

November 30, 2021

Teri Gardner 12-6-2021

Washington State Apprenticeship and Training Council
 c/o Aubre Nelson, Apprenticeship Consultant 3
 Apprenticeship Section, Labor & Industries Washington State
 950 Broadway, Suite 200
 Tacoma, WA 98402-4453

Re: Tri-Cities Apprenticeship Preparation Program -Construction program renewal application

I am pleased to submit this application for continued recognition of our apprentice preparation program hosted by Tri-Tech Skills Center and open to all area students in the Tri-Cities. The primary feeder classes are the Tri-Tech Construction, Welding and Pre-Electrical programs which have junior and seniors students in them from all 8 local school districts. The Pre-Electrical program is in its second year and has been full with a waiting list for both years already so it is off to a great start. The course outlines for the programs are attached. Our programs are 540 hours for one year and 1080 hours for students that take a second year. COVID has made the past two years challenging in that our hands-on classroom shop time was limited but our teachers worked diligently to ensure the students left with all the essential skills in the time we had. Distance and hybrid learning provided some good opportunities to transition some classroom-based theory activities to our online learning platforms which has allowed for more hands-on time when the students are here so that is a good thing. Our students have been in the classroom full time since the start of the 21-22 school year and other than wearing mask when indoors, things are pretty much back to normal. COVID has made it impossible to do our evening sessions with the training centers but once they can be open it is intended to start those sessions once again.

The apprentice preparation program started more than a decade ago with the local training center coordinators' cooperation as part of a state grant to help facilitate high school students finding out and pursuing careers in the trades. It was designed to allow additional opportunities for our students to interact with the training centers, become familiar with the apprentice application process as well as work with the training center instructors and other apprentices in the evening sessions we would schedule. The training center coordinators did not want to have any kind of direct entry attached to the program but the agreements are that students that complete our programs and apply for the affiliated apprentice programs are guaranteed an interview and are also given one year of work credit for the 540/1080 hours that they have spent in their programs at Tri-Tech. Our relationship has worked well over the years even as the training center coordinators have changed.

Tri-Tech markets all its programs to all students in the service area with particular attention to using non-traditional photographs when possible to help all students see themselves being successful. We have plans to offer our GRITT Camp (Girls Rock In The Trades) again this spring open to female students 8th-12th grade to learn about careers in the trades. Our Tri-Cities Construction Career Day that we help facilitate is another opportunity to show all students (over 700 attend) the varied careers available in construction. Below are the class breakdowns over the past 4 years. Students can take the program for one year or two years. Most students take for one year due to the difficulty to get space in the schedules. One- year students are considered completers. The second-year students do further skill development, earn additional certifications and can take advantage of internship opportunities offered by the programs.

year		Total student	Male students	Female students	Caucasian	Hispanic	African American	Other	Class
21-22	1 st	34	32	2	13	13	3	5	Construction
	2 nd	9	8	1	1	8			
20-21	1 st	40	34	6	11	28	1	1	Construction

	2 nd	12	9	3	9	1		1	
19-20	1 st	38	33	5	24	11		3	Construction
	2 nd	5	5		4	1			
18-19	1 st	32	29	3	13	16	1	2	Construction
	2 nd	11	11		4	7			
21-22	1 st	36	32	4	20	10	1		Welding
	2 nd	13	12	1	10	3			
20-21	1 st	42	41	1	30	10	2		Welding
	2 nd	9	9		5	3		1	
19-20	1 st	42	39	3	30	10	1	1	Welding
	2 nd	18	18		15	2		1	
18-19	1 st	48	48		34	11	2	1	Welding
	2 nd	11	10	1	10	1			
21-22	1 st	54	51	3	32	20	2		Pre- Electrical
20-21	1 st	53	52	1	28	23	2		Pre-Electrical

Most of the graduating students have entered the workforce directly but quite a few have gone on to registered apprenticeships, the military, trade school or other post-secondary education. We have recent graduates who are apprentices with the NW Laborers, International Brotherhood of Carpenters, SWM 55, IBEW Lineman and Local 112, UA Local 598 Plumbers and Steamfitters and Ironworkers Local 14. There are more than 15 apprentices that I am aware of however I do not have apprentice registration numbers to include in this document.

We value the long-term relationships we have developed with our local apprentice programs over the years. I believe they would tell you that our students who become of their training program are well versed in the basic skills of the trade, in the work ethic it takes to be successful and are ready and eager to start their careers. We appreciate the training center coordinators participation in our program advisory committees and our General Advisory Committee.

If you have any questions, please feel free to let me know.

Thank you,

Lisa McKinney
Assistant Director

Teri Gardner 12-6-2021



Course Outline and Breakdown

Includes: 1st and 2nd Year Course Outline

Teamwork and Cooperation	Year 1	Year 2
	<ul style="list-style-type: none"> • Team Building • Introduction of goals • Goal Setting 	<ul style="list-style-type: none"> • Leadership of activities • Tool usage presentation • Individual assistance to new students
Basic Safety	<p>Year 1</p> <ul style="list-style-type: none"> • Intro to OSHA • Tool knowledge Assessments 	<p>Year 2</p> <ul style="list-style-type: none"> • Tool Repair and maintenance • Safety of toll usage presentations
Hand Tools	<p>Year 1</p> <ul style="list-style-type: none"> • Proper care of tools • Proper Use of hand tools • OSHA 10 tools and equipment • Hilti Cards 	<p>Year 2</p> <ul style="list-style-type: none"> • OSAH 10 tools and equipment • Hilti Cards
Power Tools	<p>Year 1</p> <ul style="list-style-type: none"> • Skill Saw Usage • Chop Saw • Table Saw • Sawzall • Nail Guns 	<p>Year 2</p> <ul style="list-style-type: none"> • Review expectations • Assist new students • Supervise new students in safe work practices
Wood Building Materials, Fasteners, and Adhesives	<p>Year 1</p> <ul style="list-style-type: none"> • Nails and Screws 	<p>Year 2</p>

	<ul style="list-style-type: none"> • Glues and epoxies • Calking 	<ul style="list-style-type: none"> • Review and elevate knowledge of material fasteners
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Construction Math	<p>Year 1</p> <ul style="list-style-type: none"> • Distances and dimensions • Accuracy of Dimensions • Slope and pitch • Volume • Decimals to standard dimensions • Estimation of materials. • Square footage 	<p>Year 2</p> <ul style="list-style-type: none"> • Distances and dimensions 2 • Accuracy of Dimensions 2 • Slope and pitch 2 • Volume 2 • Decimals to standard dimensions 2 • Estimation of materials. 2 • Square footage 2
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Orientation to the Trades	<p>Year 1</p> <ul style="list-style-type: none"> • Mission statement • Career search • Contacts list • Portfolio 1 • Dept. of labor Statistics data search 	<p>Year 2</p> <ul style="list-style-type: none"> • Mission statement 2 • Advanced Career search • Contact possible employers and colleges • Portfolio 2 • Dept. of labor Statistics data advanced search
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Site Layout One – Distance Measurement and Leveling	<p>Year 1</p> <ul style="list-style-type: none"> • Square and parallel lines and layout • Footings dimensions • Wall layout basics • Addition of dimensions 	<p>Year 2</p> <ul style="list-style-type: none"> • Habitat layout projects • Corrections and problem-solving
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Blueprints, Plans and Drawings	<p>Year 1</p> <ul style="list-style-type: none"> • Lines and symbols 	<p>Year 2</p>
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	<ul style="list-style-type: none"> • Dimensions • Index page • Title block • conventions 	<ul style="list-style-type: none"> • Advanced Print Reading • Workplace applications • Section Views • Details
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Concrete and Reinforcing Materials	Year 1 <ul style="list-style-type: none"> • Footings and Rebar 1 	Year 2 <ul style="list-style-type: none"> • Sidewalks and slabs
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Foundations	Year 1 <ul style="list-style-type: none"> • Rules and regulations • Basic layout • Systems and usages • Footings 1 • Foundations 1 	Year 2 <ul style="list-style-type: none"> • State codes • advanced layout • Systems and usages • Footings 2 • Foundations 2
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Floor Systems	Year 1 <ul style="list-style-type: none"> • Joists and decking 1 	Year 2 <ul style="list-style-type: none"> • State codes • Advanced floor systems • Estimation of materials
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Wall and Ceiling Framing	Year 1 <ul style="list-style-type: none"> • Basic framing • Blocking • Engineered fasteners • Material identification 	Year 2 <ul style="list-style-type: none"> • Advanced wall framing • State codes • Layout • Fire codes • Nailing codes
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Roof Framing	Year 1 <ul style="list-style-type: none"> • Types of systems • Calculation of slope and pitch • Layout 	Year 2 <ul style="list-style-type: none"> • Types of systems • Calculation of slope and pitch • Layout
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	<ul style="list-style-type: none"> • Application • Simpson clips • Trusses and blocking 	<ul style="list-style-type: none"> • Application • Simpson clips • Trusses and blocking • Codes and inspections • State and local codes
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Roofing Applications	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Nailing patterns • Safe work practices • Sheeting • OSHA fall protection • Scaffolding 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Safe work practices • Sheeting and estimation • OSHA fall protection • Scaffolding • Scaffold erection
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Thermal and Moisture Protection	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Calking and insulation • Vapor barriers • Energy star basics • Tyvek House wrap 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Calking and insulation installation • Vapor barriers • Energy star calcs. • Estimation of time and materials
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Windows and Exterior Doors	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Window installation • Calking and fastening 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Energy star applications • alignment and installation of closures
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Exterior Finish	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • types of siding • T111 siding applications • Nailing codes • Proper calking methods 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Leadership • Lap siding applications • Calc. of ridgeline cuts • Estimation of mat.
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Interior Finish Window, Door, Floor, and Ceiling Trim	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Types of wall coverings • Sheet rock application 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Base and window trim • Flooring • Sustainable interiors
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Stairs	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Basic identification • Types of systems • Basic calculations of single run stairs 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • State and local codes • Calculation of two level stairs
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Orientation to Green Sustainability and You	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • What is building green • What is sustainable • Careers in sustainable industry 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Imagine Comp @WSU • Career search • Guest speakers • Research paper
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Best Practices for Construction and Landscaping	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • Sprinkler line excavations • Ground leveling 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Sprinkler systems layout • Sod installation
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Applying for an Apprenticeship Program	<p style="text-align: center;">Year 1</p> <ul style="list-style-type: none"> • High School and beyond • Career Search 	<p style="text-align: center;">Year 2</p> <ul style="list-style-type: none"> • Pre-apprenticeship • Mock interviews • Career Search 2
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Pre-Electricians Program

Course Outline

Outline	Unit (Frameworks)	Competencies	1st year	2 nd year
Electricians – Who? What? Where?	Career Planning	<ul style="list-style-type: none"> • Describe entry-level careers available in energy generation, transmission, distribution and the education/experience requirements for entry into those positions, along with career development and advancement opportunities from those positions. • Identify entry-level careers available in residential, commercial and other energy industries; describes the education/experience requirements for entry into those positions, and career advancement opportunities from those positions. • Identify apprenticeship opportunities and requirements for entry. 2023 ELOI only attainable through Registered Apprenticeship • Describe general wage/salary, benefits, and other advantages of careers in the industry. • Explain the educational pathways available to gain training necessary for entry into electrical careers. 	10	20
Electrical Safety and Tools	Industry Health and Safety Standards	<ul style="list-style-type: none"> • Identify, describe and apply health and safety regulations that apply to specific tasks and jobs. • Identify, describe and apply federal, state, and local safety requirements, including OSHA-10 and EPA as they apply to a specific occupation. • Identify, describe and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the specific occupational area. • Explain procedures for documenting and reporting hazards to appropriate authorities. • Identify and describe potential consequences for non-compliance with appropriate health and safety regulations. • Identify and list contact information for appropriate health and safety agencies and resources. Identify, describe and demonstrate the effective use of Safety Data Sheets (SDS), hazardous chemical labels, the Hazardous Material Identification System (HMIS), and the HMIS color bar. • Read and interpret chemical, product and equipment labels to determine appropriate health and safety considerations. • Identify, describe and demonstrate personal, shop and job site safety practices and procedures. • Understand safe dress and use of relevant safety gear, personal protective equipment (PPE) and ergonomics, e.g., wrist rests, adjustable workspaces, equipment, gloves, proper footwear, earplugs, eye protection and breathing 	30	30

		<p>apparatus, appropriate safe body mechanics, including appropriate lifting techniques and ergonomics.</p> <ul style="list-style-type: none"> • Locate emergency equipment, first aid kit, SDS information directories and emergency action/response plan/escape routes in your lab, shop and classroom, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM), eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches and emergency exits. • Describe safety practices and procedures to be followed when working with and around electricity, e.g., ground fault circuit interrupter (GFCI) and frayed wiring. • Understand how to handle, store, dispose of and recycle hazardous, flammable and combustible materials, according to EPA, OSHA and product specifications. • Understand appropriate workspace cleaning, sanitation, disinfection and sterilization procedures required in specific occupational areas, e.g., Workplace Housekeeping OSHA Regulations. • Complete First Aid and OSHA 10 training 		
Hand & Power Tools	Hand and Power Tools	<ul style="list-style-type: none"> • Recognize and identify some of the basic hand and power tools used in the trade. • State the general rules for properly maintaining all hand and power tools, regardless of type. • Describe the basic procedures for taking care of hand and power tools. • Identify tools pertinent to the electrical trade such as: various meters, battery powered tools (drills, impacts, flashlights, saws, large wire strippers, blowers, etc.), conduit bending equipment(hand, machine and PVC benders), conduit threaders (hand and machine types), propane torches, earthwork tools (shovels, rakes, picks, etc.) • Identify the hand tools commonly used and describe their uses: screwdrivers, pliers, (diagonal cutters, interlocking, needle nose, slip joint, locking, snap ring), combinations, pipes, torques, adjustable, open-end and box end wrenches, punches, chisels, hammers, sockets, extensions, files, snips, hacksaws, and vises. • Demonstrate mastery of tape measures and measurement conversion. • Be familiar with precision measurement tools, dial caliper, digital caliper, micrometers, dimensional gauging, indicator measurement, and data collection. • Identifying and using torque and torque instruments. 	20	25
Reading Electrical Drawings and Schematics and Blueprints	Blueprints Reading	<ul style="list-style-type: none"> • Recognize and identify basic blueprint terms, components, and symbols (isometric, geometric communication, orthographic, schematic) • Relate information on blueprints to actual locations on the print. • Recognize different classifications of drawings. • Interpret and use drawing dimensions. • Describe the types of drawings usually included in a set of plans and list the information found on each type. • Identify the different types of lines used on construction drawings. • Identify selected architectural symbols commonly used to represent materials on plans. 	25	25

		<ul style="list-style-type: none"> • Identify selected electrical, mechanical, and plumbing symbols commonly used on plans. • Identify selected abbreviations commonly used on plans. • Read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings. • State the purpose of written specifications. • Identify and describe the parts of a specification. • Demonstrate or describe how to perform a quantity takeoff for materials. • Identify and use drafting techniques, e.g., lines, letters, symbols. • Sketch a part or idea. • Interpret a drawing schematic. • Utilize scale rulers. 		
Math for the Industry	Contextualized Math for the Industry	<ul style="list-style-type: none"> • Add, subtract, multiply, and divide whole numbers, with and without a calculator. • Use a standard ruler and a metric ruler to measure. • Add, subtract, multiply, and divide fractions. • Convert decimals to percentages and percentages to decimals. • Convert fractions to decimals and decimals to fractions. • Recognize some of the basic shapes used in the industry and apply basic geometry to measure them. • Recognize and use metric units of length, weight, volume, and temperature. • Measure using standards tools. • Understand scale drawing. • Demonstrate estimating principles. • Understand square root and calculating square roots. • Solve one variable equation. • Understand area and volume of rectangles, circles and triangles. • Understand the definition and usage of Pythagorean theorem. • Understand conduit bending math and applicable trigonometry. • Identify steel rules and explain how it is used (10th and 100th, metrics, fractional scales). • Understand dividers and explain its uses. • Explain what the metric system is and why it is important to the trade. • Calculate using metric, linear, square, volume, and weight measurements. • Construct simple geometric figures. • Apply mathematical formulas to solve problems. • Solve linear, area, volume, and angle measurement problems. • Solve percentage problems. • Define and solve ratio and proportion problems. • Calculate selected seam allowances. • Apply standard rules and practices for solving selected field measurement problems. 	50	30
National Electrical Code Regulations	NEC and WAC	<ul style="list-style-type: none"> • Learn the layout and how to navigate of the National Electrical Code (NEC) book. 	20 (40)	20

Washington Administrative Code		<ul style="list-style-type: none"> • Understand the WAC's (Washington Administrative Code) as applied to the electrical trade. • Locate appropriate National Electric Code Amendments. • Understand the WAC Licensing requirements and continuing license renewal requirements. • Understand conductor, raceway and electrical box requirements. • Understand and describe the purpose of ground-fault circuit interrupters (GFCI) and arc-fault circuit interrupters (AFCI) and indicate where they must be installed. • Identify the circuit loads, number of circuits required, and installation requirements. • Learn how to compute branch circuit loads and define branch circuit requirements. • Understand the move to energy conservation- lighting changes/retrofits, motor changes, equipment, efficiencies. 		
Fundamentals of Power Distribution and Transmission	Electrical Power Distribution	<ul style="list-style-type: none"> • Understand electric power distribution. • Explain the electric power distribution process. • Understand transformer theory and transformers. • Discuss the need for electric distribution systems and how they are designed to operate. • Name electric power distribution system equipment and-what the various components do. • Discuss the emerging technologies in electric power distribution, including distribution automation and SmartGrid systems. 	100	50
	Electric Power and Transmission	<ul style="list-style-type: none"> • Understand electric power transmission • Explain the electric power transmission process. • Discuss the application of different electric power transmission principles (including AC vs. DC). • Name electric power transmission equipment and systems. • Discuss the emerging technologies in electric power transmission (including Smart Grid). • Explain ownership/governance of the electric transmission system. • Understands the components and workings of the electric transmission and distribution network • Understand electronic theory and basics to electronics. • Applies direct current (DC) concepts and laws and performs calculation and measurements <ul style="list-style-type: none"> • Including the following: <ul style="list-style-type: none"> • basic electrical circuits such as series and parallel, series-parallel combinations • conductors and insulators • direct current (DC) theory and DC sources (such as ideal voltage and current, non-ideal voltage and current) 	100	60

		<ul style="list-style-type: none"> • electrical laws (such as Ohm's law, Kirchhoff's voltage and current laws) • electron theory • units of electrical measurement (such as ohms, volts, amps, watts, coulombs, joules • voltage, current, resistance and power • Applies alternating current (AC) concepts and laws and performs calculations and measurements including the following: <ul style="list-style-type: none"> • alternating current (AC) theory and AC sources (such as ideal voltage and current, non-ideal voltage and current) • basic electrical circuits such as series and parallel • units of electrical measurement (such as henries, farads, reactance, impedance, inductance and capacitance) • passive components, capacitors and inductors • single-phase versus three -phase • voltage, current, impedance, real, reactive, apparent power and power factor relationships • Understands how electrical current moves through a circuit or a system and how electricity affects a circuit or system. • Understands how to control current and resistance. • Understands the way solid things move and how leverage, force, friction and momentum affect that motion and can solve problems with simple machines, • complex machines and mechanical systems. • Understands the way fluids (liquids and gases such as water and air) act as conductors or insulators • Understands the movement of heat, specifically which substances warm up quickly when heated and which ones warm up more slowly • Understands how specific heat works, including how different materials hold heat for different amounts of time • Understands and applies tag out/lock out procedures 		
Electrical Components and Devices	Motor and Motor Controls	<ul style="list-style-type: none"> • Understand concepts in control system wiring fundamentals, wiring between and outside panels, panel wiring, wire bundling, and experience a project in how to wire an electrical machine. • Demonstrate understanding of electric relay control of AC electric motors found in industrial, commercial, and residential applications. • Understanding of the operation, installation, design, and troubleshooting of AC electric motor control circuits for many common applications. • Demonstrate skills in interpreting schematics, system design, motor start / stop circuits, motor sequence control, reversing motor control, and motor jogging. • Use a Voltmeter to Verify Supply Voltage • Size Circuit Protection • Understand motor theory • Make, Connect and Operate a Simple Motor Control Circuit • Test the Low-Voltage Protection Capabilities of a Manual Starter • Start and Stop a Motor Using a Manual Starter • Set the Trip Level of a Bimetallic Overload 	60	40

		<ul style="list-style-type: none"> ● Select the Correct Heaters for a NEMA Overload ● Connect and Operate a Control Relay in a Circuit ● Connect and Operate a Memory Logic Circuit ● Connect and Operate a Magnetic Motor Starter Connected to a Three-Phase Motor ● Describe the Operation of Three-Phase Power ● Describe the Two Most Common Three-Phase Voltage Systems ● Explain the Function of Neutral ● Describe the Operation of Grounded and Ungrounded Systems ● Describe Two Devices Used to Disconnect Power to a Circuit ● Explain Why Time-Delay Fuses Are Used with Motor Starting Circuits ● Describe the Operation of a Three-Phase Motor ● Describe the Operating Data on a Motor's Nameplate ● Describe Five Functions of Motor Control ● Describe the Four Basic Requirements of a Typical Motor Installation ● Define Motor Controller and Motor Starter ● Describe the Functions of Two Categories of Motor Starters ● Describe the Functions of Two Types of Manual Starters ● Describe the Operation of Two Types of Control Relays and Give an Application of Each ● Describe How Detached Symbology Is Used to Show a Control Relay on a Ladder Diagram ● Describe the Operation of Memory Logic and Give an Application ● Describe the Operation of a Two-Wire Motor Control Circuit and Give an Application ● Describe the Operation of a Three-Wire Motor Control Circuit and Give an Application ● Describe the Operation of a Push-to-Test Pilot Light and Give Its Schematic Symbol ● Describe the function of electrical prints, panels, the wiring between panels, and wire color coding. ● 		
	<p>Programmable Logic Controllers</p>	<ul style="list-style-type: none"> ● Programmable Logic Controller Foundations and Programming Concepts ● Name and explain the basic building blocks of a programmable logic controller (PLC). ● Identify the major advantages in the use of PLCs. ● Identify the major components of a PLC. ● Explain the various modes of operations of a PLC. ● Identify the criteria used in categorizing PLCs including functionality, number of inputs and outputs, cost, and physical size. ● Identify and explain PLC hardware components. ● Identify the input/output (I/O) section of a PLC and field device connections. ● Describe PLC I/O addressing formats. ● Describe the specifications, use and operation of Discrete I/O modules. ● Describe the specifications, use and operation of Analog I/O modules. ● Describe the specifications, use and operation of Specialty I/O modules. 	25	10

		<ul style="list-style-type: none"> • Identify the Central Processing Unit (CPU) of a PLC. • Identify the power supply of a PLC and its specifications. • Identify PLC memory types and designs. • Describe the various Terminal Programming Devices used to program PLCs. • Explain Human Machine Interfaces (HMI's) and their applications. • Demonstrate an understanding of the fundamentals of PLC Logic. • Develop equivalent PLC logic from Logic Gate Circuits derived from Boolean Expressions. • Develop equivalent PLC logic from Boolean Expressions derived from Logic Gate Circuits. • Demonstrate an understanding of the fundamentals of PLC programs and PLC wiring diagrams. • Explain the role of electromagnetic relays and their role in PLC programming and PLC wiring diagrams. • Explain the NO and NC contacts and develop equivalent PLC programming and PLC wiring diagrams. • Develop PLC programming and PLC wiring diagrams using motor starters and contactors. • Develop PLC programming and PLC wiring diagrams using manually operated switches. • Develop PLC programming and PLC wiring diagrams using various sensors. • Develop PLC programming and PLC wiring diagrams from electromagnetic relay logic. • Develop PLC programming and PLC wiring diagrams directly from a narrative description. • Demonstrate PLC control of analog input and output devices. 		
Working with Residential and Small Electrical Systems		<ul style="list-style-type: none"> • Understand circuitry wiring and cable assemblies • Understand conduit and wiring. (conduit bending) • Understand electrical materials • Understand electrical wire (types, installation, NEC conduit fill) • Understand lighting (theory, types, layout/design) • Understand residential circuitry using NM (Romex) cable and wire (Rope) a house, including panel and devices, etc. <p>Understand the move to energy conservation- lighting changes/retrofits, motor changes, equipment, efficiencies.</p>	45	45
Work Site Experiences: Job Shadow, Tours, Internship	Workplace Ethics and Effectiveness	<ul style="list-style-type: none"> • Identify, describe and apply health and safety regulations that apply to specific tasks and jobs. Students must complete a safety credential program, e.g., • Identify and practice professional time-management and attendance behaviors including punctuality, reliability, planning and flexibility. • Identify and practice professional appearance specific to the workplace. • Identify and practice personal hygiene appropriate for duties specific to the workplace. • Identify and wear required safety gear specific to the workplace. • Demonstrate ability (both verbally and non-verbally) to accept direction and constructive criticism and to implement solutions to change behaviors. • Ask appropriate questions to clarify understanding of feedback. 	20	30

		<ul style="list-style-type: none"> ● Analyze own learning style and seek instructions in a preferred format that works best for their understanding (such as oral, written or visual instruction). ● Evaluate assigned tasks for time to completion and prioritization. ● Demonstrate motivation through enthusiasm, engagement, accurate completion of tasks and activities. ● Demonstrate initiative by requesting new assignments and challenges. ● Explain proposed solutions to challenges observed in the workplace. ● Demonstrate the ability to evaluate multiple solutions to problems and challenges using critical reasoning and workplace/industry knowledge and select the best solution to the problem. ● Implement solution(s) to challenges and/or problem(s) observed in the workplace. ● See projects through completion and check work for quality and accuracy. ● Display ethical behavior in use of time, resources, computers and information. ● Identify the mission of the organization and/or department. ● Explain the benefits of a diverse workplace. ● Demonstrate a respect for diversity and its benefit to the workplace. ● Work productively with individuals and in teams. ● Develop positive mentoring and collaborative relationships within work environment. ● Show respect and collegiality, both formally and informally. ● Explain and follow workplace policy on the use of cell phones and other forms of social media. ● Maintain focus on tasks and avoid negative topics or excessive personal conversations in the workplace. ● Negotiate solutions to interpersonal and workplace conflicts. 		
<p>Work Site Experiences: Job Shadow, Tours, Internship</p>	<p>Industry Experience Externship</p>	<ul style="list-style-type: none"> ● Complete a supervised student practicum with a minimum number of electrician job experiences at a qualified industry related site. ● Demonstrate professional behavior/employability skills in a clinical practice <ul style="list-style-type: none"> ○ Demonstrate proper workplace appearance ○ Demonstrate motivation and initiative <ul style="list-style-type: none"> ▪ Evaluate assigned tasks for time to completion and prioritization ▪ Demonstrate initiative by requesting new assignments and challenges ▪ Explain proposed solutions to challenges observed in workplace ▪ Demonstrate ability to evaluate multiple solutions to problems and challenges using critical reasoning and workplace/industry knowledge and select best solution to the problem ○ Demonstrate awareness of workplace culture and policy ○ Demonstrate attendance and punctuality including professional time-management and attendance behaviors as punctuality, reliability, planning and flexibility ○ Demonstrate professional communication (language) <ul style="list-style-type: none"> ▪ Show respect and collegiality, both formally and informally ▪ Accept direction and constructive criticism ○ Interact appropriately with coworkers 	<p>30</p>	<p>150</p>

		<ul style="list-style-type: none"> ○ Explain and follow workplace policy on the use of cell phones and other forms of social media ● Documentation of completion of skills competencies <ul style="list-style-type: none"> ○ Provide weekly documentation of hours at clinical site ○ Documentation of student competencies by instructor using an observation checklist ● Upon completion of hours, job site completes evaluation and returns to instructor ● Assist with and perform projects as identified in the IBEW Apprenticeship program ● Demonstrate job seeking skills 		
Portfolio Presentation	Career Planning	<ul style="list-style-type: none"> ● Complete and present portfolio to community, peers, teachers and administrators. 	5	5

Notes for instructor:

- NCCER book – Your Role in the Green Environment
- Have students fill out a timecard every day listing the topic learned as their ‘job’
- Set up ‘interviews’ to transition from some of the topics, having students tell of what they know regarding the topic
- The better the foundation students have in DC and AC theory, the better prepared they will be for an Apprenticeship
- Be sure to spend time teaching ladder diagrams; this skill is a pre-requisite for the successive course, PLCs.
- Regarding workplace ethics and effectiveness: time management and attendance behaviors are real issues in today’s workforce. If these habits can be instilled in the students at this level, they will be far ahead of most! It really is that simple – show up on time, ready to work and work hard.

Welding Technology/Manufacturing TRI TECH Skills Center Course Outline

1. Career Planning

- Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest;
- Create a personal career portfolio including academic, certification and technical-skill requirement, career opportunities, expected wages, skills and aptitude necessary and the impact of technology on careers of personal interest.
- Determine academic/training or certification requirements for transition from one learning level to the next and explore opportunities for earning credit/certifications in high school such as advanced placement, tech prep, International Baccalaureate, college in the high school, military and apprenticeship opportunities.
- Make oral presentation regarding the career pathway of your choice.
- Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning.
- Compare and contrast at least three careers of interest in regard to salary expectations and education/training costs.
- Prepare a program of study for at least one career of interest
- Apply knowledge gained from individual assessment to a set of goals and a career plan
- Develop strategies to make an effective transition from school to career
- Identify industry certification opportunities

2. Employability

- Demonstrate effective verbal, nonverbal, written, and electronic communication skills;
- Evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites;
- Model characteristics of effective leadership, teamwork, and conflict management;
- Recognize the importance of a healthy lifestyle, including the ability to manage stress;
- Explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population; and
- Complete activities using project- and time-management techniques.
- Identify and model appropriate grooming and appearance for the workplace;
- Demonstrate dependability, punctuality, and initiative;
- Research positive interpersonal skills, including respect for diversity;
- Model appropriate business and personal etiquette in the workplace;
- Exhibit productive work habits, ethical practices, and a positive attitude;
- Demonstrate the ability to work with the other employees to support the organization and complete assigned tasks;
- Demonstrate willingness to learn and further develop skills
- Describe the importance of having a positive attitude and techniques that boost morale
- Show initiative by coming up with unique solutions and taking on extra responsibilities
- Explain the importance of setting goals and demonstrate the ability to set, reach, and evaluate goals
- Explain the importance of taking pride in work accomplished and extrinsic and intrinsic motivators that can be used to increase pride
- Identify how to prioritize work to fulfill responsibilities and meet deadlines;
- Research and compare published workplace policies and procedures;

- Summarize provisions of the Fair Labor Standards Act;
- Describe the consequences of breach of confidentiality

3. Teamwork and Cooperation

- Employ leadership skills to accomplish organizational goals and objectives.
- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
- Conduct and participate in meetings to accomplish work tasks.
- Employ mentoring skills to inspire and teach others.
- Cooperates rather than compete with team members
- Offers/seeks suggestions, opinions, and information to team members.
- Listens to and considers the ideas of team members.
- Supports group decision even if not in total agreement.
- Communicates changes or problems to team members.
- Treat everybody with respect and understanding
- Employ mentoring skills to inspire and teach others.

4. Ethics and Legal responsibilities

- Evaluate and justify decisions based on ethical reasoning.
- Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
- Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
- Interpret and explain written organizational policies and procedures.
- Collaborate with classmates in researching or reviewing an Acceptable Use Policy
- Internet search (optional)
- Responsibilities of Internet use (using the Internet efficiently and ethically for work, identifying the risks of posting personal and

work information on the internet, social networking sites, job search sites, taking measures to avoid internet security risks such as viruses, malware)

- Discuss legal issues associated with locating and retrieving information from the internet
- Understand Acceptable Use Policy, Copyright and Fair Use Laws
- Conduct research on the Internet and correctly identify sources in bibliography
- Utilize information from electronic communication sources
- Understand End User License Agreements (EULA)
- Understand Intellectual Properties rights

5. Occupational and Shop Orientation

- Prepares time or job cards, reports or records.
- Performs housekeeping duties.
- Follows verbal instructions to complete work assignments.
- Follows written instructions to complete work assignments.
- Prepare and maintain accurate, clear, legible, and concise records or job cards
- Justify why it is important to file documents in a timely manner for the benefit of common shop business and planning operations
- Perform proper organization of the shop (e.g., tools, work area, and storage) on a daily basis, according to customer service standards and customer and worker safety standards
- Manage supplies and inventory in a logical and orderly fashion

6. Safety and Health of Welders

- Demonstrates proper use and inspection of personal protection equipment (PPE).
- Demonstrates proper safe operation practices in the work area.
- Demonstrates proper use and inspection of ventilation equipment.
- Demonstrates proper Hot Zone operation.
- Demonstrates proper work actions for working in confined spaces.

- Demonstrates proper use of precautionary labeling and MSDS information.
- Demonstrates proper inspection and operation of equipment used for each welding and thermal cutting process. This is best done as part of the process module/unit for each of the required welding and thermal cutting processes.)
- Follow the safety procedures required for lifting heavy objects.
- Explain the importance of Hazard Communications (HazCom) and safety data sheets (SDSs)
- Describe fire prevention and firefighting techniques.
- Define safe work procedures to use around electrical hazards.
- Wears applicable Personal Protective Equipment (PPE) while conducting, or in the vicinity of welding and cutting activities.
- Follows procedures established using the concepts and requirements from NFPA, ANZI Z49.1 and OSHA General Construction for “Hot Zone” management to ensure the safety of the work area and the general public.
- Is aware of the dangers associated with welding fumes, and uses the best possible means of ventilation available for the capture of welding fumes as close to the source as possible.
- Follows established procedures and policies for implementing of emergency action plans and for the use of safety equipment.
- Performs fire safety inspections of the work area.
- Follows established procedures and policies for working in confined areas.
- Follows written instructions and precautions provided on applicable documentation for materials used in support of welding and cutting activities.
- Is aware of the purpose of precautionary labels and Safety Data Sheets (SDSs) and refers to them for materials used in support of welding and cutting activities.

7. Drawing and Welding Symbol Interpretation

- Interprets basic elements of a drawing or sketch.

- Fabricates parts from a drawing or sketch.
- Recognize and identify basic blueprint terms, components, and symbols.
- Relate information on blueprints to actual locations on the print.
- Recognize different classifications of drawings.
- Interpret and use drawing dimensions.
- Identify and explain the various parts of a welding symbol.
- Identify and explain fillet and groove weld symbols.
- Read welding symbols on drawings, specifications, and welding procedure specifications.
- Interpret welding symbols from a print.
- Draw welding symbols based on the observation of actual welds.
- Identify and explain a welding detail drawing.
- Identify and explain lines, material fills, and sections.
- Identify and explain object views.
- Identify and explain dimensioning.
- Identify and explain notes and bill of materials.
- Interpret basic elements of a welding detail drawing.
- Develop basic welding drawings.
- Apply information found in the information block of the drawing.
- Identify the basic views used in blueprints including assembly, detail and fit-up drawings.
- Identify common types of lines, abbreviations and symbols in accordance with national drawing standards (ANSI).
- Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size or length) in accordance with the current national welding symbol standard AWS A 2.4 current edition.

8. Welding Joint Designs

- Indicating types of welds

- Weld location
- Location significance of arrow
- Fillet welds
- Plug welds
- Spot welds
- Seam welds
- Groove welds
- Flanged welds
- Nondestructive testing symbols
- Joint types
- Welding positions
- Weld size

9. Metal Processing / Shop Equipment

- Hand Sawing / Hand Grinders
- Power Sawing / Band Saw
- Cut Off Saws / Iron Worker
- Contour-Cutting Band saws
- Chisels and Chipping
- Files
- Filing
- Scrapers and Scraping
- Abrasives
- Crane
- Rigging

10. Metals and Metallurgy

- Mechanical properties and structure of Iron
- Mechanical properties and structure of Steel
- Mechanical properties and structure of Steel Alloys
- Mechanical properties and structure of Nonferrous Metals
- Grain formation
- Iron-carbon equilibrium

- Hardening temperature
- Tempering
- Case hardening
- Identify and describe hardening and annealing
- Describe how heat-treating works
- Describe how annealing works.
- Describe how stress hardening works.
- Identify differences in quenching substances.
- Thermal effects of welding
- Welding defects
- Segregation
- Residual welding stresses
- Cracks and voids
- Fixtures and jigs

11. SMAW (Shielded Metal Arc Welding)

- Performs safety inspections of SMAW equipment and accessories.
- Makes minor external repairs to SMAW equipment and accessories.
- Sets up for SMAW operations on carbon steel.
- Operates SMAW equipment on carbon steel.
- Demonstrate ability to correctly set up SMAW power sources, related welding equipment and do basic process and equipment troubleshooting for welding of carbon steel.
- Select correct type of electrode based on carbon steel plate (1/4-inch to 3/8-inch thickness).
 - Prepare carbon steel for welding.
 - Makes fillet weld in all positions on carbon steel.
 - Makes groove welds, in all positions, on carbon steel.
 - Passes SMAW welder performance qualification test (2G and 3G, uphill, limited thickness test plates) on carbon steel.
 - Types of welding current/power
 - Open circuit voltage
 - Operating circuit voltage

- Arc blow
- Types of power sources
- Generators and alternators
- Rectifiers
- Duty cycle
- Welding cables
- Electrode holders
- Work clamps
- Setup
- Functions of the flux
- AWS electrode identification system

12. GMAW-S & GMAW-SP (Gas Metal Arc Welding)

- Performs safety inspections of GMAW equipment and accessories.
- Makes minor external repairs to GMAW equipment and accessories.
- Short Circuiting Transfer (SHT) Sets up for GMAW-S operations on carbon steel.
- (SHT) Operates GMAW-S equipment on carbon steel.
- (SHT) Makes fillet welds in the horizontal and vertical positions on carbon steel.
- (SHT) Makes groove welds in the horizontal and vertical positions on carbon steel.
- (SHT) Passes GMAW-S welder performance qualification test on carbon steel.
- Spray Transfer (ST) Sets up for GMAW (spray) operations on carbon steel.
- (ST) Operates GMAW (spray) equipment on carbon steel.
- (ST) Makes fillet welds in the horizontal and vertical positions on carbon steel.
- (ST) Makes groove welds in the horizontal and vertical position on carbon steel.
- (ST) Passes GMAW (spray) welder performance qualification test on carbon steel.

- Identify short circuiting, globular, spray and pulsed transfer welding of carbon steel.
- Select correct type of filler metal, type of shielding gas, amperage and voltage based on carbon steel plate (1/16-inch to 1/4- inch thickness).
- Prepare the carbon steel for welding.
- Demonstrate ability to correctly set up FCAW power sources, related welding equipment and do basic process and equipment troubleshooting.

13. FCAW-G/GM, FCAW-S (Flux Cored Arc Welding)

- Performs safety inspections of FCAW equipment and accessories.
- Makes minor external repairs to FCAW equipment and accessories.
- Gas Shielded (GS) Sets up for FCAW-G/GM operations on carbon steel.
- (GS) Operates FCAW-G/GM equipment on carbon steel.
- (GS) Makes fillet welds in the horizontal and vertical positions on carbon steel.
- (GS) Makes groove welds in the horizontal and vertical positions on carbon steel.
- (GS) Passes FCAW-G/GM welder performance qualification test on carbon steel
- (GS) Self-Shielded (SH) Sets up for FCAW-S operations on carbon steel.
- (SH) Operates FCAW-S equipment on carbon steel.
- (SH) Makes fillet welds in the horizontal and vertical positions on carbon steel.
- (SH) Makes groove welds in the horizontal and vertical positions on carbon steel.
- (SH) Passes FCAW-S welder performance qualification test on carbon steel.

14. GTAW (Gas Tungsten Arc Welding)

- Performs safety inspections of GTAW equipment and accessories.

- Makes minor external repairs to GTAW equipment and accessories.
- Carbon Steel (CS) Sets up for GTAW operations on carbon steel.
- (CS)Operates GTAW equipment on carbon steel.
- (CS)Makes fillet welds in all positions on carbon steel.
- (CS)Makes groove welds in all positions on carbon steel.
- (CS)Passes GTAW welder performance qualification test on carbon steel.
- Austenitic Stainless Steel (ASS) Sets up for GTAW operations on austenitic stainless steel.
- (ASS)Operates GTAW equipment on austenitic stainless steel.
- (ASS)Makes fillet welds in the 2F, and 3F positions, on austenitic stainless steel.
- (ASS)Makes groove welds in the 2G and 3G positions, on austenitic stainless steel.
- (ASS)Passes GTAW welder performance qualification test on austenitic stainless steel.
- Aluminum (AL) Sets up for GTAW operations on aluminum.
- (AL) Operates GTAW equipment on aluminum.
- (AL) Makes fillet welds in the 2F and 3F positions, on aluminum.
- (AL) Makes groove welds in the 2G position, on aluminum.
- (AL) Passes GTAW welder performance qualification test on aluminum.
- Demonstrate ability to correctly set up GTAW power sources, related welding equipment and do basic process and equipment troubleshooting for regular and pulsed welding of aluminum, stainless steel and/or carbon steel.
- Select the correct type of tungsten and/or filler metal based on aluminum, stainless steel or carbon steel sheet and/or plate (1/16-inch to 1/4-inch thickness).
- Prepare aluminum, stainless steel and/or carbon steel for welding.
- Tungsten
- Type of tungsten
- Heat distribution

- Shaping the tungsten
- GTA Welding equipment
- Types of welding currents
- Shielding gases
- Remote controls
- Torch Angle
- Tungsten Contamination
- Current setting
- Gas flow
- Filler rod manipulation

15. OFC (Manual Oxyfuel Cutting)

- Performs safety inspections of manual OFC equipment and accessories.
- Makes minor external repairs to manual OFC equipment and accessories.
- Sets up for manual OFC operations on carbon steel.
- Operates manual OFC equipment on carbon steel.
- Performs straight, square edge cutting operations, in the flat position, on carbon steel.
- Performs shape, square edge cutting operations, in the flat position, on carbon steel.
- Performs straight, bevel edge cutting operations, in the flat position, on carbon steel.
- Performs scarfing
- Fuel gases
- Flame rate of burning
- Acetylene
- Liquefied fuel gases
- Methylacetylene-propadiene
- MAPP
- Propane and Natural Gas
- Hydrogen

- Filler Metals
- Pressure Regulators
- Welding and cutting torches
- Welding and heating tips
- Hoses and fittings
- Backfires and flashbacks
- Types of flames
- Leak detection
- Manifold systems

16. OFC (Mechanized Oxyfuel Gas Cutting)

- Performs safety inspections of mechanized OFC equipment and accessories.
- Makes minor external repairs to mechanized OFC equipment and accessories.
- Sets up for mechanized OFC operations on carbon steel.
- Operates mechanized OFC equipment on carbon steel.
- Performs straight, square edge cutting operations in the flat position, on carbon steel.
- Performs straight, bevel edge cutting operations in the flat position, on carbon steel.

17. PAC (Plasma Arc Cutting)

- Performs safety inspections of manual PAC equipment and accessories.
- Makes minor external repairs to manual PAC equipment and accessories.
- Sets up for manual PAC operations on carbon steel, austenitic stainless steel, and aluminum.
- Operates manual PAC equipment on carbon steel, austenitic stainless steel, and aluminum.
- Performs straight, square edge cutting operations, in the flat position, on carbon steel, austenitic stainless steel, and aluminum.

- Performs shape, square edge cutting operations, in the flat position, on carbon steel, austenitic stainless steel and aluminum.

18. CAC-A (Manual Air Carbon Arc Cutting)

- Performs safety inspections of manual CAC-A equipment and accessories.
- Makes minor external repairs to manual CAC-A equipment and accessories.
- Sets up for manual CAC-A scarfing and gouging operations on carbon steel.
- Operates manual CAC-A equipment on carbon steel.
- Performs scarfing and gouging

19. Welding Inspection and Testing

- Demonstrate knowledge of visual inspection
- Examine and measure undercut.
- Identify Weldment Discontinuities.
- Measure fillet size.
- Examine and measure weld reinforcement
- Determine acceptability of welded samples in accordance with provided acceptance criteria.
- Examines cut surfaces and edges of prepared base metal parts.
- Examines tacks, root passes, intermediate layers, and completed welds.

20. Math and Measurements for Welding (Weld Cost)

- Add, subtract, multiply, and divide four-digit whole numbers, fractions, decimals, metric and percentages with the use of a calculator.
- Add, subtract, multiply, and divide four-digit numbers without the use of a calculator.
- Apply basic math function to solve problems.
- Solve basic welding fabrication math problems.
- Create and interpret basic graphs and charts commonly used in manufacturing.
- Match measurement activities to manufacturing process.
- Select and use appropriate measurement techniques and instruments.
- Describe measurements' role in manufacturing.
- Distinguish between direct and calculated measurements.
- Compute calculated measurements.
- Demonstrate proper general measurement techniques.
- Demonstrate proper precision measurement techniques.
- Describe the appropriate application and use of precision measurement in manufacturing.
- Explain calibration requirements of various precision instruments.
- Illustrate measurement differences when taken with calibrated and non-calibrated instruments.
- Match appropriate measurement tools with various types of measurement requirements.
- Demonstrate proper measurement tool usage.
- State selection criteria for measurement tools.
- Convert between U.S. and metric measurement systems.
- Convert fractional measurements to decimal measurement.
- Compute within measurement systems.
- Interpret results of measurements and calculations.
- Distinguish between general and precision measurement.
- Distinguish between U.S. and metric measurement systems.
- Solve problems using formulas

- Measure parts using an engineer scale (1/50th scale), fractional scale, metric scale, vernier caliper, micrometer.
- Develop drawings utilizing measurements.
- Solve problems using algebra
- Solve problems using geometry
- Solve problems using trigonometry
- Convert decimals to percentages and percentages to decimals.
- Convert fractions to decimals and decimals to fractions.
- Explain what the metric system is and how it is important in the production trade.
- Recognize and use metric units of length, weight, volume, and temperature.
- Recognize some of the basic shapes used in the production industry and apply basic geometry to measure them.
- Calculate the area and volume of various geometric shapes.
- Create a Bill of Materials

21. Soldering, Brazing and Braze Welding

- Soldering and brazing advantages
- Physical properties of the joint
- Fluxes
- Soldering and brazing methods
- Filler metals
- Joint design
- Building up surfaces and filling holes
- Soldering

22. Welding Positions and Terminology (Fabricating Technics)

- Start, stop and restart stringer beads in the flat, horizontal, vertical up and down and overhead positions.
- Weld a pad with a multiple pass weld in the flat, horizontal, vertical up and down and overhead positions.
- Weld a lap joint with a single pass, 2F, 3F up and down positions.
- Weld a lap joint 2F, 3F, vertical up and down.
- Weld a T-joint with a single-pass, fillet weld in 2F, 3F and down and overhead positions.
- Weld a T-joint with a multiple-pass, fillet weld in the flat, horizontal, vertical up and down.
- Weld a butt joint with a single-pass, square groove weld in the flat, horizontal, vertical up and down and overhead positions.
- Weld a butt joint with a partial joint penetration, single pass, double V-groove weld in the flat, horizontal, vertical up and down and overhead positions.
- Weld a butt joint with a multiple pass, V-groove weld on in the flat, horizontal, vertical up and down and overhead positions.
- Weld a butt joint with complete joint penetration, multiple pass, double groove weld in the flat, horizontal, vertical up and down and overhead positions.
- Weld 2- to 8-inch diameter, schedules 40 to 80 pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions.
- Lay out, weld, cut and prepare coupons for evaluation.



Rec 12/03/2021 AN



NORTHWEST LABORERS-EMPLOYERS TRAINING TRUST FUND

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December 3, 2021

Teri Gardner 12-6-2021

Washington State Apprenticeship and Training Council:

It is my pleasure to write a letter of support of Tri-Tech Skill Center located in Kennewick Washington.

Rojo Daniel, Prieto Miguel are some of the current apprentices from the Skill Center who are now indenture into the NWLETT program, Tri-Tech Skill Center does a terrific job exposing students to the industry.

Through the course of the school year, Tri-Tech invites the NWLETT program to come and speak with their students and when possible their students come to our training facility in Pasco WA. Where they get to spend a few hours with actual apprentices who are taking their RSI.

In conclusion, I fully support the efforts of Tri-Tech. Any program that can help students make a good decision on their future such as Tri-Tech is doing, can only benefit our community and help various register apprenticeship programs obtain participants.

Sincerely

Luis Licea
Apprenticeship Coordinator
Northwest laborers



LU 112-NECA Electrical JATC

Rec 12/02/2021

AN

8340 West Gage Boulevard – Kennewick, WA 99336

Phone (509) 783-0589 Fax (509) 783-6721

Kris Tuura – Training Director

November 15, 2021

To Whom It May Concern,

Our electrical apprenticeship and training program is currently working with Tri-Tech Skills Center in Kennewick, Washington and our goal is to help the students in their electrical program meet the entrance requirements for our apprenticeship program.

Our JATC has approved Standards in Washington and Oregon for three electrical apprenticeship programs. In addition to Tri-Tech, we work with other Apprentice Preparation programs such as Yakima Valley Technical Skills Center in Yakima, Washington. We are pleased to report that several of the high school participants have been successful in obtaining electrical apprenticeships in our program and obtained journey-level status.

One quality example is a skills center graduate himself by the name of Marcus Burleson, who successfully completed his electrical apprenticeship with our program and reached journey-level status, plus achieving a Master Electrician license in Washington and a General Supervising Electrician license in Oregon. He became one of our full-time electrical apprenticeship instructors and is currently a curriculum specialist for our national training program. He also sits on the Advisory Committees for some of the local schools and technical centers.

We believe that Tri-Tech has the potential to be a valuable service to the students it serves, as well as providing an Apprenticeship Preparation Program for apprenticeship programs in SE Washington. Our apprenticeship program is looking forward to continuing our partnership with Tri-Tech for the betterment of our students in creating real and meaningful family wage careers for tomorrow's workers.

If you have any questions or require further information, please contact the Training Center Office at 509-783-0589.

Sincerely,

Kristopher Tuura
Training Director