



CTSO Course Alignments: Automation and Robotics (PLTW)

Below you will find standards for the Automation and Robotics (PLTW) 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 TSA COMPETITIVE EVENTS/PROGRAMS	OTHER POTENTIAL CTSO TOOLS & RESOURCES
2.1	What is Automation and Robotics? (7 days)		
2.1(1)	Automation is the use of technology to ease human labor or to extend the mental or physical capabilities of humans.		
2.1(2)	Robotics is the specialized field of engineering and computer science that deals with the design, construction, and application of robots.		
2.1(3)	The use of automation and robotics affects humans in various ways, both positively and negatively, including their safety, comfort, choices, and attitudes about a technology's development and use.		
2.1(4)	Automation and robotics have had an influence on society in the past and present and will influence society in the future.		
2.1(5)	Engineers, designers, and engineering technologists are in high demand for the development of future technology to meet societal needs and wants.	TSA: Career Prep	<ul style="list-style-type: none"> HOSA: Job Seeking Skills

2.1KS	<p><i>Knowledge and Skills</i></p> <p>It is expected that students will:</p> <ul style="list-style-type: none"> • Describe the purpose of automation and robotics and its effect on society. • Summarize ways that robots are used in today's world and the impact of their use on society. • Describe positive and negative effects of automation and robotics on humans in terms of safety and economics. • Provide examples of STEM careers and the need for these professionals in our society. 	TSA: Career Prep	<ul style="list-style-type: none"> • HOSA: Job Seeking Skills
2.2	Mechanical Systems (12 days)		
2.2(1)	Energy is the capacity to do work; the use of mechanisms is necessary to transfer energy.	TSA: Energy Sources	
2.2(2)	Engineers and technologists design mechanisms to change energy by transferring direction, speed, type of movement, and force or torque.		<ul style="list-style-type: none"> • HOSA: Job Seeking Skills
2.2(3)	Mechanisms can be used individually, in pairs, or in systems.		
2.2KS	<p><i>Knowledge and Skills</i></p> <p>It is expected that students will:</p> <ul style="list-style-type: none"> • Use ratios to solve mechanical advantage problems. • Use numerical and algebraic expressions and equations to solve real-life problems, such as gear ratios. • Use the characteristics of a specific mechanism to evaluate its purpose and applications. • Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. 		<ul style="list-style-type: none"> • FFA: Agricultural Mechanics and Technology
2.3(1)	Automated systems require minimal human intervention.		
2.3(2)	An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.		
2.3(3)	Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.		
2.3(4)	Comments do not change the way a robot behaves, but they do allow the programmer to remember the function that the code performs.		

2.3(5)	Invention is a process of turning ideas and imagination into devices and systems.	<ul style="list-style-type: none"> • TSA: Inventions and Innovations 	
2.3(6)	Some technological problems are best solved through experimentation.		
2.3(7)	Fluid power systems are categorized as either pneumatic, which uses gas, or hydraulic, which uses liquids. (FT Version)	<ul style="list-style-type: none"> • TSA: Energy Sources 	
2.3(8)	Automated systems can be powered by alternative energy sources like solar and fuel cells. (FT Version)	<ul style="list-style-type: none"> • TSA: Energy Sources 	
2.3KS	<p><i>Knowledge and Skills</i></p> <p>It is expected that students will:</p> <ul style="list-style-type: none"> • Know the seven technological resources and how they are integrated into an open and closed loop system. • Describe the purpose of pseudocode and comments within a computer program. • Know how to use ratio reasoning to solve mechanical advantage problems. • Design, build, wire, and program both open and closed loop systems. • Use motors and sensors appropriately to solve robotic problems. • Troubleshoot a malfunctioning system using a methodical approach. • Experience fluid power by creating and troubleshooting a pneumatic device. (FT Version) • Design, build, wire and program a system operated by alternative energy. (FT Version) • Explain the roles and responsibilities of mechanical, electrical, and computer engineers who solve robotic problems. 	<ul style="list-style-type: none"> • TSA: Energy Sources, Career Prep 	<ul style="list-style-type: none"> • HOSA: Job Seeking Skills
ALL	CAN BE USED WITH ALL/MOST STANDARDS	<ul style="list-style-type: none"> • TSA: Problem Solving, System Control Technology, VEX Robotics 	<ul style="list-style-type: none"> • FCCLA: Illustrated Talk, Career Investigation, Chapter in Review Display, Chapter in Review Portfolio, • SkillsUSA: Career Pathways Showcase, Job Skills Demonstration A, Job Skills Demonstration O, Prepared Speech, Extemporaneous Speaking, Chapter Display, Principles of Engineering Technology, Engineering Technology/Design, Robotics and Automation (Not Offered), Mobile Robotics, Robotics: Urban Search and Rescue