Engineering Design & Presentation II (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.

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Knowledge & Skills Statement	Student Expectation	iCEV Lesson Title
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) research and describe governmental regulations, including health and safety;	Ethics in Advanced Engineering Design
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) analyze ethical issues related to engineering and technology and incorporate proper ethics in submitted projects;	Ethics in Advanced Engineering Design
(3) The student develops skills for managing a project.The student is expected to:	(C) use strategies such as decision matrices, flow charts, or Gantt charts to maintain the project schedule and quality of project.	Engineering Project Management Skills
(3) The student develops skills for managing a project.The student is expected to:	(E) develop a plan for production of an individual product.	Engineering Project Management Skills
(4) The student demonstrates principles of project documentation, workflow, and evaluated results. The student is expected to:	(A) complete work orders and related documentation;	Production Management
(4) The student demonstrates principles of project documentation, workflow, and evaluated results. The student is expected to:	(B) identify and defend factors affecting cost and strategies to minimize costs;	Production Management
(4) The student demonstrates principles of project documentation, workflow, and evaluated results. The student is expected to:	(C) formulate a project budget;	Production Management
(4) The student demonstrates principles of project documentation, workflow, and evaluated results. The student is expected to:	(E) identify intellectual property and other legal restrictions; and	Production Management
(4) The student demonstrates principles of project documentation, workflow, and evaluated results. The student is expected to:	(F) read and interpret technical drawings, manuals, and bulletins.	Production Management
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(A) prepare drawings to American National Standards Institute (ANSI) and International Organization for Standardization (ISO) graphic standards;	Advanced Computer-Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(B) customize software user interface;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(C) prepare and use advanced views such as auxiliary, section, and break-away;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(D) draw detailed parts, assembly diagrams, and sub assembly diagrams;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(E) indicate tolerances and standard fittings using appropriate library functions;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(F) demonstrate understanding of annotation styles and setup by defining units, fonts, dimension styles, notes, and leader lines;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(G) identify and incorporate the use of advanced layout techniques and viewports using paper-space and modeling areas;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(H) use management techniques by setting up properties to define and control individual layers;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(I) create and use custom templates for advanced project management;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(J) prepare and use advanced development drawings;	Advanced Computer Aided Drawing

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(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(K) use advanced polar tracking and blocking techniques to increase drawing efficiency;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(L) create drawings that incorporate external referencing;	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(M) create and render objects using parametric modeling tools; and	Advanced Computer Aided Drawing
(5) The student applies the concepts and skills of computer-aided drafting and design software to perform the following tasks. The student is expected to:	(N) model individual parts or assemblies and produce rendered or animated output.	Advanced Computer Aided Drawing
(6) The student practices safe and proper work habits.The student is expected to:	(B) comply with safety guidelines as described in various manuals, instructions, and regulations;	Lab Safety Procedures: Advanced Engineering Design
(6) The student practices safe and proper work habits.The student is expected to:	(C) identify and classify hazardous materials and wastes according to Occupational Safety and Health Administration (OSHA) regulations;	Lab Safety Procedures: Advanced Engineering Design
(6) The student practices safe and proper work habits.The student is expected to:	(D) describe the appropriate disposal of hazardous materials and wastes appropriately;	Lab Safety Procedures: Advanced Engineering Design
(6) The student practices safe and proper work habits.The student is expected to:	(F) handle and store tools and materials correctly; and	Lab Safety Procedures: Advanced Engineering Design
(7) The student uses engineering design methodologies. The student is expected to:	(A) describe principles of solution ideation and evaluate ideation techniques for an engineering project, including systems-based engineering and advanced prototyping;	Design Challenge: Remote Control Vehicle
(7) The student uses engineering design methodologies. The student is expected to:	(C) develop or improve a solution using rational thinking;	Design Challenge: Remote Control Vehicle
(7) The student uses engineering design methodologies. The student is expected to:	(D) apply decision-making strategies when developing solutions;	Design Challenge: Remote Control Vehicle
(7) The student uses engineering design methodologies. The student is expected to:	(E) identify quality-control issues in engineering design and production;	Design Challenge: Remote Control Vehicle
(7) The student uses engineering design methodologies. The student is expected to:	(G) use an engineering notebook to record prototypes, corrections, and/or mistakes in the design process; and	Design Challenge: Remote Control Vehicle
(7) The student uses engineering design methodologies. The student is expected to:	(H) use an engineering notebook or portfolio to record and justify the final design, construction, and manipulation of finished projects.	Design Challenge: Remote Control Vehicle
(8) The student applies concepts of engineering to specific problems. The student is expected to:	(A) design solutions from various engineering disciplines such as electrical, mechanical, structural, civil, or biomedical engineering;	Design Challenge: Remote Control Vehicle
(8) The student applies concepts of engineering to specific problems. The student is expected to:	(B) experiment with the use of tools, laboratory equipment, and precision measuring instruments to develop prototypes;	Design Challenge: Remote Control Vehicle
(8) The student applies concepts of engineering to specific problems. The student is expected to:	(D) use multiple software applications for concept presentations.	Design Challenge: Remote Control Vehicle
(9) The student addresses a need or problem using appropriate systems engineering design processes and techniques. The student is expected to:	(A) create and interpret engineering drawings;	Advanced Computer Aided Drawing
(9) The student addresses a need or problem using appropriate systems engineering design processes and techniques. The student is expected to:	(B) identify areas where quality, reliability, and safety and multidisciplinary optimization and stakeholder analysis can be designed into a solution such as a product, process, or system;	Design Challenge: Remote Control Vehicle
(9) The student addresses a need or problem using appropriate systems engineering design processes and techniques. The student is expected to:	(C) improve a system design, including properties of materials selected, to meet a specified need;	Design Challenge: Remote Control Vehicle
(9) The student addresses a need or problem using appropriate systems engineering design processes and techniques. The student is expected to:	(D) produce engineering drawings to industry standards; and	Advanced Computer Aided Drawing

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(9) The student addresses a need or problem using appropriate systems engineering design processes and techniques. The student is expected to:	(E) describe potential patents and the patenting process.	Design Challenge: Remote Control Vehicle
(10) The student builds a prototype using the appropriate tools, materials, and techniques. The student is expected to:	(A) implement and delineate the steps needed to produce a prototype such as defining the problem and generating concepts;	Design Challenge: Remote Control Vehicle
(10) The student builds a prototype using the appropriate tools, materials, and techniques. The student is expected to:	(B) identify industry-appropriate tools, equipment, machines, and materials;	Advanced Prototype Fabrication
(10) The student builds a prototype using the appropriate tools, materials, and techniques. The student is expected to:	(D) present and validate the prototype using a variety of media and defend engineering practices used in the prototype.	Design Challenge: Remote Control Vehicle
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace using engineering design practices and processes. The student is expected to:	(A) identify and define engineering problems from different engineering disciplines such as mechanical, civil, structural, electrical, bio, or aerospace engineering;	Design Challenge: Remote Control Vehicle
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace using engineering design practices and processes. The student is expected to:	(B) formulate goals, objectives, and requirements to solve an engineering problem;	Engineering Project Management Skills
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace 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;	Design Challenge: Remote Control Vehicle
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace 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;	Design Challenge: Remote Control Vehicle
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace using engineering design practices and processes. The student is expected to:	(F) test and evaluate proposed solutions using tools and methods such as models, prototypes, mock-ups, simulations, critical design review, statistical analysis, or experiments; and	Design Challenge: Remote Control Vehicle
(11) The student creates justifiable solutions to open ended real-world problems within a multitude of engineering disciplines such as mechanical, electrical, civil, structural, bio, or aerospace using engineering design practices and processes. The student is expected to:	(G) apply a structured technique problem such as a decision tree, design matrix, or cost-benefit analysis to select and justify a preferred solution to a problem.	Engineering Project Management Skills