The State Board of Education (SBOE) proposes new §§127.270, 127.472, 127.512, 127.824, and 127.828-127.830, concerning Texas Essential Knowledge and Skills (TEKS) for career development and career and technical education (CTE). The proposed new sections would add new TEKS developed by subject matter experts convened by the Texas State Technical College (TSTC) and Education Service Center (ESC) Region 4 that are needed for completion of CTE programs of study.

BACKGROUND INFORMATION AND JUSTIFICATION: In accordance with statutory requirements that the SBOE identify by rule the essential knowledge and skills of each subject in the required curriculum, the SBOE follows a board-approved cycle to review and revise the essential knowledge and skills for each subject.

During the November 2022 meeting, the SBOE approved a timeline for the review of CTE courses for 2022-2025. Also at the meeting, the SBOE approved a specific process to be used in the review and revision of the CTE TEKS. The CTE-specific process largely follows the process for TEKS review for other subject areas but was adjusted to account for differences specific to CTE.

In 2023, CTE advisory committees convened to make recommendations for the review and refresh of programs of study as required by the Texas Perkins State Plan. Finalized programs of study were published in the fall of 2023 with an implementation date beginning in the 2024-2025 school year. CTE courses to be developed or revised to complete or update programs of study were determined.

At the April 2023 SBOE meeting, the board discussed and approved changes to the TEKS review process, including approving a process for selecting work group members. The changes were implemented beginning with the engineering TEKS review process. The SBOE began the review of current CTE TEKS, the development of new CTE TEKS, and the review of innovative courses to be approved as TEKS for courses in the new engineering program of study in 2024. New engineering CTE TEKS were adopted at the April 2025 SBOE meeting.

At the April 2024 meeting, the SBOE approved new TEKS for 23 courses in the agribusiness, animal science, plant science, and aviation maintenance programs of study as well as two STEM courses that may satisfy science graduation requirements, Physics for Engineering and Scientific Research and Design. Additionally, Texas Education Agency (TEA) staff shared an overview of upcoming interrelated needs for TEKS review and revision and instructional materials review and approval (IMRA). Staff explained upcoming needs related to development and amendment of CTE courses, made recommendations for completing the work in batches, and recommended including CTE in the next three cycles of IMRA.

At the June 2024 meeting, the board considered next steps related to the adoption of CTE courses that are needed to complete programs of study and a schedule for future CTE TEKS reviews. The SBOE approved recommendations that TEA present a set of innovative courses with minor edits for consideration for adoption as TEKS-based courses. Additionally, the SBOE authorized TEA to enter into interagency contracts with Collin College, TSTC, and ESC Region 4 to develop initial drafts of TEKS for the CTE courses.

The proposed new sections would ensure the standards for these career clusters support relevant and meaningful programs of study.

The SBOE approved the proposed new rules for first reading and filing authorization at its June 27, 2025 meeting.

FISCAL IMPACT: Monica Martinez, associate commissioner for standards and programs, has determined that for the first five years the proposal is in effect (2025-2029), there are no additional costs to state government. However, in fiscal year 2025 there was a cost to the state of approximately $285,000 to secure contracts for the development of the proposed new CTE TEKS. In addition, there will be implications for TEA if the state develops professional development to help teachers and administrators understand the revised TEKS. Any professional development that is created would be based on whether TEA received an appropriation for professional development in the next biennium.

There may be fiscal implications for school districts and charter schools to implement the proposed new TEKS, which may include the need for professional development and revisions to district-developed databases, curriculum,

and scope and sequence documents. Since curriculum and instruction decisions are made at the local district level, it is difficult to estimate the fiscal impact on any given district.

LOCAL EMPLOYMENT IMPACT: The proposal has no effect on local economy; therefore, no local employment impact statement is required under Texas Government Code, §2001.022.

SMALL BUSINESS, MICROBUSINESS, AND RURAL COMMUNITY IMPACT: The proposal has no direct adverse economic impact for small businesses, microbusinesses, or rural communities; therefore, no regulatory flexibility analysis specified in Texas Government Code, §2006.002, is required.

COST INCREASE TO REGULATED PERSONS: The proposal does not impose a cost on regulated persons, another state agency, a special district, or a local government and, therefore, is not subject to Texas Government Code, §2001.0045.

TAKINGS IMPACT ASSESSMENT: The proposal does not impose a burden on private real property and, therefore, does not constitute a taking under Texas Government Code, §2007.043.

GOVERNMENT GROWTH IMPACT: TEA staff prepared a Government Growth Impact Statement assessment for this proposed rulemaking. During the first five years the proposed rulemaking would be in effect, it would create new regulations by proposing new CTE TEKS required to be taught by school districts and charter schools offering the courses.

The proposed rulemaking would not create or eliminate a government program; would not require the creation of new employee positions or elimination of existing employee positions; would not require an increase or decrease in future legislative appropriations to the agency; would not require an increase or decrease in fees paid to the agency; would not expand, limit, or repeal an existing regulation; would not increase or decrease the number of individuals subject to its applicability; and would not positively or adversely affect the state's economy.

PUBLIC BENEFIT AND COST TO PERSONS: Ms. Martinez has determined that for each year of the first five years the proposal is in effect, the public benefit anticipated as a result of enforcing the proposal would be to add course options for students to support relevant and meaningful programs of study. There is no anticipated economic cost to persons who are required to comply with the proposal.

DATA AND REPORTING IMPACT: The proposal would have no data or reporting impact.

PRINCIPAL AND CLASSROOM TEACHER PAPERWORK REQUIREMENTS: TEA has determined that the proposal would not require a written report or other paperwork to be completed by a principal or classroom teacher.

PUBLIC COMMENTS: The SBOE requests public comments on the proposal, including, per Texas Government Code, §2001.024(a)(8), information related to the cost, benefit, or effect of the proposed rule and any applicable data, research, or analysis, from any person required to comply with the proposed rule or any other interested person. The public comment period on the proposal begins October 10, 2025, and ends at 5:00 p.m. on November 10, 2025. A form for submitting public comments is available on the TEA website at https://tea.texas.gov/about-tea/laws-and-rules/sboe-rules-tac/proposed-state-board-of-education-rules. The SBOE will take registered oral and written comments on the proposal at the appropriate committee meeting in November 2025 in accordance with the SBOE board operating policies and procedures. A request for a public hearing on the proposal submitted under the Administrative Procedure Act must be received by the commissioner of education not more than 14 calendar days after notice of the proposal has been published in the *Texas Register* on October 10, 2025.

STATUTORY AUTHORITY. The new section is proposed under Texas Education Code (TEC), §7.102(c)(4), which requires the State Board of Education (SBOE) to establish curriculum and graduation requirements; TEC, §28.002(a), which identifies the subjects of the required curriculum; TEC, §28.002(c), which requires the SBOE to identify by rule the essential knowledge and skills of each subject in the required curriculum that all students should be able to demonstrate and that will be used in evaluating instructional materials and addressed on the state assessment instruments; TEC, §28.002(n), which allows the SBOE to develop by rule and implement a plan designed to incorporate foundation curriculum requirements into the career and technical education (CTE)

curriculum required in TEC, §28.002; TEC, §28.002(o), which requires the SBOE to determine that at least 50% of the approved CTE courses are cost effective for a school district to implement; TEC, §28.025(a), which requires the SBOE to determine by rule the curriculum requirements for the foundation high school graduation program that are consistent with the required curriculum under TEC, §28.002; and TEC, §28.025(b-17), which requires the SBOE to ensure by rule that a student may comply with curriculum requirements under TEC, §28.025(b-1)(6), by successfully completing an advanced CTE course, including a course that may lead to an industry-recognized credential or certificate or an associate degree.

CROSS REFERENCE TO STATUTE. The new section implements Texas Education Code, §§7.102(c)(4); 28.002(a), (c), (n), and (o); and 28.025(a) and (b-17).

<rule>

§127.270. Commercial Lending and Real Estate (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 10-12. Prerequisite: at least one credit in a Level 2 or higher course from the Business, Marketing, and Finance 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 Business, Marketing, and Finance Career Cluster focuses on planning, managing, organizing, directing, and evaluating business functions essential to efficient and productive business management, finance, operations, and marketing.
(3) Commercial Lending and Real Estate is designed to equip students with the knowledge and skills needed to excel in the field of commercial lending. Students gain an understanding of commercial lending principles and practices, develop expertise in analyzing commercial real estate properties, learn about various types of commercial loans and their underwriting processes, and explore the role of commercial lenders in driving economic development.
(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 the fundamental concepts of commercial lending and real estate. The student is expected to:
(A) define commercial lending and distinguish commercial lending from residential lending;
(B) explain how the role of commercial lending affects economic development and the growth of the real estate market; and
(C) describe the relationship between commercial real estate and commercial lending practices.
(2) The student examines different types of commercial real estate. The student is expected to:
(A) identify and describe various types of commercial properties, including office buildings, retail centers, industrial facilities, and multifamily housing;
(B) analyze the unique characteristics and investment potential of each type of commercial property; and
(C) identify and evaluate the impact of market trends on different sectors of commercial real estate.
(3) The student understands the processes involved in commercial lending. The student is expected to:
(A) describe the steps involved in originating a commercial loan, including application, underwriting, and approval;
(B) analyze the criteria, including income, credit history, and collateral, that lenders use to assess creditworthiness of borrowers; and

(C) explain the role of risk assessment and mitigation in the commercial lending process.
(4) The student uses financial analysis techniques to evaluate commercial real estate investments. The student is expected to:
(A) calculate key financial metrics such as net operating income (NOI), cap rate, and return on investment (ROI) for a given commercial lending scenario;
(B) use financial modeling to project cash flows and assess the profitability of commercial real estate projects through consideration of market trends, financing options, and risk assessment; and
(C) analyze the impact of financing terms, interest rates, and loan structures on commercial real estate investments.
(5) The student examines commercial lending and real estate legal and regulatory environments. The student is expected to:
(A) identify key laws and regulations, including zoning laws, environmental regulations, and fair lending practices, that govern commercial real estate transactions;
(B) analyze the role of contracts in commercial real estate, including purchase agreements, lease agreements, and loan documents;
(C) explain the difference between surface rights and mineral rights and how they relate to commercial real estate projects; and
(D) identify and discuss how regulatory changes impact commercial lending and real estate markets.
(6) The student explores the various structures and terms used in commercial loans. The student is expected to:
(A) describe common loan structures, including fixed-rate, adjustable-rate, and interest-only loans;
(B) analyze the advantages and disadvantages of different loan terms, including loan-to-value ratio, origination costs, amortization period, and prepayment penalties; and
(C) compare creative commercial financing options such as mezzanine financing and bridge loans in commercial real estate transactions.
(7) The student analyzes commercial real estate markets to inform investment and lending decisions. The student is expected to:
(A) conduct market research to assess supply and demand dynamics in commercial real estate;
(B) evaluate the impact of economic indicators, including employment and interest rates on commercial real estate markets; and
(C) analyze and evaluate emerging trends in commercial real estate such as urbanization and technology-driven changes.
(8) The student understands the importance of risk management in commercial lending and real estate. The student is expected to:
(A) identify common risks associated with commercial lending, including default risk, interest rate risk, and market risk;
(B) research and describe risk mitigation strategies, including diversification, insurance, and due diligence, used in commercial lending and real estate transactions; and
(C) evaluate the role of loan covenants, personal guarantees, cosigners, and credit enhancements in protecting lenders.
(9) The student examines the processes involved in servicing commercial loans and managing real estate assets. The student is expected to:
(A) describe the responsibilities of loan servicers, including payment processing, account management, and collections;
(B) analyze asset management strategies for maximizing the value of commercial real estate investments, including financial analysis, performance monitoring, property management, tenant relations, market analysis, strategic planning, risk management, portfolio diversification, and exit strategy planning; and
(C) research and describe the challenges of managing distressed assets and non-performing loans such as valuation difficulties, legal and regulatory complexities, operational challenges, market and economic factors, and reputational risks.
(10) The student understands the principles and practices of commercial real estate development. The student is expected to:
(A) describe the stages of commercial real estate development from site selection to project completion;
(B) analyze the financial, legal, and regulatory considerations of commercial development projects; and
(C) analyze various impacts of development on communities, including benefits and challenges.
(11) The student identifies and understands ethical considerations in commercial lending and real estate transactions. The student is expected to:

(A) discuss ethical issues related to lending practices, including predatory lending, conflicts of interest, and transparency, and evaluate the impact of these issues on consumers and financial institutions; and
(B) propose strategies for promoting integrity and ethical behavior in the commercial lending and real estate professions, including transparency, accountability, and compliance with regulations.
(12) The student explores career opportunities in commercial lending and real estate. The student is expected to:
(A) identify various career paths in commercial lending and real estate, including loan officers, underwriters, real estate appraisers, real estate analysts, and developers, and describe the primary responsibilities and qualifications for each role;
(B) research and identify the education, skills, and certifications required for different roles in the industry, including loan officers, real estate appraisers, underwriters, real estate analysts, and developers; and
(C) develop a career plan that includes short- and long-term goals for entering and advancing in the commercial lending and real estate fields.
(13) The student explores entrepreneurship opportunities in commercial lending and real estate. The student is expected to:
(A) research and identify federal rules such as Consumer Financial Protection Bureau and Nationwide Multistate Licensing Systems rules and federal laws such as the Truth in Lending Act and Fair Credit Reporting Act related to owning and operating a mortgage firm;
(B) research and identify federal rules such as Housing Urban Development and Federal Housing Finance Agency (FHFA) rules and federal laws such as the Fair Housing Act and Equal Opportunity Act related to owning and operating a commercial real estate agency; and
(C) research and identify requirements for owning and operating a commercial real estate property.

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STATUTORY AUTHORITY. The new sections are proposed under Texas Education Code (TEC), §7.102(c)(4), which requires the State Board of Education (SBOE) to establish curriculum and graduation requirements; TEC, §28.002(a), which identifies the subjects of the required curriculum; TEC, §28.002(c), which requires the SBOE to identify by rule the essential knowledge and skills of each subject in the required curriculum that all students should be able to demonstrate and that will be used in evaluating instructional materials and addressed on the state assessment instruments; TEC, §28.002(n), which allows the SBOE to develop by rule and implement a plan designed to incorporate foundation curriculum requirements into the career and technical education (CTE) curriculum required in TEC, §28.002; TEC, §28.002(o), which requires the SBOE to determine that at least 50% of the approved CTE courses are cost effective for a school district to implement; TEC, §28.025(a), which requires the SBOE to determine by rule the curriculum requirements for the foundation high school graduation program that are consistent with the required curriculum under TEC, §28.002; and TEC, §28.025(b-17), which requires the SBOE to ensure by rule that a student may comply with curriculum requirements under TEC, §28.025(b-1)(6), by successfully completing an advanced CTE course, including a course that may lead to an industry-recognized credential or certificate or an associate degree.

CROSS REFERENCE TO STATUTE. The new sections implement Texas Education Code, §§7.102(c)(4); 28.002(a), (c), (n), and (o); and 28.025(a) and (b-17).

<rule>

§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 differs from modern practices. The student is expected to:

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

(B) describe treatments, including herbal remedies and supernatural explanations, that were commonly practiced prior to the Enlightenment period in Western Civilization; and

(C) describe eighteenth and nineteenth century medicine, including bloodletting, purging, blistering, inoculation, amputation, and surgery and how major wars influenced medicine.
(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) explain methods to maintain competency in the pharmacy industry through continuing education and continuing professional development; and
(E) 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;
(C) explain standard procedures for delivery and documentation of immunizations;
(D) 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;
(E) explain the role of health screenings in maintaining a healthy population;
(F) research and describe the impact of external factors such as diet, exercise, alcohol, tobacco, vaping, and drug use on patient health; and
(G) 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.

§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)(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 prerequisite: Principles of Nursing Science or Principles of Health Science. 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, Jean Piaget's Theory of Child Development, and Lev Vygotsky's Contemporary Theories on 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.

*n

STATUTORY AUTHORITY. The new sections are proposed under Texas Education Code (TEC), §7.102(c)(4), which requires the State Board of Education (SBOE) to establish curriculum and graduation requirements; TEC, §28.002(a), which identifies the subjects of the required curriculum; TEC, §28.002(c), which requires the SBOE to identify by rule the essential knowledge and skills of each subject in the required curriculum that all students should be able to demonstrate and that will be used in evaluating instructional materials and addressed on the state assessment instruments; TEC, §28.002(n), which allows the SBOE to develop by rule and implement a plan designed to incorporate foundation curriculum requirements into the career and technical education (CTE) curriculum required in TEC, §28.002; TEC, §28.002(o), which requires the SBOE to determine that at least 50% of the approved CTE courses are cost effective for a school district to implement; TEC, §28.025(a), which requires the SBOE to determine by rule the curriculum requirements for the foundation high school graduation program that are consistent with the required curriculum under TEC, §28.002; and TEC, §28.025(b-17), which requires the SBOE to ensure by rule that a student may comply with curriculum requirements under TEC, §28.025(b-1)(6), by successfully completing an advanced CTE course, including a course that may lead to an industry-recognized credential or certificate or an associate degree.

CROSS REFERENCE TO STATUTE. The new sections implement Texas Education Code, §§7.102(c)(4); 28.002(a), (c), (n), and (o); and 28.025(a) and (b-17).

<rule>

§127.824. Blueprint Reading for Manufacturing Applications (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 9-12. Recommended prerequisites: Algebra I and Geometry. 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 Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.

(3) In Blueprint Reading for Manufacturing Applications, students gain knowledge and skills in an introduction to reading and interpreting working drawings for basic machining processes, mechanical maintenance, basic electrical, basic fluid power, and basic facility prints. Students also use sketching techniques to create pictorial and multiple-view drawings.

(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 blueprint and technical drafting terminology and functions. The student is expected to:

(A) explain the function of various parts of a title block such as scale, materials, and print title;

(B) interpret and explain the function of multi-view drawings;

(C) describe fractional, decimal, and metric dimensions used in technical drawings;

(D) interpret and explain the function of section views;

(E) identify and describe projection methods, including isometric, oblique, and orthographic, used in engineering drawings;

(F) explain the function of auxiliary views;

(G) identify and explain types of dimensions, including linear, radial, angular, ordinate, and arc length;

(H) explain the function of pictorial drawings in manufacturing applications;
(I) explain the function of geometric dimensioning and tolerancing in manufacturing applications;
(J) explain tolerances with parts from a print;
(K) explain the function of scaling in a print;
(L) differentiate between a pictorial and a schematic drawing;
(M) explain the function of call outs in a print; and
(N) differentiate between electrical schematics, fluid power schematics, and piping and instrumentation diagram (P&ID) drawings.
(2) The student demonstrates an understanding of tools and symbols to produce technical schematics, facility prints, P&ID prints, and blueprints. The student is expected to:
(A) explain the function of and use a compass for drawing arcs in a print;
(B) explain the function of and use measuring devices such as scales, micrometers, and dial calipers;
(C) explain and demonstrate basic functions of computer-aided design and drafting (CADD) software;
(D) identify blueprint symbols, including surface profile, position, run out, countersink, and depth symbols;
(E) differentiate between driving and reference dimensions;
(F) identify basic electrical print symbols, including switch, lamp, relay, and contact symbols;
(G) identify basic fluid power print symbols, including power unit, actuator, directional control valve, and flow control symbols;
(H) identify various P&ID symbols, including valve, gauge, meter, and regulator symbols; and
(I) identify symbols for components, including threads, fasteners, and springs, used in the manufacturing process.
(3) The student interprets facility drawings related to manufacturing buildings. The student is expected to:
(A) interpret and explain floor plan drawings;
(B) interpret and explain elevation drawings;
(C) interpret and explain section views and details;
(D) locate electrical components, including distribution panels, lights, switches, and outlets, on facility drawings;
(E) identify plumbing components, including drains, water supply, and boilers, on facility drawings; and
(F) identify heating, ventilation, and air conditioning (HVAC) components, including condensers, evaporators, and plenum, in facility drawings.
(4) The student applies drafting principles to create sketch pictorials and construct multi-view drawings. The student is expected to:
(A) sketch auxiliary projected views, including inclined and oblique surfaces, in pictorial drawings;
(B) create a sketch using multi-views; and
(C) annotate a series of multi-view projections using proper dimensioning standards.
(5) The student demonstrates knowledge of tolerances as applied to technical drawings and prints. The student is expected to:
(A) illustrate and explain how bilateral and unilateral tolerances are expressed in drawings; and
(B) calculate tolerances for mating parts based on maximum material conditions, tolerance stacking, and allowance.
(6) The student demonstrates knowledge of revision information related to drawings. The student is expected to:
(A) describe standard drawing practices such as title blocks, revision history, and change orders for drawing revisions;
(B) apply standard drawing practices to revise technical drawings, ensuring accuracy and compliance with industry standards; and
(C) apply revision information, including date of revision, description of changes, and approval signatures, to mechanical and electrical industrial prints.

§127.828. Industrial Maintenance (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 10-12. 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 and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
(2) The Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
(3) Industrial Maintenance is designed to introduce students to knowledge and skills used in the proper application of industrial maintenance. The study of manufacturing technology allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of relevant maintenance tasks. Students gain an understanding of what employers require to gain and maintain employment in manufacturing careers.
(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 applies mechanical skills to maintain and repair industrial equipment using the appropriate tools and equipment while adhering to safety policies. The student is expected to:
(A) identify equipment malfunctions using visual, audible, and other sensory inspection skills to detect issues such as lack of lubrication, misalignment, excess wear, vibration, and over-temperature;
(B) differentiate between mechanical, hydraulic, pneumatic, and electrical systems;
(C) identify safety concerns with equipment maintenance such as dangers with rotating equipment, hot surfaces from operating equipment, potential for shock from electrical power cords and grounding, and sharp surfaces from equipment wear;
(D) create a safe plan of action to address safety concerns for an industrial training environment such as sparks, metal shavings, and electrical shock hazards;
(E) identify tools and describe procedures used in cutting, drilling, cleaning, and abrasive processes;
(F) explain safety practices for various types of manufacturing tools used for cutting, drilling, cleaning, and abrasive processes;
(G) identify and demonstrate proper use of precision measuring tools, including micrometers, dial calipers, and scales, to verify proper repair and alignment; and
(H) identify and explain the applications such as material and fastener strength for various types of fasteners such as bolts, screws, washers, and nuts.
(2) The student applies communication and documentation skills to manufacturing activities. The student is expected to:
(A) compose written and oral technical communication such as maintenance plans, equipment breakdowns, and repair part ordering in a clear, concise, and effective manner for a variety of purposes and audiences;
(B) identify documentation methods such as maintenance logbooks and checklists for maintenance tasks and plans; and
(C) develop and execute a plan for maintenance task completion such as equipment lubrication, filter changes, and equipment visual checks.
(3) The student maintains and repairs industrial equipment using the appropriate tools, equipment, machines, materials, and technical processes. The student is expected to:
(A) describe the processes needed to complete a project, including initiating, planning, executing, monitoring, controlling, and closing;
(B) use appropriate tools to complete maintenance repair processes, including drilling, tapping, layout, and tightening fasteners to spec; and
(C) use various wrenches such as open and box end wrenches, filter wrenches, and adjustable pliers to disassemble filter housings to change filters and fluids.
(4) The student understands the foundations of occupational safety and health. The student is expected to:
(A) explain and discuss the responsibilities of workers and employers to promote safety and health and the rights of workers to a secure workplace;
(B) explain and discuss the importance of Occupational Safety and Health Administration (OSHA) standards and OSHA requirements for organizations;
(C) explain and discuss how OSHA inspections are conducted;
(D) explain and discuss the role of national and state safety and health regulatory entities;

(E) explain types of industrial hygiene hazards, including physical, chemical, biological, and ergonomic, and explain the role industrial hygiene plays in occupational safety;
(F) discuss the importance of safe walking and working surfaces and best practices for preventing or reducing slips, trips, and falls in the workplace;
(G) describe types of electrical hazards in the workplace;
(H) describe control methods to prevent electrical hazards in the workplace;
(I) analyze the hazards of handling, storing, using, and transporting hazardous materials;
(J) discuss ways to reduce exposure to hazardous materials in the workplace;
(K) identify workplace health and safety resources, including emergency plans, and discuss how these resources are used to make decisions in the workplace;
(L) describe elements of a safety and health program, including management leadership, worker participation, and education and training;
(M) explain the purpose and importance of written emergency action and fire protection plans;
(N) describe key components of evacuation plans, emergency exit routes, and fire hazards lists;
(O) explain the role of emergency personnel within an organization;
(P) explain components of a hazard communication program; and
(Q) explain and provide examples of safety and health training requirements specified by standard setting organizations.
(5) The student examines safe work habits in an industrial maintenance setting. The student is expected to:
(A) identify and describe proper storage and disposal procedures for hazardous materials using Safety Data Sheets (SDS);
(B) identify and demonstrate use of proper personal protective equipment (PPE) and safety requirements in the manufacturing industry such as hearing protection, eye protection, and gloves;
(C) describe and demonstrate proper lockout/tagout procedures;
(D) describe and demonstrate safe operation of power tools, including drills, saws, grinders, and sanders; and
(E) identify and select appropriate PPE needed to operate various power tools, including drills, saws, grinders, and sanders.
(6) The student examines the importance of preventative maintenance in an industrial maintenance environment. The student is expected to:
(A) perform preventative maintenance (PM), including lubrication, cleaning of parts, and tightening of fasteners, on equipment such as motors, gearboxes, chain drives, and conveyors;
(B) determine a PM schedule based on data collected from machine breakdowns, including frequency of failures, types of malfunctions, and repair times; and
(C) differentiate between reactive maintenance such as breakdown repairs, preventative maintenance such as lubrication, and predictive maintenance such as planning repairs based on previous breakdown frequencies.
(7) The student examines career opportunities and educational requirements in manufacturing and technology. The student is expected to:
(A) identify special skill career pathways in manufacturing such as maintenance technician, engineer, designer, and automation technician;
(B) identify and explain the importance of industry networking opportunities such as career or job fairs; and
(C) describe the roles and functions of engineers, technologists, and technicians in an industrial maintenance setting.

§127.829. Mechanical Maintenance (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 10-12. Prerequisite: at least one credit in a course from the Manufacturing Career Cluster. Recommended prerequisite: Algebra I or Geometry. 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 Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
(3) Mechanical Maintenance is designed to introduce students to knowledge and skills used in the proper application of mechanical maintenance. The study of mechanical maintenance and hands-on application allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of relevant activities. Students gain an understanding of what employers require to gain and maintain employment in manufacturing careers and potential hazards faced by the maintenance technician in an industrial setting.
(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 the foundations of occupational safety and health. The student is expected to:
(A) explain and discuss the responsibilities of workers and employers to promote safety and health and the rights of workers to a secure workplace;
(B) explain and discuss the importance of Occupational Safety and Health Administration (OSHA) standards and OSHA requirements for organizations;
(C) explain and discuss the importance of how OSHA inspections are conducted;
(D) explain and discuss the role of national and state regulatory entities;
(E) explain the role industrial hygiene plays in occupational safety and explain types of industrial hygiene hazards, including physical, chemical, biological, and ergonomic;
(F) discuss the importance of safe walking and working surfaces in the workplace;
(G) discuss best practices for preventing or reducing slips, trips, and falls in the workplace;
(H) describe types of electrical hazards in the workplace and the risks associated with these hazards;
(I) describe control methods to prevent electrical hazards in the workplace;
(J) analyze the hazards of handling, storing, using, and transporting hazardous materials;
(K) identify and discuss ways to reduce exposure to hazardous materials in the workplace;
(L) identify workplace health and safety resources, including emergency plans, and discuss how these resources are used to make decisions in the workplace;
(M) describe elements of a safety and health program, including management leadership, worker participation, and education and training;
(N) explain the purpose and importance of written emergency action plans and fire protection plans;
(O) describe key components of evacuation plans, emergency exit routes, fire hazards lists;
(P) explain the role of emergency personnel within an organization;
(Q) explain components of a hazard communication program; and
(R) explain and provide examples of safety and health training requirements specified by standard setting organizations such as OSHA and industrial companies.
(2) The student demonstrates safe work habits while performing mechanical activities in a mechanical maintenance setting. The student is expected to:
(A) identify and describe proper storage and disposal procedures for hazardous materials using Safety Data Sheets (SDS);
(B) identify and demonstrate use of proper personal protective equipment (PPE), including ear plugs, safety glasses, dust masks, and respirators, in the manufacturing industry;
(C) describe and demonstrate proper lockout/tagout procedures;
(D) describe and demonstrate safe operation of hand tools needed for disassembly and reassembly of mechanical parts; and
(E) identify and select appropriate PPE needed to operate various hand tools, including gloves for protection from pinch points, sharp edges, and hot surfaces.
(3) The student examines the operation of various pumps. The student is expected to:
(A) identify components of a centrifugal pump, including vane, internal seals, and bearings;
(B) identify components of a positive displacement piston pump, including rings, seals, pistons, and crankshaft;
(C) identify components of a positive displacement diaphragm pump, including diaphragm, check valves, and internal seals;
(D) explain the function of a pressure tank and effects on flow with a diaphragm pump;

(E) explain and demonstrate how to fill a suction line to prime a pump;
(F) identify components of a check valve in pumps; and
(G) explain the function of a check valve in maintaining pump priming by preventing back flow and ensuring fluid flow.
(4) The student examines the operation of various compressors. The student is expected to:
(A) identify components of compressors, including the piston, crankshaft, and cylinders, and explain how these components work together to compress air or other gases;
(B) explain the operation of a piston compressor and how the components work together to increase pressure;
(C) differentiate between a single-stage and two-stage piston compressor;
(D) identify and explain the function of intercoolers in two-stage piston compressors;
(E) identify and explain the function of after coolers in two-stage piston compressors;
(F) identify components of a rotary screw compressor, including screws, compression chamber, intake valves, and discharge valves;
(G) explain the operation of a rotary screw compressor and how the components work together to increase pressure; and
(H) explain the importance of dryers with industrial compressors, including how dryers prevent corrosion, improve efficiency, and extend equipment lifespan.
(5) The student analyzes test or performance data to assess equipment operation. The student is expected to:
(A) inspect equipment parts, including bearings, bolts, housing, and shafts, to identify typical defects such as breakage or excessive wear;
(B) observe equipment in operation to check for potential problems such as leaks, misalignment, and overheating; and
(C) test mechanical equipment to ensure proper functioning of equipment after replacement or repair of parts.
(6) The student uses prints, specifications, and diagrams to perform installation, disassembly, and assembly of mechanical systems. The student is expected to:
(A) identify components of pumps, compressors, and mechanical drives in mechanical drawings and diagrams;
(B) apply torque to fasteners as prescribed in equipment manuals during reassembly;
(C) identify input and output capability of pumps and compressors according to manufacturer specifications;
(D) identify input and output speed and torque capability of belt, chain, and gear driven mechanical drives systems according to manufacturer specifications;
(E) locate part numbers using a diagram; and
(F) use a logbook or computer to record information about parts, materials, and repair procedures.
(7) The student uses industrial maintenance skills to safely disassemble and assemble various types of pumps for the purpose of maintenance and repair. The student is expected to:
(A) identify safety hazards, including electrical, mechanical, and thermal risks, associated with assembly and disassembly of pumps;
(B) explain the purpose of lockout/tagout procedures for pumps to reduce electrical, mechanical, and thermal hazards;
(C) identify tools and describe procedures used in the disassembly and assembly of a centrifugal pump;
(D) identify tools and describe procedures used in the disassembly and assembly of a diaphragm pump;
(E) inspect pumps to locate damage, defects, and wear;
(F) operate pumps to ensure correct function such as rotation direction, prime, and flow;
(G) explain and demonstrate proper lubrication procedures for pumps; and
(H) use a logbook or computer to record information about parts, materials, and repair procedures.
(8) The student uses industrial maintenance skills to safely disassemble and assemble various types of compressors for the purpose of maintenance and repair. The student is expected to:
(A) identify safety hazards, including electrical, mechanical, and thermal risks, associated with assembly and disassembly of compressors;
(B) explain the purpose of lockout/tagout procedures for compressors to reduce electrical, mechanical, and thermal hazards;
(C) identify tools and describe procedures used in the disassembly and assembly of a reciprocating compressor;
(D) identify tools and describe procedures used in the disassembly and assembly of a rotary screw compressor;
(E) inspect compressors to locate damage, defects, and wear;
(F) operate newly reassembled compressor to ensure correct function such as direction of rotation;
(G) explain and demonstrate proper lubrication procedures for compressors; and
(H) use a logbook or computer to record information about parts, materials, and repair procedures.

(9) The student examines and recognizes internal components of various pumps and compressors. The student is expected to:
(A) identify internal seals and vanes in various compressors and pumps, including centrifugal, vane, and diaphragm pumps;
(B) inspect vanes in a centrifugal pump for wear and damage;
(C) inspect internal seals in pumps and compressors for wear and damage;
(D) inspect diaphragm for damage, defects, and wear;
(E) identify bearings on pumps and compressors; and
(F) inspect bearings on pumps and compressors for damage and wear.
(10) The student understands the purpose of specific internal components of various pumps and compressors. The student is expected to:
(A) explain the purpose of internal seals on compressors and pumps;
(B) explain the function and operation of bearings on compressors and pumps;
(C) identify and explain the function of check valves in a diaphragm pump; and
(D) explain lubrication requirements for pumps and compressors.
(11) The student understands the purpose of specific internal components of gear boxes. The student is expected to:
(A) identify and explain the function of spur gears in mechanical drive systems;
(B) identify and explain the function of helical gears in mechanical drive systems;
(C) identify and explain the function of miter and bevel gears in mechanical drive systems;
(D) differentiate between miter and bevel gears in mechanical drive systems; and
(E) identify and explain the function of slingers for lubrication distribution in mechanical drive systems.
(12) The student applies industrial maintenance skills to safely disassemble and assemble various types of mechanical drives. The student is expected to:
(A) identify tools and describe procedures used in the disassembly and assembly of belt, chain, and gear driven mechanical drives; and
(B) identify safety hazards associated with assembly and disassembly of belt, chain, and gear driven mechanical drives.
(13) The student understands the use of drive belts and chains for speed control. The student is expected to:
(A) identify belt style, size, and application on a mechanical drive system to meet speed and torque specifications;
(B) identify proper sheave for belt application on a mechanical drive system;
(C) differentiate between a drive and driven sheave in mechanical drive systems;
(D) calculate sheave ratios for speed adjustments on a mechanical drive system;
(E) inspect sheave and belt for wear and possible replacement on a mechanical drive system;
(F) identify drive chain size to match sprocket used on a mechanical drive system;
(G) calculate sprocket ratios for speed adjustments on a mechanical drive system;
(H) adjust chain length by breaking roller chain with special chain breaking tools;
(I) assemble a chain on a mechanical drive system according to length and tension requirements; and
(J) inspect sprocket and chain for wear and possible replacement on a mechanical drive system.
(14) The student examines career opportunities and educational requirements in manufacturing and technology. The student is expected to:
(A) identify special skill career pathways in manufacturing such as an industrial maintenance technician, mechanical installer, mechanical repair, and mechanical troubleshooter;
(B) identify and explain the importance of industry networking opportunities such as career or job fairs; and
(C) describe the roles and functions of an industrial maintenance technician in manufacturing.

§127.830. Basic Fluid Power (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 10-12. Prerequisite: at least one credit in a course from the Manufacturing Career Cluster. Recommended prerequisites: Algebra I and Geometry. 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 Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
(3) In Basic Fluid Power, students gain knowledge and skills in hydraulic and pneumatic systems as applied to industrial manufacturing. Instruction includes terminology and fluid power theory, interpreting technical drawings, component identification, mathematical calculations as applied to fluid power systems, and component functions. Students gain basic knowledge of fluid power system design with basic system components, installing basic fluid power system components, and building maintenance schedules for preventative and reactive maintenance.
(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 examines career opportunities and safety concerns in the manufacturing industry. The student is expected to:
(A) research and describe trends of manufacturing careers in industry; and
(B) identify safety, health, environmental, and ergonomic issues in the manufacturing industry.
(2) The student examines terminology and fundamental concepts of fluid power in manufacturing. The student is expected to:
(A) explain the function of Pascal's Law in hydraulic systems;
(B) identify and explain the function of actuators in fluid power systems;
(C) identify and explain the function of valves in fluid power systems;
(D) describe the relationship between pressure, force, and cylinder volume in fluid power systems;
(E) analyze the application of Gay Lussac's Law, Charles's Law, and Boyle's Law in pneumatic systems;
(F) explain how the law of conservation of energy applies to specific fluid power systems, including hydraulic and pneumatic systems;
(G) explain how pressure is generated in a fluid power circuit;
(H) explain how different seal types and operating temperatures can impact fluid compatibility;
(I) explain the difference between flash point, fire point, and auto ignition regarding hydraulic fluid;
(J) explain displacement regarding hydraulic pumps; and
(K) identify specific hazards such as high-pressure injection injuries and equipment damage resulting from unrelieved pressure in the lines of a fluid power system.
(3) The student reads and interprets technical drawings in a fluid power system. The student is expected to:
(A) identify common fluid power symbols, including cylinders, motors, pumps, reservoirs, and directional control valves;
(B) differentiate between schematic and pictorial diagrams;
(C) match fluid power schematic symbols to physical components in a system;
(D) construct and operate a basic fluid power circuit given a schematic with a directional control valve and a double-acting cylinder; and
(E) draw a fluid power schematic from a given fluid power application.
(4) The student demonstrates understanding of the characteristics and applications of fluid power systems. The student is expected to:
(A) analyze pressure gauge readings to identify potential internal and external leakage issues in fluid power systems;
(B) analyze flow meters to detect proper and improper system flow in fluid power systems;
(C) analyze temperature gauges to detect heat issues within fluid power systems;
(D) explain the operational difference between hydraulic and pneumatic systems;
(E) explain the importance of dryers in pneumatic systems, including the prevention of moisture-related issues; and
(F) explain the importance of lubrication in a pneumatic system, including the reduction of friction, prevention of wear and tear, and enhancement of system efficiency.
(5) The student applies mathematical calculations to various operations of a fluid power system. The student is expected to:
(A) describe and analyze pressure, force, and volume in the context of fluid power systems;

(B) calculate output force and rod speed given cylinder size, flow rate, and pressure applied;
(C) describe and calculate how a change in pressure or volume results in change in force;
(D) describe and calculate how change in volume results in change of rod speed and force applied; and
(E) calculate the force output of an extending cylinder using Pascal's Law.
(6) The student understands the function of various components in fluid power systems. The student is expected to:
(A) differentiate between a pneumatic compressor and a hydraulic pump;
(B) describe the functions of a hydraulic reservoir such as fluid storage, fluid cooling, and contaminant separation;
(C) describe the function of various pumps, including piston, gear, and vane pumps;
(D) differentiate between a fixed and variable displacement pump;
(E) explain the purpose of an actuator in fluid power systems;
(F) explain the purpose of various gauges and meters in fluid power systems;
(G) explain the purpose of various pressure controlling devices in hydraulic systems, including pressure relief valves, pressure reducing valves, sequence valves, and counterbalance valves;
(H) explain the purpose of various pressure controlling devices in pneumatic systems, including regulators and pressure relief valves;
(I) explain the purpose of various flow controlling devices in fluid power systems, including check valves, directional control valves, needle valves, and flow controls;
(J) explain the purpose of various motors in fluid power systems, including unidirectional and bi-directional motors;
(K) describe the function of hydraulic and pneumatic actuators, including motor, cylinder, and rotary actuators;
(L) describe the function of various hydraulic and pneumatic cylinders, including single- and double-acting, single- and double-rod, and rodless cylinders;
(M) describe the function of a fluid power double-acting cylinder;
(N) describe and analyze the function of flow control valves in regulating actuator speed in a fluid power circuit;
(O) identify and explain the function of a check valve; and
(P) explain the function of an accumulator.
(7) The student designs basic fluid power circuits using various components in a fluid power system. The student is expected to:
(A) design a fluid power circuit with a unidirectional motor;
(B) design a fluid power circuit with a bi-directional motor;
(C) design a fluid power circuit with multiple cylinders;
(D) design a fluid power circuit with a flow control valve to regulate actuator speed;
(E) design a fluid power circuit incorporating a check valve;
(F) design a basic fluid power circuit incorporating various configurations of directional control valves to alter flow direction;
(G) design fluid power circuits using various operators for directional control, including lever, solenoid, pilot, and push button operator;
(H) design a hydraulic sequence valve to operate multiple actuators in sequence; and
(I) design a hydraulic pressure reducing valve to lower pressure in a branch circuit.
(8) The student installs various components in a fluid power system. The student is expected to:
(A) connect fluid power circuits using various connecting methods, including threaded, push-fit, and quick disconnect fittings;
(B) identify and demonstrate proper safety procedures required for system installation such as lockout/tagout to control hazardous energy;
(C) install a fluid power circuit with a unidirectional motor;
(D) install a fluid power circuit with a bi-directional motor;
(E) install a fluid power circuit with multiple cylinders;
(F) install a fluid power circuit with a flow control valve to regulate actuator speed;
(G) install a fluid power circuit using a check valve;
(H) install a basic fluid power circuit using various configurations of directional control valves to change flow direction;
(I) install fluid power circuits using various operators for the directional control valve, including lever, solenoid, pilot, and push button operator;
(J) install and adjust a pneumatic system regulator to match a defined system pressure setting;
(K) install and adjust a hydraulic power unit relief valve to match a defined system pressure setting;
(L) install a hydraulic sequence valve to operate multiple actuators in sequence; and
(M) install a hydraulic pressure reducing valve to lower pressure in a branch circuit.

(9) The student uses industry standard practices to maintain functional capacity in fluid power systems. The student is expected to:
(A) analyze service data to develop and implement preventive maintenance schedules;
(B) analyze and document repair data to develop and implement predictive maintenance schedules;
(C) inspect components in a fluid power system to identify signs of malfunction, including discoloration, vibration, and loud sounds;
(D) inspect hydraulic fluid to identify contaminants and signs of viscosity breakdown;
(E) explain and demonstrate procedures to change filters in a fluid power system; and
(F) explain and demonstrate procedures to drain and replace hydraulic fluid.
(10) The student understands the function of a basic vacuum system. The student is expected to:
(A) identify and explain the function of a venturi vacuum application;
(B) connect and read a vacuum gauge;
(C) connect and read a manometer;
(D) connect and operate a vacuum generator;
(E) identify and explain the function of a vacuum generator; and
(F) connect a venturi to a pneumatic system.