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CTSO Course Alignments: Introduction to Electromechanical

Below you will find standards for the Introduction to Electromechanical course aligned with competitive events from appropriate career and technical student organizations (CTSOs). Knowing the aligned events for your organization will allow you to have additional tools for teaching course standards, as well as increase student engagement and preparation in your CTSO activities. The final column recommends potential tools from other CTSO organizations. Even if your students are not participating in these organizations, available rubrics, tools, and materials can also add to the instructional resources at your disposal for best teaching your content.

Important to note: While the aligned activities below can be important tools in teaching course standards, it is important to note that events may not cover a standard in its entirety and should not be the sole instructional strategy used to address a standard.

	STANDARD	ALIGNED SkillsUSA & TSA COMPETITIVE EVENTS/PROGRAMS	OTHER POTENTIAL CTSO TOOLS & RESOURCES
1	Assess a given situation requiring the use of tools, equipment, and materials. Explain the applicability of various safety standards and procedures, and then safely demonstrate the use of the tools, equipment, and materials. For example, the hoisting of material requires lifting equipment of sufficient strength and applicability to the task, physical clearance from personnel, necessary alerting to others, and authorization to use the required equipment, as well as conformance to Occupational Safety and Health Administration (OSHA) policies for avoiding and reporting accidents associated with this type of activity. (TN Reading 2, 3)	• **SkillsUSA**: Occupational Health and Safety	• **FFA:** Agricultural Technology and Mechanical Systems, Forestry
2	Assess a given situation requiring the use of hand and/or power tools. Select the proper tool and accessories, critique the readiness of the tool, use the tool to accomplish the desired task, and then return the tool and accessories to its proper storage. For example, creating a hole in aluminum requires the choice of the proper drill, drill bit, mounting hardware, lubricant, and safety procedures and precautions. The suitability of the drill bit is just one of many aspects that must be assessed and analyzed. (TN Reading 3)	• **TSA**: Prepared Presentation, On Demand Video, Digital Video Production, Extemporaneous Presentation	• **FFA:** Agricultural Technology and Mechanical Systems • **HOSA**: Prepared Speaking
3	Analyze situations, create plans, and implement plans requiring the use of rigging to install and/or remove equipment and machinery. Perceive and critique the safety risks involved in the job. For example, contrast the implications of lifting and positioning heavy objects of small compact shape versus those of large rotational moment. (TN Reading 3, 4; TN Writing 4)		• **FCCLA**: Advocacy

4	Identify and evaluate situations that require electrical circuits and electromechanical principles. Develop and safely implement a plan to achieve the desired electromechanical objective. For example, recognize the power requirements for operating a 35 hp lathe, develop a wiring plan, and draft the details for a work order. (TN Reading 4)	• **SkillsUSA**: Electrical Construction Wiring, Electronics Technology	• **FFA:** Agricultural Technology and Mechanical Systems
5	Create linear and angular drawings to represent real-world physical scenarios in two and three dimensions. For example, based on physical requirements for a bracket, develop a plan, and create a drawing based on the required geometry for accurately fabricating the bracket, including precise linear and angular measures. (TN Reading 7; TN Math: N-Q, A-CED, G-GMD, G-MG)	• **TSA**: Computer-Aided Design (CAD) 2D, Architecture, Computer-Aided Design (CAD) 3D, Engineering, Technical Sketching and Application	• **FBLA:** 3D Animation
6	Apply mathematics concepts to solve electronics and manufacturing industry problems. For example, calculate the impact of the addition of random variables representing material dimensions that include several tolerances and dimensional allowances on the final combined work product. (TN Reading 4, 7; TN Math: N-Q, A-SSE, A-REI)		
7	Create two- and three-dimensional scale drawings using accepted dimensioning rules and measurement systems. For example, as part of a project to fabricate a custom-shaped metal block, develop the complete drawings that specify the dimensional details for each step of the construction process. (TN Reading 3, 7; TN Math: A-REI, G-CO, G-C, G-GMD, G-MG)	• **TSA**: Computer-Aided Design (CAD) 2D, Architecture, Computer-Aided Design (CAD) 3D, Engineering, Technical Sketching and Application	• **FBLA:** 3D Animation
8	Identify and demonstrate basic troubleshooting strategies appropriate for evaluating electronic circuits/systems and electromechanical devices. For example, in a relay-logic circuit with four display bulbs, develop and implement a troubleshooting strategy to remedy a bulb that fails to light. (TN Reading 3; TN Math N-Q, S-IC)	• **SkillsUSA**: Electronics Technology • **TSA**: Technology Problem Solving	• **FFA:** Agricultural Technology and Mechanical Systems
9	Demonstrate understanding of the operation of electrical circuits and devices and relate it to the physical laws (such as Ohm's Law, Kirchhoff's Law, and power laws) that govern the behavior of electrical circuits and devices. Accurately apply these physical laws to solve problems. For example, calculate and support the consequence of the maximum volume of air that can be moved by an AC-powered 50 hp electric motor. (TN Reading 3, 4; TN Math N-Q, A-CED, A-REI, F-BF)	• **SkillsUSA**: Electronics Technology • **TSA**: Technology Problem Solving	• **FFA:** Agricultural Technology and Mechanical Systems
10	Explain the interrelationships among sources of current, voltage, resistance, and power in electric circuits, both theoretical (illustrated) and actual by designing a direct current (DC) circuit of resistors and LEDs, and predicting the likely current and power requirement. Discriminate among used resistors in a junk box, using the color codes to identify resistors of suitable value. (TN Reading 1, 5; TN Writing 4; TN Math N-Q, A-REI)	• **SkillsUSA**: Electronics Technology	• **HOSA**: Researched Persuasive Speaking
11	Assemble the required connections of electronic test equipment to properly test the operation of basic electronic circuit behavior and performance, using equipment such as a digital multimeter, oscilloscope, and resistance bridge. For example, design, assemble, and verify a passive analog filter able to block at least 6 dB of audio-level signals of frequency greater than 500 Hz. (TN Reading 3; TN Math N-Q)	• **SkillsUSA**: Electronics Technology	

12	Investigate an assortment of occupations and manufacturing processes that rely on electromechanical principles and technologies, such as shipyard rigging, metalworking, agricultural mechanics, construction, and medical prosthetics. Write an informative text that summarizes the typical educational and certification requirements, working environments, and career opportunities for these occupations. (TN Reading 2; TN Writing 2)	• **SkillsUSA**: Job Interview, Entrepreneurship, Employment Application Process • **TSA**: Career Preparation	• **FCCLA**: Job Interview, Career Investigation, Entrepreneurship • **HOSA**: Job Seeking Skills, Researched Persuasive Speaking
13	Analyze and describe a variety of quality control constraints on manufacturing materials, parts, and processes that impact the suitability of a given electromechanical production process. Collect and interpret data that includes, but is not limited to, physical and electrochemical properties such as size, mass, hardness, pH, temperature, conductivity, rate, and so forth, and synthesize the results to yield a clear, written documentation of the findings. For example, assist a quality assurance inspector who must carefully complete the steps of a standard inspection order to certify an incoming shipment of raw material by making several measurements and tests for conformance to specification. (TN Reading 1, 5; TN Writing 7)	• **TSA**: Manufacturing Prototype	• **HOSA**: Researched Persuasive Speaking
14	Inspect and interpret blueprints, schematic diagrams, or written specifications for electromechanical devices and systems. Explain how pictorial representations relate to an actual project layout, verifying sufficient agreement as prescribed by specified tolerances. For example, create a proposed parts list for wiring a room addition based on electrical construction drawings, conforming to generally accepted building codes. (TN Reading 1, 5; TN Writing 7; TN Math N-Q, G-CO, G-GMD)	• **TSA**: Technical Sketching and Applications	• **HOSA**: Researched Persuasive Speaking, Extemporaneous Writing
15	Given a malfunctioning electromechanical system, use resources such as blueprints, diagrams, and equipment manuals to troubleshoot the machinery. Develop and graphically illustrate at least three possible solutions to the problem. Select the optimal solution and justify the selection with evidence drawn from the resources listed above. (TN Reading 1, 4; TN Writing 1, 4)	• **SkillsUSA**: Electronics Technology • **TSA**: Computer-Aided Design (CAD) 2D, Architecture, Computer-Aided Design (CAD) 3D, Engineering, Technical Sketching and Application	• **FCCLA**: Advocacy
ALL	**CAN BE USED WITH ALL/MOST STANDARDS**	• **SkillsUSA**: Career Pathways Showcase, Job Skills Demonstration A, Job Skills Demonstration O, Prepared Speech, Extemporaneous Speaking, Chapter Display, Mechatronics • **TSA**: Prepared Presentation	• **FCCLA**: Illustrated Talk, Chapter in Review Display, Chapter in Review Portfolio • **HOSA**: Prepared Speaking