situations. The student is expected to:

(A) identify and apply standard laboratory precautions;

(B) identify and apply microbiological safety practices in accordance with industry standards, including the proper handling, disinfection, and disposal of biological waste and maintenance of containment levels;

(C) identify and apply appropriate personal protection equipment (PPE) and transmission-based precautions, including precautions against droplet, contact, and airborne transmission;

(D) sterilize laboratory and medical equipment and instruments in accordance with industry standards; and

(E) define and select different mechanisms of decontamination such as antiseptics, disinfection, and sterilization.

Source: The provisions of this §127.486 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.487. Health Informatics (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Medical Terminology. Recommended prerequisites: Principles of Health Science and Business Information Management I. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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. Healthcare information technology has increased 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. This course will include a focus on billing and coding.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) 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, define, and differentiate the common health information systems 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

(B) explain how various health information systems support the administrative, financial, clinical, and research needs of a health care enterprise.

(2) 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;

(B) identify the purpose of data modeling;

(C) define the customary steps in the data modeling process;

(D) differentiate between entities, attributes, and relationships in a data model; and

(E) explain various types of organizational databases.

(3) The student distinguishes between data and information. The student is expected to:

(A) discuss the importance of data security, accuracy, integrity, reliability, and validity; and

(B) demonstrate an understanding of data information concepts for health information systems, electronic health records, and patient registries.

(4) 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;

(C) explain functional requirements for electronic health records; and

(D) explain the concept and importance of the interoperability of electronic health records and other health information systems.

(5) 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;

(C) discuss the linkage between current procedural terminology (CPT) codes; International Classification of Diseases, 10th revision, Clinical Modification (ICD-10-CM) codes; and medical necessity for reimbursement for charges billed;

(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.

(6) The student identifies agencies involved in the health insurance claims process. The student is expected to:

(A) define fiscal intermediary;

(B) define Medicaid and Medicare;

(C) discuss health care benefit programs such as TRICARE and Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA);

(D) explain how to manage a worker's compensation case;

(E) complete a current health insurance claim form such as the Centers for Medicare and Medicaid Service (CMS-1500) form; and

(F) identify three ways to transmit electronic claims.

Source: The provisions of this §127.487 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.488. Medical Billing and Coding (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Medical Terminology. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) Medical Billing and Coding familiarizes students with the process, language, medical procedure codes, requirements of Health Insurance Portability and Accountability Act (HIPAA), and 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. 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.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

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(1) The student explores career opportunities in revenue cycle management. The student is expected to:

(A) identify professional opportunities within the medical billing and revenue cycle management professions;

(B) demonstrate ethical billing and coding practices as outlined by professional associations guidelines; and

(C) 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).

(2) The student explains the ethical and legal responsibilities of personnel in medical billing and coding. The student is expected to:

(A) 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);

(B) identify major laws and regulations that impact health information, including HIPAA, the Stark Law, the Fair Debt Collection Practices Act, and the False Claims Act;

(C) analyze legal and ethical issues related to medical billing and coding, revenue cycle management, and documentation within the medical record;

(D) research compliance laws;

(E) identify appropriate documentation required for the release of patient information;

(F) differentiate between informed and implied consent;

(G) compare and contrast use of information and disclosure of information; and

(H) evaluate cases for insurance fraud and abuse.

(3) The student identifies the body systems to support proficiency in billing and coding. The student is expected to:

(A) explain the sections and organizations of the International Classification of Diseases and Related Health Problems, 10th Revision, Clinical Modification (ICD-10-CM) 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:

(i) the integumentary system;

(ii) the skeletal system;

(iii) the muscular system;

(iv) the cardiovascular system;

(v) the respiratory system;

(vi) the digestive system;

(vii) the endocrine system;

(viii) the urinary system;

(ix) the reproductive system; and

(x) the nervous system and special senses; and

(B) identify mental, behavioral, and neurodevelopmental disorders and how they apply to medical billing and coding.

(4) The student demonstrates proficiency in the use of the ICD-10-CM, CPT, and Healthcare Common Procedure Coding System (HCPCS) coding systems. The student is expected to:

(A) apply coding conventions and guidelines for appropriate charge capture;

(B) describe the process to update coding resources;

(C) 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;

(D) describe the concepts of disease groupings and procedure-code bundling;

(E) identify coding compliance, including medical necessity; and

(F) use appropriate medical terminology and abbreviations.

(5) The student understands revenue cycle management. The student is expected to:

(A) define revenue cycle management;

(B) 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;

(C) define Medicare Administrative Contractors (MACs) and investigate the administrative services provided by the MAC for Texas;

(D) describe the patient scheduling and check-in process, including verifying insurance eligibility, obtaining pre-authorization, and processing appropriate patient authorization and referral forms;

(E) describe the sections of the CMS-1500 form to prepare and submit mock clean claims electronically or manually;

(F) differentiate between primary and secondary insurance plans to initially process crossover claims;

(G) interpret remittance advice to determine financial responsibility of insurance company and patient, including a cash-paying patient;

(H) analyze reason for insurance company denials or rejections and determine corrections or appeals required; and

(I) analyze an aging report and how it relates to the revenue cycle.

Source: The provisions of this §127.488 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.489. Medical Assistant (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite or corequisite: Anatomy and Physiology. Recommended prerequisite: Medical Terminology. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Assistant course provides students with the knowledge and skills to pursue a career as a medical assistant and to improve college and career readiness. Students will obtain communication skills, clinical ethics knowledge, safety awareness, and information related to medical assisting career opportunities.

(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) 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.

(6) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(7) 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.

(d) Knowledge and skills.

(1) The student evaluates the roles and responsibilities of the medical assistant as a member of the healthcare team. The student is expected to:

(A) explain the role of the medical assistant in various healthcare settings;

(B) discuss the scope of practice, including responsibilities and limitations of a medical assistant;

(C) explain the level of authority within the healthcare professional hierarchy; and

(D) 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.

(2) The student applies professional communication skills to provide information to patients and team members in a healthcare setting. The student is expected to:

(A) demonstrate the ability to report abnormal results in writing and orally to the patient's provider;

(B) demonstrate how to communicate with patients, caregivers, and the interdisciplinary team to assist in the planning, delivery, and coordination of patient-centered care;

(C) evaluate different communication techniques for responding to the needs of individuals in a diverse society;

(D) practice conflict-resolution techniques such as cooperation, contribution, compromise, and collaboration in various situations; and

(E) 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.

(3) The student demonstrates knowledge of healthcare ethical principles in their practice of medical assisting. The student is expected to:

(A) evaluate principles of ethical behavior, including beneficence, non-maleficence, justice, and autonomy;

(B) debate ethical issues related to technological advances in health care such as stem cells, robotics, and immunologic therapies in health care;

(C) evaluate ethical issues and legal ramifications related to malpractice, negligence, and liability; and

(D) summarize legal and ethical standards, including Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act (HIPAA).

(4) The student demonstrates knowledge of the administrative duties of a medical assistant in a healthcare setting. The student is expected to:

(A) identify considerations for scheduling a patient such as availability of test results, availability of staff, patient flow, triage, and coordination of care;

(B) discuss considerations related to managing an office schedule such as types of scheduling, under booking, over booking, cancellations, add-ons, and no-shows;

(C) 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;

(D) describe the elements of completing patient registration such as recording demographics, emergency contact, and insurance information;

(E) analyze different types of health insurance coverage, including Medicare, Medicaid, TRICARE, Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA), private insurance, employer-based insurance, and workers' compensation;

(F) identify the components of an insurance card such as plan name, group number, ID number, patient co-pay, co-insurance, and phone numbers;

(G) define insurance plan terminology such as prior authorization, formulary, explanation of benefits, denial, appeal, and referrals;

(H) define electronic health records systems and their components such as demographics, financial insurance information, orders and referrals, correspondence, and test results; and

(I) analyze the benefits and risks of electronic health records systems.

(5) The student uses appropriate medical terminology as a medical assistant. The student is expected to:

(A) use directional terms and anatomical planes related to body structure;

(B) use occupationally specific terms such as terms relating to the body systems, surgical and diagnostic procedures, diseases, and treatment; and

(C) apply knowledge of prefixes, suffixes, and root words to translate medical terms to conversational language to facilitate communication.

(6) The student practices or models patient intake skills as a medical assistant. The student is expected to:

(A) 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;

(B) explain how to use a medical chart to identify patient care needs;

(C) identify normal ranges for vital signs per age group, including blood pressure, temperature, heart rate, respiratory rate, and oxygen saturation;

(D) measure and record accurate vital signs, including manual blood pressure, temperature, heart rate, respiratory rate, and pain scale;

(E) measure and record accurate anthropometric measurements, including height, weight, and head circumference; and

(F) calculate accurate conversions between different units of measurement such as kilograms to pounds, centimeters to inches, and Fahrenheit to Celsius.

(7) The student demonstrates knowledge and application of point of care testing as a medical assistant. The student is expected to:

(A) define point of care testing;

(B) identify and correlate specimen types and collection methods, including throat swabs, capillary blood, and urine used in point of care testing;

(C) 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, vision screening, and electrocardiogram (EKG) tests;

(D) perform and document a vision screening using the Snellen eye chart; and

(E) locate landmarks for performing a 12-lead electrocardiogram (EKG).

(8) 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:

(A) apply the six rights of medication administration, including right patient, right medication, right dose, right time, right route, and right documentation;

(B) identify drug classifications and the indication for use;

(C) define drug-related terms, including adverse event, therapeutic response, side effect, drug interactions, and allergic reaction;

(D) calculate the amount of medication to administer based on the dosage ordered and the strength of medication supply on hand;

(E) evaluate a patient for known allergies and contraindications prior to administering any medication;

(F) identify routes of medication administration, including oral, buccal, sublingual, inhaled, intranasal, otic, ophthalmic, intravaginal, anal, topical, transdermal, intradermal, subcutaneous, intramuscular, intravenous, and intrathecal;

(G) use proper technique when preparing medications for administration, including injections, oral, sublingual, inhaled, otic, ophthalmic, and topical;

(H) use proper technique when administering medications, including injections, oral, sublingual, inhaled, otic, ophthalmic, and topical;

(I) identify appropriate muscle groups for intramuscular injections, including deltoid, vastus lateralis, and ventrogluteal;

(J) explain the factors that influence intramuscular injection site selection, including patient size, patient age, viscosity of medication, and muscular density;

(K) explain the factors that affect needle size and gauge selection, including medication viscosity, patient size, muscular density; and

(L) demonstrate knowledge of syringe styles and markings on various size syringes such as Luer Lock, oral, insulin, TB, 1ml, 3ml, 5ml, and 10ml syringes.

(9) The student demonstrates knowledge of collecting, labeling, storing, and transferring lab specimens. The student is expected to:

(A) identify how to properly store and transfer lab specimens such as blood, urine, fecal, and sputum samples;

(B) list the proper order of draw for blood collection tubes;

(C) select the proper collection tubes for specific types of blood tests such as complete blood count (CBC), comprehensive metabolic panel (CMP), and lipid panel;

(D) locate veins used for blood draws;

(E) demonstrate proper technique and post procedural care for veinous blood draws; and

(F) demonstrate proper labeling of lab specimens, including patient name, date of birth, source, date, time, and initials of collector.

(10) The student demonstrates knowledge of patient populations and their specific care considerations. The student is expected to:

(A) discuss and identify stages of development throughout a patient's lifespan;

(B) describe coping and defense mechanisms exhibited by patients such as emotion-focused behaviors, problem-focused behaviors, denial, displacement, intellectualization, projection, rationalization, and regression;

(C) identify and discuss end-of-life considerations such as advanced directives, power of attorney, stages of grief, and family support;

(D) practice appropriate methods of care for working with patients with mental, physical, and developmental disabilities;

(E) explain how socioeconomic factors such as income, transportation, access to community resources, employment, and education level can influence patient outcomes; and

(F) explain how various multicultural values can affect patient care decisions.

(11) The student demonstrates knowledge of safety practices and procedures as related to medical assisting. The student is expected to:

(A) employ standard precautions in a healthcare scenario;

(B) identify various modes of disease transmission, including vector borne, air borne, direct or indirect contact, and vehicle;

(C) distinguish between the types of isolation precaution signage used to address modes of disease transmission such as contact, droplet, and airborne;

(D) identify personal protective equipment (PPE);

(E) apply the knowledge of PPE used in various situations such as venipuncture, collecting a throat swab, or dipping urine;

(F) demonstrate proper putting on (donning) and removing (doffing) of PPE;

(G) define the use of a sharps container, biohazard container, shredding bin, and trash receptacle;

(H) practice safe handling of sharps such as not recapping after injection and prompt disposal in a sharps container;

(I) identify symptoms of anaphylaxis and the proper emergency response;

(J) explain storage requirements for medications, vaccines, and lab specimens;

(K) locate and use the safety data sheets (SDS) to retrieve information such as proper storage, clean up, and exposure response; and

(L) define and apply knowledge of medical asepsis.

Source: The provisions of this §127.489 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.490. Respiratory Therapy I (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: At least one credit in a course from the health science career cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) 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.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations, including:

(A) work-based experiences/learning; and

(B) volunteering/shadowing opportunities.

(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.

(d) Knowledge and skills.

(1) The student applies mathematics, science, English language arts, and social studies in respiratory therapy. The student is expected to:

(A) interpret complex technical material related to respiratory therapy;

(B) identify how race, culture, and religion impact patient care;

(C) solve mathematical calculations related to respiratory therapy; and

(D) summarize biological and chemical processes that maintain homeostasis.

(2) The student investigates the history and profession of respiratory therapy, including education and licensure. The student is expected to:

(A) analyze the advancement of respiratory therapy practices over time;

(B) summarize the roles of respiratory therapists in various settings; and

(C) identify academic requirements for respiratory therapist and professional advancement opportunities such as professional organizations, credentials, certifications, registrations, licensure, continuing education, and advanced degrees.

(3) The student applies regulatory and safety standards in a respiratory therapy setting. The student is expected to:

(A) identify and conform to 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), U.S. Food and Drug Administration (FDA), The Joint Commission, the National Institute of Health (NIH), Texas Commission on Environmental Quality (TCEQ), Texas Department of State and Health Services (DSHS), and American Association for Respiratory Care (AARC);

(B) identify infection control standard and transmission-based precautions in the patient care setting, including hand hygiene, equipment sterilization, and the use of personal protective equipment (PPE); and

(C) identify industry safety standards, including standards for body mechanics, fire prevention, electrical safety, oxygen safety, and the handling of hazardous materials.

(4) The student investigates the structure and function of cardiopulmonary anatomy. The student is expected to:

(A) analyze the cardiovascular system, including ventricles, atrium, valves, blood vessels, nerves, blood flow, and cardiac conduction system;

(B) explain the respiratory system, including airways, trachea, lungs, and pulmonary vessels that aid the body in the exchange of gases;

(C) trace the blood flow through the cardiopulmonary system; and

(D) 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.

(5) The student develops knowledge pertaining to respiratory therapy procedures. The student is expected to:

(A) demonstrate the use of breathing exercises for patients with cardiopulmonary disease such as pursed lipped breathing and diaphragmatic breathing;

(B) explain the use of hyperinflation and airway clearance therapies;

(C) explain the use of tracheostomy and endotracheal tubes and oral and nasal airway devices for assisted breathing;

(D) identify anatomy of the heart and lungs and proper endotracheal tube placement on X-ray;

(E) explain the use of oximetry and arterial blood-gases for patient assessment;

(F) 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 masks, and non-rebreather masks; and

(G) demonstrate the administration of oxygen therapy using oxygen concentrators and portable cylinders.

(6) The student recognizes cardiopulmonary pharmaceutical agents and safety and protocol measures. The student is expected to:

(A) identify medications used in respiratory therapy, including bronchodilators and inhaled corticosteroids;

(B) summarize indications, contraindications, and side effects of respiratory medications;

(C) discuss delivery of respiratory medications such as nebulizers and meter dose inhalers (MDI); and

(D) assess the impact of cardiopulmonary agents on vital signs.

(7) The student implements the knowledge and skills of respiratory therapy professionals in a laboratory setting. The student is expected to:

(A) demonstrate patient assessment of vital signs, including blood pressure, pulse, respiratory rate, temperature, oxygenation, and ventilation status;

(B) demonstrate patient positioning for respiratory comfort and procedures;

(C) demonstrate patient care techniques used in high stress respiratory therapy situations such as non-compliant, combative, and distressed patients;

(D) demonstrate correct cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) skills; and

(E) demonstrate therapeutic communication appropriate to the situation, including communication with individuals with language differences/barriers and sensory loss.

(8) The student evaluates ethical behavioral standards and legal responsibilities in the respiratory therapy profession. The student is expected to:

(A) examine legal and ethical behavior standards such as the Patient's Bill of Rights, advanced directives, and the Health Insurance Portability and Accountability Act (HIPAA);

(B) investigate and discuss the legal and ethical ramifications of unacceptable behavior in therapeutic practice;

(C) research and describe role of professional associations and regulatory agencies; and

(D) describe ethical dilemmas in health care.

Source: The provisions of this §127.490 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.491. Respiratory Therapy II (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grade 12. Prerequisite: Respiratory Therapy I. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education 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.

(2) The Health Science Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

(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).

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations, including:

(A) work-based experiences/learning; and

(B) volunteering/shadowing opportunities.

(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.

(d) Knowledge and skills.

(1) The student applies mathematics, science, English language arts, and social studies in respiratory therapy. The student is expected to:

(A) analyze complex technical material related to respiratory therapy;

(B) analyze how race, culture, and religion impact patient care;

(C) apply mathematical calculations related to respiratory therapy; and

(D) analyze biological and chemical processes that affect homeostasis in relation to cardiopulmonary diseases.

(2) The student applies safety standards for a respiratory therapy setting. The student is expected to:

(A) 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), U.S. Food and Drug Administration (FDA), and Texas Commission on Environmental Quality (TCEQ), as they apply to cardiopulmonary diseases;

(B) demonstrate infection control standard and transmission-based precautions in the laboratory setting, including hand hygiene, equipment sterilization, and the use of personal protective equipment (PPE); and

(C) model industry safety standards, including standards for body mechanics, fire prevention, electrical safety, oxygen safety, and the handling of hazardous materials.

(3) The student explains the interactions between the cardiopulmonary and other body systems as they relate to wellness and diseases. The student is expected to:

(A) analyze the role of the autonomic nervous system in the regulation of the cardiopulmonary system as it pertains to health and illness;

(B) analyze the role of the urinary system in the regulation of the acid-base and fluid balance and in cardiopulmonary health and illness;

(C) investigate the interactions between body systems and cardiopulmonary diseases and disorders such as Guillain-Barré syndrome, Myasthenia Gravis, SARS-CoV-2 (Covid), Idiopathic Pulmonary Fibrosis (IPF), adult respiratory distress syndrome (ARDS), and congestive heart failure (CHF);

(D) 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

(E) discuss the role of respiratory therapists in the use of mechanical systems, including non-invasive and invasive mechanical ventilators and extracorporeal membrane oxygenation (ECMO), when the cardiopulmonary system fails.

(4) The student implements the knowledge and skills of a respiratory therapy professional used in a laboratory setting. The student is expected to:

(A) demonstrate breathing exercises commonly used for patients with cardiopulmonary disease;

(B) 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 devices, oral and nasal airways, tube fasteners, or tape;

(C) 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 an incentive spirometer;

(D) differentiate between normal lung and pathology in a chest X-ray;

(E) recognize typical and atypical arterial blood-gas values related to patient oxygenation and ventilation status;

(F) demonstrate the use of the oxygen therapy equipment such as nasal cannula, high flow nasal cannula, simple masks, air-entrainment masks, partial rebreather masks, non-rebreather masks, and non-invasive ventilators;

(G) demonstrate patient assessment methods, including inspection, auscultation, palpitation, and percussion;

(H) interpret and create a basic care plan for asthma and chronic obstructive pulmonary disease (COPD);

(I) demonstrate the role of a respiratory therapist during simulated emergency situations such as situations requiring a rapid response team and advanced cardiac life support; and

(J) describe the respiratory therapists' role in patient education regarding the disease process and proper use of medication and respiratory equipment.

(5) The student understands cardiopulmonary pharmaceutical agents and safety. The student is expected to:

(A) research and identify the application of medications used in respiratory therapy, including bronchodilators, inhaled corticosteroids, mucolytics, biologics, inhaled antibiotics, inhaled pulmonary vasodilators, and antivirals;

(B) evaluate indications, contraindications, and side effects of respiratory medications;

(C) demonstrate delivery methods of medication such as nebulizers and meter dose inhalers (MDI); and

(D) evaluate patient response to therapy before, during, and after respiratory treatments such as heart rate, blood pressure, respiration, and breath sounds.

(6) The student evaluates ethical behavioral standards and legal responsibilities in the respiratory therapy profession. The student is expected to:

(A) analyze legal and ethical scenarios as it relates to the Patient's Bill of Rights and the Health Insurance Portability and Accountability Act (HIPAA);

(B) evaluate the legal and ethical ramifications of unacceptable behavior in therapeutic practice; and

(C) describe ethical dilemmas in respiratory therapy such as advanced directives, palliative care, hospice, and end-of-life care.

(7) The student identifies academic preparation and skills necessary for employment in the field of respiratory therapy. The student is expected to:

(A) research and identify academic requirements for professional advancement such as credentials, certifications, licensure, registration, continuing education, and advanced degrees; and

(B) research and identify the path to obtain and maintain entry level licensure and credentialing.

Source: The provisions of this §127.491 adopted to be effective August 1, 2025, 50 TexReg 4421.

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

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Medical Terminology. Recommended prerequisites: Principles of Health Science and Business Information Management I. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) 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.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates an understanding of the healthcare management concept. The student is expected to:

(A) define the term healthcare management;

(B) explain the roles and responsibilities of healthcare professionals, including the management functions of planning, organizing, staffing, leading, and controlling;

(C) explain how organizational behavior and teamwork in healthcare impact patient outcomes and effective day-to-day operations;

(D) explore and discuss the factors that influence healthcare management such as governmental regulations, payment models, employee turnover, and workforce shortages;

(E) define ethical workplace behavior and role play how to make ethical decisions; and

(F) explain how socially responsible management policies such as healthcare equity access, inclusion, and diversity policies are initiated and implemented.

(2) The student recognizes the business functions of healthcare systems. The student is expected to:

(A) differentiate among the major healthcare delivery systems such as hospitals, outpatient care facilities, community-based organizations, insurance companies, and pharmaceutical companies;

(B) define and discuss healthcare quality and quality improvement;

(C) specify various types of health information technology and discuss barriers to health information technology adoption;

(D) investigate healthcare financing models;

(E) explain the difference between and provide examples of healthcare revenues and healthcare expenses;

(F) define revenue-cycle management; and

(G) describe the roles of customer service and marketing in health care.

(3) The student evaluates ethical behavioral standards and legal responsibilities. The student is expected to:

(A) research and describe the role of professional associations and regulatory agencies;

(B) examine legal and ethical behavior standards such as Patient Bill of Rights, Advanced Directives, and the Health Insurance Portability and Accountability Act (HIPAA);

(C) investigate the legal and ethical ramifications of unacceptable behavior;

(D) identify examples of conflicts of interest; and

(E) differentiate between the concepts of fraud, waste, and abuse.

Source: The provisions of this §127.492 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.493. Leadership and Management in Nursing (One Credit), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2022-2023 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: one credit in biology, one credit in chemistry, and at least one credit in a course from the health science career cluster. Recommended prerequisite: Science of Nursing. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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) 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.

(4) 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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student understands the different educational levels of licensed nurses and applicable careers and career pathways. The student is expected to:

(A) compare the differences between the educational requirements and roles of a licensed vocational nurse and a registered nurse;

(B) diagram the educational requirements of a registered nurse, including diploma, associate degree, bachelor's degree, master's degree, and doctoral degree;

(C) identify the different specializations of a nurse with a master's degree such as family nurse practitioner, nurse informaticist, nurse midwife, and nurse educator;

(D) differentiate the roles of the Doctor of Philosophy (PhD) and the Doctor of Nursing Practice (DNP) prepared nurse; and

(E) develop a six-year career plan in nursing.

(2) The student understands the functions of leadership in nursing. The student is expected to:

(A) illustrate or diagram the relationship and progression within the hierarchy of nursing leadership;

(B) identify critical skills and competencies for each level in the hierarchy of nursing leadership;

(C) present and examine the impact of each level of nursing in the hierarchy of leadership; and

(D) investigate and analyze different leadership styles and how they are used in different situations.

(3) The student demonstrates personal and professional leadership qualities and competencies. The student is expected to:

(A) identify different personal growth practices such as self-reflection, introspection, self-care, and journaling;

(B) describe and demonstrate intrapersonal skills such as empathy, patience, risk-taking, confidence, integrity, personal values and ethics, punctuality, and goal setting;

(C) examine personal and professional values and ethics;

(D) research and develop a plan to coach and mentor others; and

(E) evaluate decision-making processes such as delegation, problem-solving processes such as conflict management, and processes to support patient satisfaction, patient safety, and patient advocacy.

(4) The student demonstrates the appropriate use of communication techniques. The student is expected to:

(A) examine communication platforms and apply the appropriate professional response in different mediums such as telephone, email, text, electronic health records, and face to face;

(B) demonstrate professional written and verbal communication skills for individuals and teams using communication tools such as Situation Background Assessment and Recommendation (SBAR) and Acknowledge Introduce Duration Explanation and Thank you (AIDET);

(C) determine appropriate communication methods for urgent, emergent, and non-urgent situations such as team strategies and tools to enhance performance and patient safety (TeamSTEPPS); and

(D) demonstrate receiving and giving constructive criticism.

(5) The student understands the definition and application of time management. The student is expected to:

(A) demonstrate how to create an agenda that prioritizes tasks, duties, and responsibilities that must be completed, including required meetings and communications;

(B) differentiate goals that advance professional growth and responsibility and non-professional goals;

(C) identify factors that inhibit the good use of time and apply strategies that mitigate the loss of time; and

(D) demonstrate how to manage long- and short-term personal and professional schedules by creating and updating a yearly calendar.

(6) The student understands how to build and manage interdisciplinary teams and facilitate teamwork. The student is expected to:

(A) define and explain the purpose of an interdisciplinary team and the role of each member;

(B) develop a plan for creating a team through team-building exercises, culture and climate awareness, and interpersonal skills;

(C) define and apply techniques to manage personal conflict within teams; and

(D) describe the stages of team evolution such as forming, storming, norming, performing, and transforming.

(7) The student understands regulatory agencies and boards and their related requirements. The student is expected to:

(A) identify the role and responsibility of the Board of Nursing, including establishing graduation and licensure requirements;

(B) identify federal, state, and local regulatory agencies such as local hospital boards, Health and Human Services, The Joint Commission, and Center for Medicare and Medicaid Services;

(C) define and identify the nursing scope of practice;

(D) compare the difference between a certification and licensure; and

(E) compare the role of the Board of Nursing and professional nursing organizations.

Source: The provisions of this §127.493 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.510. Speech and Language Development (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisites: Principles of Health Science, Anatomy and Physiology, and Introduction to Speech Pathology and Audiology. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Speech and Language Development course provides advanced knowledge and skills related to speech and language acquisition and growth of developing children. Understanding healthy development and speech, language, and communication developmental milestones is a prerequisite for studying communication disorders. This course provides students with the knowledge and skills necessary to pursue further education, possibly culminating in a bachelor's degree and subsequent master's degree in communication sciences and disorders.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student understands basic human communication processes, including the biological, neurological, psychological, developmental, linguistic, and cultural processes. The student is expected to:

(A) differentiate between communication, speech, language, and hearing;

(B) summarize the structural bases of speech production and hearing;

(C) compare anatomy and physiology of the speech mechanism;

(D) examine and describe the anatomy and physiology of the auditory system;

(E) identify and describe healthy verbal and nonverbal communication development;

(F) describe the developmental building blocks and prerequisites for healthy speech and language development;

(G) identify and define terminology related to human communication such as speech sound production, fluency (stuttering), voice, language, hearing, hearing loss, breathing, swallowing, pragmatics, and cognition; and

(H) explain social-interactive and psychological bases of communication and the influences it has on interpersonal communication, including linguistic and cultural influences.

(2) The student gains knowledge and understanding of various theoretical perspectives of healthy speech and language acquisition. The student is expected to:

(A) investigate and explain the major theories of language acquisition;

(B) compare the major theories of speech sound production; and

(C) research and explain the connections between language development and speech development as they relate to phonological awareness in learning to read.

(3) The student understands the healthy development of speech sound production in children. The student is expected to:

(A) describe articulatory phonetics and explain how articulatory phonetics relate to the respiratory system, including the larynx, vocal tract, articulators (velopharynx, tongue, lips, and jaw), and air flow;

(B) analyze the foundation for speech acquisition in relation to auditory perception before birth and in infants;

(C) describe early vocal development in infants as a prerequisite for speech;

(D) explain how the use of vowels by infants and young children is important for the development of speech;

(E) illustrate ways to categorize or describe vowel and diphthong production;

(F) research and describe the development of consonant inventories in young English-speaking children;

(G) describe and differentiate between models for describing consonant production;

(H) summarize progression in speech development for combining sounds into syllable shapes and words; and

(I) analyze the linguistic and cultural influences of the heritage/native language on the development of speech sound production in English.

(4) The student understands the components of a developing language system and how language skills develop in children. The student is expected to:

(A) identify and explain the components of a language system, including phonology, phonetics, morphology, syntax, semantics, and pragmatics;

(B) explain the components of a developing language system in terms of vocabulary, grammar, and social and interpersonal communication;

(C) describe the prerequisite skills for developing language;

(D) differentiate between language delay, language disorders, and language difference;

(E) outline the milestones of healthy language development from birth through age five years related to comprehension and expression;

(F) summarize healthy language development from Kindergarten (age 5) through Grade 5 (age 10 or 11) and describe factors that influence age-appropriate development of language;

(G) describe healthy continuing language development in adolescence for each component of a developing language system; and

(H) compare cultural and ethnic differences in language development.

(5) The student explores the healthy development of verbal fluency skills in children. The student is expected to:

(A) define and differentiate between verbal fluency, disfluencies, and stuttering;

(B) identify and explain common disfluencies and periods of expected disfluencies;

(C) explain the development of speech and language skills;

(D) differentiate between and discuss variables that may affect verbal fluency; and

(E) describe ways to measure verbal fluency for English language learners and evaluate the effectiveness of each method.

(6) The student explores parameters of voice production in children and adults. The student is expected to:

(A) describe the physical and physiological parameters of voice production;

(B) describe the components of healthy voice production, including voice quality, pitch, loudness, resonance, and duration;

(C) explain causes or etiologies of variations in voice production;

(D) describe how parameters of voice production change throughout the span of life;

(E) analyze environmental variables that may affect voice production;

(F) explain the practice of speech-language pathology and allowable services; and

(G) analyze the ethical considerations for the speech-language pathologist in dealing with individuals with a possible voice disorder and the requirement for ongoing work with a physician.

(7) The student understands the development of effective language and communication skills needed to demonstrate high levels of achievement in elementary and secondary school. The student is expected to:

(A) research and describe the milestones of communication development and literacy development;

(B) compare milestones of communication development to the milestones of literacy development;

(C) differentiate between interpersonal language used for conversational interaction and more formal, literate language used for learning academic content;

(D) define and provide examples of tier 1, tier 2, and tier 3 vocabulary as it relates to language development and meeting grade level expectations of academic vocabulary across subject areas;

(E) explain the development of language used for oral and written narratives and demonstrate how story grammar can be used as a bridge between conversational language and academic language;

(F) analyze the development of pragmatic-language skills and the types of verbal, nonverbal, and written communication skills needed to do well in school; and

(G) define emergent literacy and analyze the language base necessary for the development of reading skills.

(8) The student explores healthy and unhealthy speech and language development. The student is expected to:

(A) describe the role of the speech-language pathologist in determining healthy speech and language development and speech sound disorders and language disorders;

(B) explain the purpose of and describe techniques for screening speech and language skills in children;

(C) explain the purpose of and describe techniques for evaluating speech and language skills in children;

(D) analyze the Response to Intervention (RtI) method for accurately identifying a speech or language disorder in school-age children; and

(E) discuss the role of the speech-language pathologist in referral, counseling, and providing basic information when there are concerns about a child's speech or language development.

(9) The student demonstrates effective verbal and nonverbal communication skills. The student is expected to:

(A) describe and demonstrate appropriate communication skills when interacting with elementary age students, classroom teachers, speech-language pathologists, principals, and parents in various situations;

(B) identify and demonstrate verbal and nonverbal communication techniques that should be used when communicating with children who have sensory loss, language barriers, cognitive impairment, and other learning disabilities;

(C) identify and evaluate electronic communication and technology devices that may be used when interacting with children with communication disorders; and

(D) differentiate between oral interpretation and translation skills from English to a second language.

(10) The student explores the influence of dialects of Standard American English or native language on the development of speech and language skills in English and on the production of English. The student is expected to:

(A) provide examples of how a common phrase may be expressed across Standard American English and three different dialects;

(B) describe how speech and language patterns vary as a function of language, age, socioeconomic status, and geography;

(C) analyze the characteristics of American English dialects in terms of speech sound production and language use;

(D) explain the influence of heritage language on the speech sound production and grammar development of English in emergent bilingual students; and

(E) analyze speech and language patterns of English language learners in terms of expected speech and language development.

Source: The provisions of this §127.510 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.511. Speech Communication Disorders (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: at least one credit in a course from the Health Science Career Cluster. Recommended prerequisites: Principles of Health Science, Anatomy and Physiology, Introduction to Speech-Language Pathology and Audiology, Speech and Language Development, and Human Growth and Development. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Speech Communication Disorders course is designed to provide for the development of advanced knowledge and skills related to an overview of communication disorders that occur in children and adults in the areas of speech sound production, stuttering, voice disorders, and the language areas of semantics, syntax, pragmatics, phonology, and metalinguistics. An overview of treatment for hearing loss and deafness will also be provided.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates knowledge of the nature of speech, language, hearing, and communication disorders and differences. The student is expected to:

(A) identify the anatomy and describe the function of the peripheral and central auditory pathways;

(B) describe the physical and psychological attributes of sound;

(C) differentiate between the different types of hearing loss and their causes;

(D) describe the impact of hearing loss on speech and language development;

(E) compare the processes of speech, language, and hearing in people of various cultures;

(F) identify and relate disorder differences in relationship to communication skills;

(G) explain the concepts of speech, language, hearing, and communication disorders across the human lifespan; and

(H) explain potential barriers and solutions that an interpreter or translator must consider when communicating with a child with a communication disorder.

(2) The student demonstrates knowledge of the etiologies, characteristics, and anatomical/physical, acoustic, psychological, developmental, linguistic, and cultural correlates of communication disorders across the human lifespan. The student is expected to:

(A) compare common causes of hearing impairment in children and adults;

(B) analyze the causes of speech, language, and hearing disorders across the lifespan;

(C) identify common communication and hearing disorders, their typical symptoms, etiologies, characteristics, and associated correlates;

(D) evaluate the impact of communication disorders on the individual; and

(E) compare cultural variations in how communication disorders are perceived.

(3) The student describes the types of communication disorders most commonly seen in children and the services provided by professionals in this field to provide habilitation or rehabilitation. The student is expected to:

(A) analyze speech sound disorders of the child's phonological system and describe the production of speech sounds such as place, manner, voicing, and distinctive feature analysis;

(B) describe and organize evidence-based treatment approaches for speech sound disorders;

(C) summarize fluency disorders, including secondary characteristics;

(D) analyze evidence-based treatment approaches for stuttering;

(E) identify voice disorders in terms of vocal quality, pitch, volume, resonance, and duration;

(F) develop a plan for an evidence-based treatment for voice disorders and the required interface with a physician;

(G) explain language disorders in terms of the child's use of syntax, morphology, semantics, pragmatics, phonology, and metalinguistics; and

(H) compare current evidence-based treatment approaches for language disorders in preschool and elementary-age children.

(4) The student demonstrates effective verbal and nonverbal communication skills. The student is expected to:

(A) demonstrate communication skills appropriate to the situation when interacting with elementary age students, classroom teachers, speech-language pathologists, principals, and parents with communication disorders;

(B) demonstrate knowledge of verbal and nonverbal communication techniques that should be used when communicating with children that have sensory loss, language barriers, cognitive impairment, and other learning disabilities; and

(C) employ electronic communication and technology devices when interacting with children with communication disorders with appropriate supervision in a school setting.

(5) The student demonstrates sensitivity and understanding of cultural and linguistic influences on an individual's communication patterns and describes how cultural and linguistic influences must be considered when working with children with communication disorders and their families. The student is expected to:

(A) analyze how speech and language patterns vary as a function of language, age, socioeconomic status, and geography;

(B) prepare a simulated interview with the parent or family member of a child referred for a hearing or communication evaluation;

(C) identify patterns of communication that are common for individuals from different cultural and linguistic backgrounds such use of eye contact, personal space, and gestures;

(D) apply design strategies for culturally sensitive family-centered practices for children with communication disorders; and

(E) explain the terms language disorder, language delay, language difference, heritage language, and dialect for describing the communication patterns of a young child.

(6) The student identifies screening, evaluation, and diagnosis procedures that are used to identify hearing loss/deafness, speech sound production disorders, stuttering, voice impairment, and language disorders in children. The student is expected to:

(A) explain principles related to different audiometric test procedures;

(B) participate in a basic audiometric test (screening procedure) and interpret a variety of test results regarding whether the individual passed or failed the screening;

(C) interpret principles related to screening speech sound production, fluency, voice, and language skills in young children;

(D) evaluate developmental screening activities that include screening speech and language development; and

(E) synthesize the components of a comprehensive diagnostic report of findings inclusive of speech sound production, fluency (stuttering), voice production, and receptive, expressive, and social language skills to explain the test results.

(7) The student identifies research-based and evidence-based practices in speech-language pathology and audiological service delivery. The student is expected to:

(A) define evidence-based practice (EBP) and differentiate EBP from scientifically-based research in the fields of speech-language pathology and audiology;

(B) define the set of Evidence Levels used by the American Speech-Language-Hearing Association as a protocol to evaluate research evidence;

(C) correlate research studies to the Evidence Levels used by the American Speech-Language-Hearing Association;

(D) analyze the role of expert opinion and clinical experience in evidence-based practice; and

(E) design and present an action research project in the field of communication disorders.

(8) The student demonstrates knowledge and understanding of a variety of treatment approaches used with children with communication disorders. The student is expected to:

(A) compare two treatment approaches for speech sound disorders;

(B) compare two treatment approaches for fluency disorders;

(C) describe and practice treatment approaches for voice disorders in the areas of vocal quality, pitch, loudness, resonance, and duration;

(D) compare two treatment approaches for language disorders in preschool children;

(E) compare two treatment approaches for language disorders in elementary school-age children; and

(F) identify treatment approaches for language disorders with children with disabilities such as autism, intellectual disability, cleft palate, or cerebral palsy.

Source: The provisions of this §127.511 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.512. Science of Nursing (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2026-2027 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10 and 11. Prerequisite: at least one credit in a course from the Health Science Career Cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) 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.

(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 Science of Nursing course introduces students to basic research-based concepts in nursing. Topics include the nursing process, regulatory agencies, professional organizations, and the importance of critical thinking in patient care. Instruction includes skills needed to pursue a nursing degree and training requirements for specialty nursing roles. Knowledge and skills include emergency care, patient assessment, basic interpretation of vital signs, identification of patients with physical and mental disabilities, patient positioning, use of assistive devices, and application of nursing theories in patient care plans.

(A) 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 healthcare depends on the ability to work well with others.

(B) Professional integrity in the health science industry is dependent on acceptance of ethical responsibilities. Students employ their ethical responsibilities, recognize limitations, and understand the implications of their actions.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student understands tiers of nursing careers and the associated licensures. The student is expected to:

(A) identify and describe the educational and certification requirements for an entry-level patient care technician (PCT);

(B) identify and describe common work settings, including hospitals, doctors' offices, and healthcare agencies for PCTs;

(C) list qualifications to become a certified nursing assistant (CNA);

(D) identify and describe scope of practice for CNAs;

(E) describe the professional responsibilities of unlicensed assistive personnel (UAP) and explain how UAPs assist individuals with physical disabilities, mental disorders, and other healthcare needs;

(F) compare coursework required to obtain nursing credentials, including a licensed vocational nurse (LVN), Associate Degree Registered Nurse (ADN RN), and Bachelor of Science in Nursing Registered Nurse (BSN RN);

(G) analyze the requirements for advanced practice registered nurse (APRN) certification, including certified registered nurse anesthetist (CRNA), certified nurse midwife (CNM), certified nurse practitioner (CNP), and certified clinical nurse specialist (CNS); and

(H) compare nursing specialty options, including pediatric, critical care, emergency room, mental health, forensic, geriatric, and hospice nursing roles.

(2) The student examines how the nursing process is used to collect subjective and objective data in patient assessment. The student is expected to:

(A) describe the steps of a basic patient intake interview, including recording family history, biographical information, reason for seeking healthcare, present illness or health concerns, past health history, current medication list, and review of systems;

(B) explain the visual and physical head-to-toe assessment, including abnormal and normal structure and function of the body systems, used to evaluate patient condition;

(C) describe the importance of patient vital signs, including temperature, systolic and diastolic pressures, pulse, respiratory rate, pulse oximetry, and pain assessment using appropriate pain scales, in assessing a patient's overall health status;

(D) identify equipment, including a thermometer, sphygmomanometer, stethoscope, pulse oximeter, and time keeping device, used to measure and record patient vital signs;

(E) compare patient vital signs, including values outside of normal ranges, that establish baseline homeostasis; and

(F) explain how the steps in the nursing process are used to assist the patient to reach optimal physiological, social, mental, and emotional wellness.

(3) The student demonstrates knowledge of therapeutic care by reviewing patient activities of daily living (ADL). The student is expected to:

(A) define and differentiate between essential ADLs;

(B) explain the procedures for assessing patient independence, identifying functional limitations, and developing appropriate care plans;

(C) explain how a nurse promotes optimal patient function and quality of life;

(D) identify mental health disorders, including depression and anxiety, on patient ADLs;

(E) evaluate physical disabilities and limitations to recommend the correct assistive device for patient care; and

(F) identify and align therapeutic care to specific deficiencies in ADLs such as performing personal care, ambulating, and orienting to and using assistive devices to promote patient independence and optimize functional outcomes.

(4) The student understands the role of the nurse in providing first aid and emergency care. The student is expected to:

(A) identify and describe first aid and emergency care certifications such as Basic Life Support (BLS), Automated External Defibrillator (AED), First Aid, and Mental Health First Aid;

(B) discuss the advantages of obtaining first aid and emergency care certifications;

(C) identify and describe first aid and emergency care skills used by nurses; and

(D) explain the significance of the role of a nurse in an emergency setting such as an emergency room, intensive care unit, urgent care, or a life-saving event.

(5) The student applies nursing theory to simulate the implementation of patient care. The student is expected to:

(A) identify and explain the purpose of medical equipment that is used to assist patients with varied needs, including a Hoyer lift, hospital beds, foley catheter and drainage system, wheelchairs, gait belts, and bedside commodes;

(B) compare patient care needs throughout the lifespan using theories such as Maslow's Hierarchy of Needs, Erik Erikson's Stages of Psychosocial Development, and Jean Piaget's Theory of Child Development;

(C) identify proper patient positioning for patient needs, including Trendelenburg, Fowler's, supine, prone, lithotomy, and lateral recumbent;

(D) identify methods used to educate patients, family members, and caregivers in techniques for managing disabilities; and

(E) model the proper use of assistive medical equipment used in a variety of medical facilities, including long-term care, nursing and rehabilitation, home healthcare settings, and classroom environment.

(6) The student examines technology used in the practice of nursing. The student is expected to:

(A) identify and describe the technology, including electronic medical records, mobile computer workstations, scanning devices, and charting software, used to collect patient information;

(B) describe how to access laboratory values and normal ranges for diagnostic tests such as complete blood count, comprehensive metabolic panel, basic metabolic panel, and urinalysis to determine patient health status; and

(C) identify and describe advancements in technology, including remote patient monitoring systems, wearable monitoring systems, electronic intake patient interviews, interpreting services, deaf-link communication services, and patient safety alarms.

(7) The student understands the importance of using critical-thinking skills in the nursing process. The student is expected to:

(A) analyze the components of conducting a comprehensive patient assessment;

(B) identify and differentiate between subjective and objective data, including what the patient reports and what is observable and quantifiable;

(C) compare trends in health outcomes between national, Texas, and local populations across their lifespans, including birth rates, life expectancy, mortality rates, and morbidity rates;

(D) analyze peer-reviewed medical research articles to evaluate the efficacy of specific treatments in improving patient care outcomes;

(E) create a patient care plan using procedures, including assess, diagnose, plan, implement and evaluate (ADPIE) and subjective, objective, assess, plan, implement, and evaluate (SOAPIE);

(F) analyze the impact of nursing interventions on patient condition in a simulated setting; and

(G) examine and describe clinical outcomes based upon patient assessment, care plan, and nursing interventions.

(8) The student understands pharmacology terminology associated with nursing practices. The student is expected to:

(A) identify and describe the eight rights of medication administration, including right patient, medication, dose, route, time, documentation, diagnosis, and response;

(B) identify and describe the principles of pharmacodynamics, including receptor binding, drug-receptor interactions, dose-response relationships, and therapeutic index;

(C) explain pharmacokinetics in the human body system, including the course of drug absorption, distribution, metabolism, and excretion;

(D) analyze the advantages of various routes of drug administration, including oral, injection, topical, buccal, suppository, mucosal, intravenous, interosseous, nebulization, and intrathecal; and

(E) analyze the disadvantages of various routes of drug administration, including oral, injection, topical, buccal, suppository, mucosal, intravenous, interosseous, nebulization, and intrathecal.

Source: The provisions of this §127.512 adopted to be effective February 24, 2026, 51 TexReg 1124.

§127.553. Practicum in Health Science (Two Credits), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Health Science Theory and Biology. Students shall be awarded two credits for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) 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.

(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 Practicum in Health Science course is designed to give students practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

(4) To pursue a career in the health care 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 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.

(6) 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.

(7) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies mathematics, science, English language arts, and social sciences in health science. The student is expected to:

(A) interpret data from various sources in formulating conclusions;

(B) compile information from a variety of sources to create a technical report;

(C) plan, prepare, and deliver a presentation;

(D) examine the environmental factors that affect homeostasis;

(E) relate anatomical structure to physiological functions; and

(F) distinguish atypical anatomy and physiology in the human body systems.

(2) The student uses verbal and non-verbal communication skills. The student is expected to:

(A) accurately report information according to facility policies and procedures;

(B) demonstrate therapeutic communication skills to provide quality care; and

(C) employ therapeutic measures to minimize communication barriers.

(3) The student implements the knowledge and skills of a health care professional necessary to acquire and retain employment. The student is expected to:

(A) demonstrate proficiency in medical terminology and skills related to the health care of an individual;

(B) develop new problem-solving strategies based on previous knowledge and skills; and

(C) evaluate performance for continuous improvement and advancement in health care.

(4) The student employs ethical behavior standards and legal responsibilities. The student is expected to:

(A) identify individual ethical and legal behavior standards according to professional regulatory agencies; and

(B) research case studies related to unethical behavior in the health care industry.

(5) The student employs a safe environment to prevent hazardous situations. The student is expected to:

(A) integrate regulatory standards such as standard precautions and safe patient handling;

(B) evaluate hazardous materials according to the material safety data sheets; and

(C) apply principles of infection control and body mechanics in all aspects of the health care industry.

(6) The student explores the knowledge and skill levels necessary for advancing in the health science professions. The student is expected to:

(A) identify knowledge and skills that are transferable among health science professions; and

(B) research career pathways pertaining to the health care industry.

(7) The student implements skills in monitoring individual health status during therapeutic or diagnostic procedures. The student is expected to:

(A) identify care indicators of health status; and

(B) record health status according to facility protocol.

(8) The student recognizes the importance of participation in extended learning experiences. The student is expected to:

(A) participate in extended learning experiences such as community service, career and technical student organizations, and professional organizations; and

(B) create a plan of action targeting the career and technical student organization's community service goal.

Source: The provisions of this §127.553 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.554. Extended Practicum in Health Science (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Health Science Career Cluster. Prerequisites: Health Science Theory and Biology. Corequisite: Practicum in Health Science. This course must be taken concurrently with Practicum in Health Science and may not be taken as a stand-alone course. Students shall be awarded one credit for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) 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.

(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 Extended Practicum in Health Science course is designed to give students practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

(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 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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies professional communications strategies. The student is expected to:

(A) demonstrate verbal and non-verbal communication consistently in a clear, concise, and effective manner;

(B) report information according to facility policies and procedures accurately;

(C) demonstrate therapeutic communication skills with increased fluency to provide quality care;

(D) analyze, interpret, and effectively communicate information, data, and observations;

(E) apply active listening skills to obtain and clarify information; and

(F) observe and interpret verbal and nonverbal cues and behaviors to enhance communication.

(2) The student implements advanced problem-solving methods. The student is expected to employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions.

(3) The student understands and applies proper safety techniques in the workplace to prevent hazardous situations. The student is expected to:

(A) demonstrate an understanding of and follow workplace safety rules and regulations;

(B) implement regulatory standards such as standard precautions and safe patient handling with increased fluency;

(C) evaluate hazardous materials according to the material safety data sheets in a consistent manner; and

(D) apply principles of infection control and body mechanics in all aspects of the health care industry.

(4) The student understands the professional, ethical, and legal responsibilities in health science. The student is expected to:

(A) demonstrate a positive, productive work ethic by performing assigned tasks as directed;

(B) implement individual ethical and legal behavior standards according to professional regulatory agencies;

(C) show integrity by choosing the ethical course of action when making decisions; and

(D) comply with all applicable rules, laws, and regulations in a consistent manner.

(5) The student implements the knowledge and skills of a health care professional necessary to acquire and retain employment. The student is expected to demonstrate proficiency in medical terminology and skills related to the health care of an individual.

(6) The student participates in a supervised health science experience. The student is expected to:

(A) conduct, document, and evaluate learning activities in a supervised health science experience;

(B) develop advanced technical knowledge and skills related to a personal occupational objective;

(C) evaluate strengths and weaknesses in technical skill proficiency; and

(D) collect representative work samples.

Source: The provisions of this §127.554 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.555. Practicum in Nursing (Two Credits), Adopted 2021.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: one credit in biology, one credit in chemistry, and at least one course in a Level 2 or higher course in the nursing science program of study. Recommended prerequisites: Science of Nursing, Medical Terminology, and Anatomy and Physiology. Students shall be awarded two credits for successful completion of this course.

(c) Introduction.

(1) 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.

(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) Practicum in Nursing 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.

(4) 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.

(5) 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.

(6) 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.

(7) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies mathematics, science, English language arts, and social sciences in nursing. The student is expected to:

(A) solve mathematical calculations appropriate to situations in a health-related environment;

(B) communicate using medical terminology;

(C) express ideas in writing and develop skills in documentation;

(D) interpret complex technical material related to the health science industry;

(E) summarize biological and chemical processes that maintain homeostasis;

(F) explain changes in body structure due to trauma and disease; and

(G) research the global impact of disease prevention and cost containment.

(2) The student models ethical behavior standards and legal responsibilities. The student is expected to:

(A) apply facility and industry standard policies and procedures, including the Health Insurance Portability and Accountability Act (HIPAA);

(B) research and present case studies related to legal and ethical issues in health care;

(C) recognize and analyze professional boundaries of patient relationships; and

(D) model safe practices, including infection control, proper body mechanics, and patient handling.

(3) The student explores the knowledge and skills of the nursing process for assessment. The student is expected to:

(A) perform and assess subjective data during a patient intake in a clinical or simulated setting by:

(i) performing a complete health history, including family and social data; and

(ii) assessing the chief complaint, history of present illness, past medical history, and a review of systems; and

(B) perform and assess objective data during a patient intake in a clinical or simulated setting by demonstrating:

(i) the skill of obtaining core vital signs;

(ii) the skill of obtaining and assessing height and weight and weight fluctuations; and

(iii) the performance of a head-to-toe physical assessment.

(4) The student explores the knowledge and skills of the nursing process for implementation or intervention. The student is expected to:

(A) demonstrate the proper use and application of medical equipment related to oxygen therapy, glucometers, pulse oximeters, catheters, incentive spirometers, mobility devices, patient handling devices, and electric hospital beds and chairs;

(B) demonstrate patient care, including care related to activities of daily living (ADL), patient positioning, patients' range of motion, basic first aid, patient transfers, and patient transport;

(C) demonstrate skills related to or acquire basic life support (BLS) certification as required by industry standards; and

(D) demonstrate the skills necessary to track nutrition and elimination such as input and output (I&O) and types of diets.

(5) The student explores the knowledge and skills of the nursing process of evaluation and re-evaluation. The student is expected to:

(A) compare normal and abnormal healthcare data;

(B) identify how to report trends and abnormal findings to appropriate personnel according to facility protocols; and

(C) explain the significance of abnormal findings.

(6) The student explores the knowledge and skills of the nursing process of documentation. The student is expected to:

(A) document objective data using medical terminology;

(B) document subjective data using medical terminology; and

(C) 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).

(7) The student provides care for diverse populations such as persons from varying age groups and persons with physical limitations or mental health needs in clinical or simulated environment. The student is expected to:

(A) demonstrate appropriate usage of verbal and non-verbal communication techniques for providing care to persons from diverse populations; and

(B) apply appropriate techniques for assessments and care.

(8) The student is expected to provide culturally appropriate care. The student is expected to:

(A) use culturally appropriate verbal and non-verbal communication skills; and

(B) demonstrate patient interaction strategies for assessments and care.

Source: The provisions of this §127.555 adopted to be effective August 1, 2025, 50 TexReg 4421.