Program Name	Automation Robotics
Program CIP Code	48.0500.20
Program Description and Coherent Sequence	The **Automation/Robotics** program applies automation skills to basic precision manufacturing principles and technical skills. Students will be prepared to apply their skills of electronics, hydraulics, mechanics, pneumatics to inspect, troubleshoot, program, install, modify or repair robotic systems and machines. Students will understand and apply their skills to manufacturing systems, production planning documentation, technical problem-solving, management information systems, preventive maintenance and quality control for automated manufacturing. Students will have the opportunity to earn industry-recognized certifications such as Certified Education Robot Training (CERT) and Robotics Education Competition (REC). The program consists of two core courses and an Automation/Robotics final course. The program uses a delivery system made up of four integral parts: formal/technical instruction, experiential learning, supervised occupational experience and the Career and Technical Student Organization, SkillsUSA. Prepares students for careers as an automation technician. **Fundamentals of Precision Manufacturing:** This course includes units of instruction in computer control and power systems used in manufacturing. Included are automated and control systems, materials and properties, mathematics, manufacturing processes, occupational safety, production systems, and quality control. In each area, the topics emphasized are those fundamental to basic manufacturing processes and practices. Units include set-up and change-over techniques, using industrial instruments while utilizing technical skills applied to academic foundations of communication, geometric and algebra math applications. Students completing this program will develop advanced critical thinking, interpersonal relations, and life and leadership management skills while building business relationships that are required for work-based learning utilizing workplace employability skills. **Applications of Precision Manufacturing:** This course includes units of instruction in computer control and power systems used in manufacturing. Units also include set-up and change-over techniques, using industrial instruments and utilizing technical skills. Instruction also includes careers opportunities in manufacturing, communications skills, work-based learning experiences, teamwork, safety, creative thinking and problem solving. **Automation/Robotics:** Students in this course will learn how automation reduces the need for human labor. Students will understand the math, science and technology of robots, their design, and application in industrial automation for manufacturing.

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	Students will learn control systems, robotics and computer applications and how they are used to control machinery in industry. Students will gain a working knowledge of electronics, programming, mechanics, pneumatics, Mechatronics and applicable software through technical skills in support of technicians and other personnel engaged with robotics**.** **Work-based Learning:** Students have the opportunity to participate in either an Automation/Robotics Cooperative Education experience or an Internship.
Industry Validated Standards	http://www.azed.gov/career-technical-education/files/2015/05/technical-standards-automation-robotics-48050020.pdf
Specialized Equipment	Servo testers Encoder test equip,sound level meters Network cable testers Audio signal generators Clamp meters Voltage testers Soldering iron Desoldering pump Electronic specified hand tools Hex screwdrivers Tooling plates Firmware configuration tools Equipment List can be accessed at: http://www.azed.gov/career-technical-education/files/2011/11/equipment-list-automation-and-robotics-48050020.pdf
Industry Recognized Certifications	• Electronics Systems Associate (ESA) • IPC J-STD-001 Certification • ISA Certified Automation Professional® (CAP®) 700 • CCST Certified Control Systems Technician 700 • ROBOTC 70% • NCCER o Electronics Systems Technician - Level 1 o Electronics Systems Technician - Level 2 o Electronics Systems Technician - Level 3 • OpenSpan Developer 70% • Robotics Engineering Curriculum (REC) robotics 68% • Machining Manufacturing Skill Standards Council (MSSC) Level 1 • National Institute for Metalworking Skills (NIMS) Level 1 • National Career Readiness Certificate (NCRC) Level 1 • Northland Pioneer College…

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	o Certificate of Proficiency in Mechatronics: Industrial Mechanics and Fluid Power Specialization o Certificate of Proficiency in Mechatronics: Industrial Electrical, Motors and PLCs
CTE End-Of- Program (EOP) Technical Skill Assessment (TSA) Y/N	Yes
Current EOP TSA Pass Score	60%
Participation in JTED Program Qualifies Students for These Employment Opportunities	Yes Control systems technician Control systems lead Machine maintenance technician Lab automation specialist APC operator Automation maintenance tech

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SB1525 JTED Course and Program Requirements

Requires students obtain passing score of 60% on assessment 15-391(3)(b) Page 1/20-24 & 15-391(5)(b) Page 2/1-6	Yes Automation Technical Skill Assessment requires a 60% pass score. Robotics, Automation Certificates and pass scores: ISA Certified Automation Professional® (CAP®) 700 CCST Certified control systems technician 700 Open span developer 70%
Not a Course Required under Minimum Course of Study including Honors 15-391(3)(d) Page 1/27-29	Courses in this program are not required for graduation.
Majority of Instructional Time in Lab / Field / Work Based Learning Environment 15-391 (3)(e) Page 1/30-32 and **Requires CTSO Participation** 15-391(5)(d) Page 2/10-13	Yes, the majority of instructional time for each course is in a lab environment. SkillsUSA
Demonstrated Need for Extra Funding for a course 15-391 (3)(f) Page 1/33-34	Yes This program demonstrates the need for extra funding because of the equipment and cost of projects that emulate real-world applications. Both equipment and consumable supplies are cost prohibitive in the absence of extra funding.
Specialized Equipment Exceeds Cost of Standard Course 15-391(3)(g) Page 1/35-36 and 15-391(5)(c) Page 2/7-9	Yes Necessary equipment includes, but is not limited to,: Servo testers, encoder test equip, soldering iron, desoldering pump, electronic specified hand tools, hex screwdrivers, tooling plates, firmware configuration tools, 3D printers, CAD software, robotic projects, computer monitor testers, sound level meters, network cable testers, audio signal generators, clamp meters, voltage testers, electronic specified hand tools.
Alignment through Curriculum, Instructional Model and Courses Sequence 15-391(5)(e) Page 2/15-18	Yes State-established course sequence for Automation/Robotics program consists of 2 Carnegie Units of Instruction.
Defined Pathway to Career and Postsecondary Ed in Specific Vocation or Industry 15-391(5)(f) Page 2/19-21	Yes Maricopa CCs, Chandler-Gilbert CC, CIS 105, CIS 129 Industry opportunities right out of high school or community college: • Control systems technician • Control systems lead

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	• Machine maintenance technician • SQL developer • Lab automation specialist • APC operator • Automation maintenance technician
Fills High Need Vocation or Industry as Determined by CTE/ADE 15-391(5)(j) Page 2/30-31	Yes Manufacturing and related fields are identified as a high demand area by the industry. Manufacturing professional groups like the Arizona Manufacturing Partnership and Southern Arizona Manufacturing Partnership (AMP) are working diligently with high schools and communities colleges to promote manufacturing programs in schools to help fill the dwindling labor force in this occupational area.
Requires a Single or Stackable Credential or a Skill that allows a student to obtain work 15-391(5)(k) Page 2/32-35	Yes Robotics, Automation and Control Certificates: • ISA Certified Automation Professional® (CAP®) • CCST Certified control systems technician • Open span developer
Leads to certification or licensure verified by that vocation or industry that qualifies student for employment which the student would not otherwise qualify. 15-391(5)(l) Page 2/36-39	Program can lead to any of the following: • Electronics Systems Associate (ESA) • IPC J-STD-001 Certification • ISA Certified Automation Professional® (CAP®) 700 • CCST Certified Control Systems Technician 700 • ROBOTC 70% • NCCER o Electronics Systems Technician - Level 1 o Electronics Systems Technician - Level 2 o Electronics Systems Technician - Level 3 • OpenSpan Developer 70% • Robotics Engineering Curriculum (REC) robotics 68% • Machining Manufacturing Skill Standards Council (MSSC) Level 1 • National Institute for Metalworking Skills (NIMS) Level 1 • National Career Readiness Certificate (NCRC) Level 1 • Northland Pioneer College o Certificate of Proficiency in Mechatronics: Industrial Mechanics and Fluid Power Specialization o Certificate of Proficiency in Mechatronics: Industrial Electrical, Motors and PLCs

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If no certification or licensure is accepted by vocation or industry, completion of program must qualify student for employment for which student would not otherwise qualify without completing JTED program. 15-391(5)(l) Page 2/39-43	N/A
Requires instruction and instructional materials substantially different from and exceed scope of standard instruction and include skills, competencies and knowledge to be successful in JTED program vocation or industry. 15-391(5)(m) Page 2/44-45 and 3/1-3	Yes, Automation/Robotics requires precise instruction and instructional materials. Examples of instructional materials are: • Robotics academy with REC cert http://education.rec.ri.cmu.edu/roboticscurriculum/ • VEX EDR curriculum http://curriculum.vexrobotics.com/
Industry provided financial or technical support. 15-391(5)(n) Page 3/4-8	Yes, industry support provides opportunities such as: • Robot Summer camps ASU http://venus.eas.asu.edu/roboticscamp/ • ASU UA summer tech robot camps http://www.engineeringedu.com/store/index.php?route=information/information&information_id=17 • Scholarships REC robotics in Arizona http://www.roboticseducation.org/for-participants/scholarships/ In addition industry: • Serves on industry standards development and validation committees • Serves on state and local advisory boards • Provides work based learning experiences • Donate equipment and supplies • Serve as classroom speaker and resource
Demonstrated need for extra funding in order to provide JTED program 15-391(5)(o) Page 3/9-11	Yes This program needs extra funding for equipment, instructional materials, consumable supplies, tools, project supplies, competitions and employment preparation opportunities.

Eligibility		**Yes**	**No**
JTED	The **Automation/Robotics** program meets the requirements for **JTED** compliance and eligibility	x	
CTE Federal Perkins and State Priority	The **Automation/Robotics** program meets the requirements for **Perkins** and is eligible to generate **CTE State Priority funding**.	x	