

## District Career & Technical Education (CTE) Pathway Proposal: Building Controls Technology

The Career & Technical Education (CTE) Pathway proposal must be submitted to the CTE Coordinator for prior approval and must include the following information:

### Name of State approved (CCCS) CTE Program:

Pathway Name: **Construction**

Sub-Pathway Name: **Electrical**

Credit Type(s): **PRA. ELE**

Department Code: **EGR**

CIP Code: **46000**

## I. GOALS

### A. Provide a brief overview of the CTE Pathway.

- The Building Controls Technology pathway is an experiential learning program with specialized training in electrical controls and automation topics such as automated control systems, industrial wiring, electrical principles, and motors and controls. The multidisciplinary curriculum provides students with the diverse skill set required to install, calibrate, modify, troubleshoot, repair, program, and maintain automated and electrical systems.

### B. How does this CTE Pathway fit into the overall educational program?

- CTE programs significantly increase not only the high school graduation rate but also result in a higher percentage of students going to college and persisting through graduation. Students taking academic and technical courses have lower dropout rates and better achievement gains than other students. Students from throughout the district will have access to this program, and gain marketable skills that are valued and sought after throughout the industry.

### C. What benefits would students receive from **this** CTE pathway?

- This pathway will prepare students for entry-level positions as an electrical apprentice, facility and industrial maintenance, and building controls and automation. It will provide students the opportunity to focus on skills that will increase their postsecondary readiness. Students have the opportunity to earn industry credentials from industry leaders such as PMMI, SACA, Snap-on, and NC3. Students can also continue in post secondary education, or enter the workforce with some in demand skills and certifications.

## II. CAREER & TECHNICAL EDUCATION (CTE) PATHWAY COURSES

A. Complete the table below indicating the course sequence students would take within the CTE program. Other courses may be added or changed within the program, based on the need of students or program modifications.

**New course names will be indicated in red text.**

Level:	State Approved Course Name:	State Approved Description:	Credit Type	Course Number
1	CTE Principles of Manufacturing (A & B)	<p><i>In Principles of Manufacturing, students are introduced to knowledge and skills used in the proper application of principles of manufacturing. The study of manufacturing technology allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities. Students will gain an understanding of what employers require to gain and maintain employment in manufacturing careers.</i></p> <p>SCED CODE: 13002</p> <p><u>Course Fee Proposal: \$100.00</u></p>	PRA	79140204
2	CTE Digital Electronics (A & B)	<p><i>Digital Electronics is intended to provide students with an introduction to the basic components of digital electronic systems and equip them with the ability to use these components to design more complex digital systems. Proficient students will be able to (1) describe basic functions of digital components (including gates, flip flops, counters, and other devices upon which larger systems are designed), (2) use these devices as building blocks to design larger, more complex circuits, (3) implement these circuits using programmable devices, and (4) effectively communicate designs and systems. Students develop additional skill in technical documentation when operating and troubleshooting circuits. Upon completion of the Digital Electronics course, students will be able to design a complex digital system and communicate their designs.</i></p> <p>Course fee: \$50.00/term</p>	ELE	79140202
3	CTE Robotics & Automated Systems	<p><i>Robotics &amp; Automated Systems is an applied course for students who wish to explore how robots and automated systems are used in industry. Upon completion of this course, students will have an understanding of the historical and current uses of robots and automated</i></p>	PRA	79140302

		<p>systems; programmable circuits, interfacing both inputs and outputs; ethical standards for engineering and technology professions; and testing and maintenance of robots and automated systems.</p> <p><u>Course fee: \$50.00/term</u></p>		
3	CTE Electronics- Analog/Robotics	<p>An in-depth study of series-parallel circuits, inductive and capacitive reactance, rectification, amplification, voltage regulation, semiconductors, and robotics will be conducted. The electronic theory is reinforced through breadboarding circuits in the lab. Students will program robots to perform a specific task.</p> <p><u>Course Fee Proposal \$50/term</u></p>	ELE	79140304
3	CTE Electronics- Solid State/Semiconductor	<p>The course is an introduction to semiconductor fundamentals and applications to electronic devices. The course creates the background in the physics of compound semiconductor-based electronic devices and also prepares students for advanced courses in solid-state and quantum electronics. The course provides an opportunity for students to continue their education by undertaking advanced study and research in a variety of different branches of semiconductor device applications. Topics include the background solid state and semiconductor physics, and basic principles of electronic device operation including diodes, transistors, FETs, SCRs, and UJTs. The hands-on laboratory portion of this course compares different types of devices and their characteristics with an emphasis on real-life circuits and applications. (This course covers all competencies of ELT 134.)</p> <p><u>Course Fee Proposal \$50/term</u></p>	ELE	79140305
3				
3	CTE DC/AC Electricity and Electronics	<p>This course introduces the basic principles of electronics including the fundamentals of Direct Current (DC), Alternating Current (AC), and robotics.</p>	ELE	79140303

		<p><i>Topics include basic circuits, voltage, current and resistance measurement, Ohm's Law, series and parallel circuits, magnetism, motors and generators, electromagnetic induction, and robotics. The electronic theory is reinforced through breadboarding circuits in the lab. Students fabricate printed circuit boards projects. Utilization of electronic test equipment is emphasized.</i></p> <p><i>Course fee: \$50.00/term</i></p>		
4	<p><i>CTE Electromechanical Control Systems (A&amp;B)</i></p>	<p><i>Electromechanical Control Systems is designed to provide students with the knowledge and skills to effectively perform basic industrial maintenance procedures in an advanced manufacturing facility. Students in this course develop proficiency in a vast array of electromechanical domains, including fundamental safety practices in electromechanical technology, electrical systems, AC and DC motors, calibrating instruments, drive systems, hydraulic systems, pumps, digital electronics, programmable logic controllers (PLC), and troubleshooting procedures. Upon completion of this course, proficient students will be prepared to pursue postsecondary electromechanical technology programs and entry-level industrial maintenance technology careers in the advanced manufacturing industry.</i></p> <p><i>Course Fee Proposal \$50/term</i></p> <p><u><i>Course fee: \$50.00/term</i></u></p>	ELE	79140401
4	<p><i>CTE Robotics and Mechatronics Technology II (A&amp;B)</i></p>	<p><i>In this class students will research, design, and build projects based on the field of robotics automation. Students will learn about Pneumatics, Hydraulics, Electronics, and Mechanical Design along with basics in Control and Programming by designing and building robotic systems</i></p> <p><u><i>Course Fee Proposal \$50/term</i></u></p>	ELE	79140402
4	<p>CTE Electrical CE or</p>			

	Apprenticeship			
4				
	ACC OSH 1300	<p>1 ACC credit (embedded 0 HS credit)          Provide a 10-Hour OSHA certification course for the general industry, and participants will review the current OSHA standards contained in 29 CFR 1910. Participants that complete the course will receive a certificate of completion from the United States Department of Labor, Occupational Safety and Health Administration. The course is taught by instructors certified by the Occupational Safety and Health Administration. Note: This course was previously listed as OSH 117.</p>	ELE	69141000
	ACC EIC 1001 Electrical Print Reading	<p>4 ACC Credits / 1 HS Credit          Teaches the skills needed to interpret electrical drawings properly. This 15-hour seminar is critical for anyone involved in the design, construction, or maintenance of electrical systems. Note: This course was previously listed as EIC 102.</p>	ELE	69141001
	ACC ELT 1206 Fundamentals of DC/AC	<p>4 ACC Credits / 1 HS Credit          Introduces the basic skills needed for many careers in electronics and related fields. Covers the operations and applications of basic DC and AC circuits consisting of resistors, capacitors, inductors, transformers, and diodes. Emphasizes the use of common test instruments in troubleshooting. Note: This course was previously listed as ELT 106. Course fees: Actual cost of ACC fees</p>	ELE	69141002
2	ACC-ELT 2254 Industrial Wiring	<p>3 ACC Credits / .5 HS Credit          Focuses on the required and recommended practice for industrial wiring. The National Electrical Code is applied to industrial power and control wiring. Covers specification and installation of wiring, conduit, enclosures, and termination components in lecture</p>	ELE	69141003

		<i>and applied during lab. Note: This course was previously listed as ELT 254.</i>		
	<i>ACC-ELT 2252 Motors &amp; Controls</i>	<i>3 ACC Credits / .5 HS Credit Enables the student to study, construct, test, and evaluate basic industrial control systems, including AC/DC motors, stepper motors, power sources, generators, tachometers, line diagrams, and logic functions. Covers safety standards and preventive maintenance. 68 contact hours. Note: This course was previously listed as ELT 252.</i>	<i>ELE</i>	<i>69141004</i>
	<i>ACC-ELT 2455 Fluid Power</i>	<i>3 ACC Credits / .5 HS Credit Enables the student to study, construct, test, and evaluate circuit diagrams, the transmission of force and energy, pumps and motors, actuators, cylinders, valves, and control devices. Incorporates the construction of hydraulic and pneumatic circuits using industrial equipment in the laboratory. 68 contact hours. Note: This course was previously listed as ELT 255.</i>	<i>ELE</i>	<i>69141005</i>
	<i>ACC-CAD 2455 Solidworks</i>	<i>3 ACC Credits / .5 HS Credit Introduces parametric feature-based solid modeling 3D concepts to build confidence in 3D thinking and progress to three-dimensional parameters. This course provides instruction on how to construct, modify, and manage complex parts in 3D space as well as to produce 2D drawings from the 3D models. Note: This course was previously listed as CAD 255.</i>	<i>ELE</i>	<i>69075</i>
	<i>ACC-ELT 2348 Automation Control Circuits</i>	<i>3 ACC Credits / .5 HS Credit Introduces the fundamentals of automatic controls including process control methodologies used to regulate a system or multiple systems for the purpose of establishing and maintaining a predictable manufacturing process. Note: This course was previously listed as ELT 248.</i>	<i>ELE</i>	<i>69141008</i>
	<i>ACC-ELT 2358 Programmable Logic Controllers</i>	<i>3 ACC Credits / .5 HS Credit Covers the fundamentals of programmable logic controllers (PLCs) as they are applied in robotics and</i>	<i>ELE</i>	<i>69141009</i>

		<p>automation. Includes history, terminology, typical applications, hardware, and software. Incorporates lab and project activities that address operating, monitoring, programming, troubleshooting, and repairing PLC-controlled lab trainers as well as actual industrial equipment. Note: This course was previously listed as ELT 258.</p>		
	<p><i>ACC-IMA 1500 Industrial Rotating Equipment</i></p>	<p>3 Credits / .5 HS Credit Explains the theory, operation, and maintenance of rotating equipment found in industrial environments such as gears, bearings, pumps, and compressors. Mechanical power transmission systems including direct coupling, belt drives, and chain drive are studied. Alignment techniques are practiced and related to the impact on machine vibration and equipment failures. The principles involved in the operation of centrifugal and positive displacement pumps and compressors will be discussed along with the function of connected components. Note: This course was previously listed as IMA 120.</p>	<p>ELE</p>	<p>69141010</p>
	<p><i>ACC ELT 2359 Advanced Programmable Logic Controllers</i></p>	<p>3 ACC Credits / .5 HS Credit Serves as the second in a two-course sequence and covers advanced topics and applications for programmable logic controllers (PLCs) as they are applied in robotics and automation. Includes advanced programming, diagnostics, Human Machine Interfaces (HMIs), introduction to automation networking, and system integration. Incorporates lab and project activities that address designing, operating, monitoring, programming, analyzing, troubleshooting, and repairing PLC-controlled lab trainers as well as actual industrial equipment. Note: This course was previously listed as ELT 259.</p>	<p>ELE</p>	<p>69141012</p>
	<p><i>ACC ELT 2080 Internship</i></p>	<p>3 ACC Credits / .5 HS Credit Provides students with the opportunity to supplement coursework with practical work experience related to their educational program. Students work</p>	<p>ELE</p>	<p>69141013</p>

		<i>under the immediate supervision of experienced personnel at the business location and with the direct guidance of the instructor. Note: This course was previously listed as ELT 280.</i>		
	<i>CTE Construction Systems A</i>	<i>Students in this class will learn about various facets of construction in both a classroom and hands-on setting. This program of study is intended to prepare students for careers in construction by developing an understanding of the different phases of a construction project from start to finish. Upon completion of this course, proficient students will be able to demonstrate knowledge and skill in the earlier phases of building construction, including site layout, foundation systems, framing systems, and electrical systems.</i>	<i>ELE</i>	<i>79140403S1</i>
	<i>CTE Construction Systems B</i>	<i>Students in this class will learn about various facets of construction in both a classroom and hands-on setting. This program of study is intended to prepare students for careers in construction by developing an understanding of the different phases of a construction project from start to finish. Upon completion of this course, proficient students will be able to demonstrate knowledge and skill in the earlier phases of building construction, including site layout, foundation systems, framing systems, and electrical systems.</i>	<i>ELE</i>	<i>79140403S2</i>
	<i>CTE Electrical Construction I</i>	<i>Electrical Construction covers approaches to commercial and industrial building wiring in conformance with the current National Electrical Code and local codes using electric metallic tubing and other raceways. This course also includes exploration of OSHA's electrical safety-related work practices and how they are applied to the work environment. Students will acquire knowledge and skills in safety, electrical theory, tools, codes, installation of electrical equipment, and the reading of electrical drawings, schematics, and specifications.</i>	<i>ELE</i>	
	<i>CTE Electrical Construction II</i>	<i>Continues practical applications of electrical theory and techniques used by</i>	<i>ELE</i>	



		<p><i>licensed electricians. Exploration of OSHA's electrical safety-related work practices, and how they are applied to the work environment. Approaches to commercial and industrial building wiring in conformance with the current National Electrical Code and local codes using electric metallic tubing and other raceways.</i></p>		
	<p><i>CTE Mechanical, Electrical, and Plumbing Systems</i></p>	<p><i>Mechanical, Electrical, and Plumbing Systems prepares students for electrical, plumbing, and HVAC careers by introducing students to the physical principles of these systems and the fundamental skills needed to work with them. Upon completion of this course, proficient students will be able to follow safety procedures and use tools to perform basic operations with electrical circuits, as well as demonstrate understanding in fundamental concepts of electricity theory (i.e. Ohm's Law). Students will be able to apply proper tools and procedures to perform basic operations with plastic piping, including measuring, cutting, and joining pipe. Furthermore, students will be able to apply mathematics concepts to solve HVAC, electrical, and plumbing problems. This course is intended to provide an introduction and lay a solid foundation for those students entering the construction or craft skilled areas. The course provides a strong knowledge of construction safety, construction mathematics, and common hand and power tools. This course also provides communication and occupation skills to assist the student in obtaining and maintaining employment.</i></p>	<p><i>ELE</i></p>	
	<p><i>CTE Work-based Learning Experience - electrical</i></p>	<p><i>This course is designed to prepare students to enter the workforce through on-the-job training in the form of a work-based learning experience and may be combined with class instruction. Students will build on prior knowledge and skills in the program of study aligned to their career and academic plan to further develop and apply employability and technical skills that prepare them for success in future career and</i></p>	<p><i>ELE</i></p>	

		<i>postsecondary education.</i>		
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Signature Page

Does the Career and Technical Education (CTE) Coordinator approve the adoption of this program?

*\*\* Your signature below indicates your approval of the program.*

Signature \_\_\_\_\_ *Aimee Barker*

Does the Chief Assessment Officer (or designee) approve the adoption of this program?

*\*\* Your signature below indicates your approval of the program.*

Signature \_\_\_\_\_ *Matt Reynolds*

Does the Assistant Superintendent approve the adoption of this program?

*\*\* Your signature below indicates your approval of the program.*

Signature \_\_\_\_\_ *Danny Wiasor*

Does the Board of Education approve the adoption of this program?

Yes

No

Date of BOE Meeting \_\_\_\_\_

Signature \_\_\_\_\_

**Superintendent File: IGA-E-2**

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Course Number:	
Course entered in NCAA database if applicable.	
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VIP Code:	
CIP Code:	
Add to HEAR list, if applicable.	
Course Mapping SCED code:	
Date entered into Infinite Campus	
Credit amount:	

# Signatures

Date: Oct 31 2023




Signature: Erica Mason  
Erica Mason

## Document Details

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