



Principles of Applied Engineering (Proc 24)

PRE-TEST/POST-TEST TEKS BLUEPRINT

Pre-Test/Post-Test Development Overview

TEKS Addressed Selection Process

The Texas Essential Knowledge & Skills (TEKS) included in the course pre-test and post-test were selected for their direct relevance to the course content. This selection process was guided by the goal of assessing learners' understanding of specific topics and skills that are integral to the course. As a result, TEKS related to general employability skills or broader topics were often excluded. This focus ensures that the assessments accurately measure students' mastery of the subject matter, allowing educators to gain a clear insight into areas where students excel or may need additional support. By concentrating on content-specific TEKS, the tests provide a more precise evaluation of the students' knowledge and understanding of the core material.

Test Question Development Process

The questions created for the pre-test and post-test were designed using psychometric principles to ensure they are of high quality and fairness. This approach helps to accurately assess student understanding. These principles guide the development of questions to be reliable, valid, and free from bias, ensuring that they effectively measure the knowledge and skills the students are expected to acquire in the course.

Principles of Applied Engineering (Proc 24) Pre-Test/Post-Test TEKS Blueprint

Knowledge & Skills Statement	Student Expectation	iCEV Lesson Title
(02) The student investigates the components of engineering and technology systems. The student is expected to:	(A) investigate and report on the history of engineering disciplines, including chemical, civil, electrical, and mechanical engineering;	Introduction to Applied Engineering
(02) The student investigates the components of engineering and technology systems. The student is expected to:	(B) identify the inputs, processes, and outputs associated with technological systems;	Electromechanical Systems
(02) The student investigates the components of engineering and technology systems. The student is expected to:	(C) describe the difference between open and closed systems;	Electromechanical Systems
(02) The student investigates the components of engineering and technology systems. The student is expected to:	(D) describe how technological systems interact to achieve common goals;	Electromechanical Systems
(02) The student investigates the components of engineering and technology systems. The student is expected to:	(F) conduct and present research on emerging and innovative technology; and	Impact of Technology
(03) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:	(A) use clear and concise written, verbal, and visual communication techniques;	Engineering Notebooks
(03) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:	(B) maintain a design and computation engineering notebook;	Engineering Notebooks
(03) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:	(C) develop and present ideas using sketching and computer aided design and drafting (CADD);	Basic Computer-Aided Drawing
(03) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:	(E) maintain a paper or digital portfolio using the engineering documentation process; and	Engineering Notebooks
(03) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:	(F) use collaborative tools such as desktop or web-based applications to share and develop information.	Professionalism in the Sciences: Applied Engineering
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(A) master relevant safety tests;	Safety Testing & Material Properties
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(C) identify industry safety terminology related to the personal work environment such as Occupational Safety and Health Administration (OSHA), American Society of Mechanical Engineers (ASME), and personal protective equipment (PPE);	Lab Safety: Applied Engineering
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(D) recognize the classification of hazardous materials and wastes;	Lab Safety: Applied Engineering
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(E) describe appropriate ways to dispose of hazardous materials and wastes;	Lab Safety: Applied Engineering
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(F) maintain, safely handle, and properly store laboratory equipment;	Lab Safety: Applied Engineering
(04) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:	(H) demonstrate the use of precision measuring instruments.	Mathematic Principles: Measurements
(05) The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. The student is expected to:	(A) describe how technology has affected individuals, societies, cultures, economies, and environments;	Impact of Technology
(05) The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. The student is expected to:	(B) describe how the development and use of technology influenced past events;	Impact of Technology
(05) The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. The student is expected to:	(C) describe how and why technology progresses; and	Impact of Technology

Principles of Applied Engineering (Proc 24) Pre-Test/Post-Test TEKS Blueprint

Knowledge & Skills Statement	Student Expectation	ICEV Lesson Title
(05) The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. The student is expected to:	(D) predict possible changes caused by the advances of technology.	Impact of Technology
(06) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:	(A) identify and describe an engineering design process needed for a project, including the design process and prototype development and initiating, planning, executing, monitoring and controlling, and closing a project;	Engineering Design
(06) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:	(B) identify the chemical, mechanical, and physical properties of engineering materials and identify testing methods associated with the materials;	Safety Testing & Material Properties
(06) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:	(D) use consistent units for all measurements and computations; and	Mathematic Principles: Measurements
(06) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:	(E) assess the risks and benefits of a design solution.	Engineering Design
(07) The student understands the opportunities and careers in fields related to robotics, process control, and automation systems. The student is expected to:	(B) apply design concepts to problems in robotics, process control, and automation systems;	Robotics Basics
(07) The student understands the opportunities and careers in fields related to robotics, process control, and automation systems. The student is expected to:	(C) identify fields and career opportunities related to robotics, process control, and automation systems; and	Robotics Basics
(07) The student understands the opportunities and careers in fields related to robotics, process control, and automation systems. The student is expected to:	(D) identify emerging trends in robotics, process control, and automation systems.	Robotics Basics
(08) The student understands the opportunities and careers in fields related to electrical and mechanical systems. The student is expected to:	(B) describe career opportunities in electrical and mechanical systems;	Electromechanical Systems
(08) The student understands the opportunities and careers in fields related to electrical and mechanical systems. The student is expected to:	(C) identify emerging trends in electrical and mechanical systems; and	Electromechanical Systems
(08) The student understands the opportunities and careers in fields related to electrical and mechanical systems. The student is expected to:	(D) describe and apply basic electronic theory.	Basic Electronic Theory
(09) The student collaborates as a team member while completing a comprehensive project. The student is expected to:	(B) perform different roles within the project as a team member;	Team Problem Solving
(09) The student collaborates as a team member while completing a comprehensive project. The student is expected to:	(C) formulate decisions using collaborative strategies such as decision and design matrices and conflict resolution;	Team Problem Solving
(09) The student collaborates as a team member while completing a comprehensive project. The student is expected to:	(D) maintain an engineering notebook for the project;	Design Challenge: Mousetrap Cars
(09) The student collaborates as a team member while completing a comprehensive project. The student is expected to:	(E) develop and test the model for the project; and	Design Challenge: Mousetrap Cars
(09) The student collaborates as a team member while completing a comprehensive project. The student is expected to:	(F) demonstrate communication skills by preparing and presenting the project, including building consensus setback resolution and decision matrices.	Team Problem Solving
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(A) set up, create, and modify drawings;	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(B) store and retrieve geometry;	Basic Computer-Aided Drawing

Principles of Applied Engineering (Proc 24) Pre-Test/Post-Test TEKS Blueprint

Knowledge & Skills Statement	Student Expectation	iCEV Lesson Title
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(C) demonstrate and use appropriate line types in engineering drawings;	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(D) draw two-dimensional, single view objects;	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(E) create multi-view working drawings using orthographic projection;	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(F) dimension objects using current American National Standards Institute (ANSI) standards;	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(G) draw single-line two dimensional pictorial representations; and	Basic Computer-Aided Drawing
(10) The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:	(H) create working drawings that include section views.	Basic Computer-Aided Drawing
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(B) formulate goals, objectives, and requirements to solve an engineering problem;	Engineering Design
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(C) determine the design parameters such as materials, personnel, resources, funding, manufacturability, feasibility, and time associated with an engineering problem;	Engineering Design
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(E) identify or create alternative solutions to a problem using a variety of techniques such as brainstorming, reverse engineering, and researching engineered and natural solutions;	Engineering Design
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(F) test and evaluate proposed solutions using engineering methods such as creating models, prototypes, mock-ups, or simulations or performing critical design review, statistical analysis, or experiments;	Engineering Design
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(G) apply structured techniques such as a decision tree, design matrix, or cost-benefit analysis to select and justify a preferred solution to a problem	Robotics Basics
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(H) predict performance, failure modes, and reliability of a design solution; and	Engineering Design
(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:	(I) prepare a project report that clearly documents the designs, decisions, and activities during each phase of the engineering design process.	Engineering Design