LANCASTER COUNTY
CAREER & TECHNOLOGY
CENTER

Electro-Mechanical Engineering Technology

Available Certifications:

OSHA Certification
AMIST Certification
EPA 608 Refrigerant Certification

Complete Task List:

Task Number	Description	Hours	Level
**State Approved Program of Study*			
100	Technical Reports		
101	Complete technical reports.		
102	Identify the common components of technical documents.		
103	Maintain a daily journal or timecard.		
200	Safety in the Laboratory		
201	Practice accident prevention.		
202	Practice safe work habits.		
203	Use hand tools.		
204	Use portable power tools.		
205	Use a drill press.		
206	RESERVED		
207	Identify electric shock hazards.		
208	RESERVED		
209	Use fire extinguishers for different classes of fires.		
210	Collect Safety Data Sheets (SDS) information.		
211	Follow arc flash protection and National Fire Protection Administration 70E.		
212	Execute lock out/tag out procedure.		
300	Electrical Symbols on Blueprints and Schematics		
301	Interpret electrical symbols, notes, details, and components on schematics.		
302	Draw schematics for electrical circuits.		
400	Basic Electricity		
401	RESERVED		
402	Describe the application of a magnetic force.		
403	Describe the atomic structure for materials.		
404	Describe the direction of electron flow in circuits.		
405	List the effect of electric current flow.		
406	Construct simple circuits.		
407	Define voltage, current, resistance, and power.		
408	RESERVED		
409	RESERVED		
410	Describe the characteristics and purposes of good conductors of electricity.		
411	Use prefixes in the metric system of measurement.		
412	RESERVED		
413	Follow Ohm s law.		
414	Follow Watt s law.		
500	Electrical Systems Measurements		

Task Number	Description	Hours	Level
501	Use an analog and a digital multimeter to measure voltage, amperage, and resistance.		
502	Use a non-contact voltage tester to detect voltage.		
503	Perform a continuity test.		
600	National Electric Code (NEC)		
601	Follow regulations for wiring.		
602	Follow NEC code for sizes and types of wire conductors, raceways, and boxes.		
603	Follow NEC rules for grounding and bonding.		
604	Follow NEC rules for over-current protection devices.		
605	Locate the NEC code for motor circuit wiring.		
606	Use the NEC reference book to locate regulations for industrial electrical installations.		
700	Electrical Resistance		
701	Define resistance.		
702	Identify resistor materials.		
703	Describe how length and thickness of wire affect resistance.		
704	RESERVED		
705	Calculate resistance of a wire.		
706	RESERVED		
707	Explain power and heat dissipation in a resistor.		
708	RESERVED		
709	RESERVED		
710	Identify components of a potentiometer and rheostat.		
711	RESERVED		
712	RESERVED		
713	RESERVED		
714	RESERVED		
715	Identify values for color-coded resistors.		
716	RESERVED		
800	Direct Current (DC) Motors		
801	RESERVED		
802	Apply the theory of operation of a direct current motor.		
803	Operate and test a series, shunt, and compound direct current motor.		
804	RESERVED		
805	Perform calculations for horsepower, speed, and torque for direct current motors.		
806	Measure performance and efficiency of a direct current motor.		
807	Use technical terms to describe the construction of direct current motors.		
808	Determine the operations of variable speed control for direct current motors.		
900	Inductance and Capacitance		
901	Connect a capacitor in a circuit.		
902	Calculate the time required to charge and discharge a capacitor.		

Task Number	Description	Hours	Level
903	Identify capacitive and inductive circuits.		
904	Calculate total capacitance and inductance of series and parallel circuits.		
905	Perform calculations for capacitive and inductive reactance.		
906	Analyze the effect of an inductor in a direct current and alternating current circuit.		
907	Analyze the effect of a capacitor in a direct current and alternating current circuit.		
1000	Alternating Current (AC) Motors		
1001	Explain the theory of operation of alternating current motors.		
1002	Calculate the synchronous speed of an alternating current motor.		
1003	RESERVED		
1004	Connect and operate split-phase, capacitor-start, capacitor-run, and dual capacitor motors.		
1005	Reverse the rotation of a split phase, capacitor-start, capacitor-run, and dual capacitor motors.		
1006	RESERVED		
1007	Determine operating characteristics of universal motors.		
1008	Connect and operate a three-phase, squirrel cage motor.		
1009	Reverse the rotation of a three-phase motor.		
1100	Series-Parallel Circuits		
1101	Build and test a series circuit.		
1102	Build and test a parallel circuit.		
1103	Build and test a series/parallel circuit.		
1104	Troubleshoot series and parallel circuits.		
1105	Calculate voltage, current, and resistance.		
1106	Measure voltage, current, and resistance.		
1200	Electric Motor Controls		
1201	Identify symbols and terms used in electromechanical motor control circuits.		
1202	Identify relays, contactors, and motor starters.		
1203	Read schematic wiring diagrams of motors and their controls.		
1204	Wire a simple two- and three-wire motor control circuit.		
1205	Wire a reversing starter.		
1206	Wire multiple push button/jogging control circuits.		
1207	Wire sequential control circuits.		
1208	Wire and test electrical control circuits.		
1209	Perform preventive maintenance and troubleshooting on motor controls.		
1210	RESERVED		
1211	RESERVED		
1212	Use conductor ampacity to select wire size and wire type for a specific wiring application.		
1213	Label control and power wiring.		
1214	RESERVED		

Task Number	Description	Hours	Level
1215	Connect and operate alternating current and direct current variable speed drives.		
1300	Transformers		
1301	Connect and operate a transformer		
1302	Calculate the voltage-and-turns ratio.		
1303	Connect a step-up and a step-down transformer in a circuit.		
1304	Identify transformer windings and related output voltages.		
1305	Calculate volt-amps of a single-phase and three-phase transformer.		
1306	Measure single-phase transformer voltage and currents.		
1307	Measure series/parallel transformer voltages and currents.		
1308	Demonstrate knowledge of three-phase transformers.		
1309	Wire and analyze three-phase transformers.		
1400	Soldering Techniques		
1401	Use and care for soldering equipment		
1402	Implement soldering techniques for splicing conductors.		
1403	Implement soldering techniques for terminals.		
1404	Remove and install components on a printed circuit board.		
1500	Troubleshoot and Repair Electrical Devices		
1501	Troubleshoot and repair motor controls.		
1502	Troubleshoot and replace relays.		
1503	Troubleshoot and replace sensors.		
1504	Troubleshoot and replace limit switches.		
1505	Troubleshoot and replace power supplies.		
1506	RESERVED		
1507	Troubleshoot alternating current and direct current variable speed drives.		
1600	Basic Electronics		
1601	Interpret electronic symbols shown on diagrams and schematics.		
1602	Identify the function of diodes.		
1603	Identify the function of Zener diodes.		
1604	Identify the function of transistors.		
1605	Identify the function of power supplies.		
1606	Identify the function of filters.		
1607	Identify the function of half-wave, full-wave, and three-phase rectifiers.		
1608	Identify the function of thyristors.		
1609	Identify the function of single-phase and three-phase inverters.		
1610	RESERVED		
1611	RESERVED		
1700	Basic Logic Functions		
1701	RESERVED		
1702	Convert between binary, BCD, octal, hexadecimal, and decimal number systems.		
1703	RESERVED		

Task Number	Description	Hours	Level
1704	RESERVED		
1705	RESERVED		
1706	Construct logic circuits containing and, or, nand, nor, and not gates.		
1707	Create truth tables for and, or, nand, nor, and not logic.		
1708	RESERVED		
1800	Programmable Logic Controls (PLCs)		
1801	Explain where programmable logic control (PLC) networks may be used in the manufacturing process.		
1802	Identify the parts and operating principles of PLCs.		
1803	Use number systems and codes for PLCs.		
1804	Create a relay logic diagram.		
1805	Create PLC logic gate functions in PLCs.		
1806	Explain PLC logic and math functions.		
1807	Explain PLC timer and counter functions.		
1808	Explain PLC jump, compare, and sub-routine functions.		
1809	Edit PLC programs.		
1810	Troubleshoot a PLC system.		
1900	Mechanical Power Transmission Systems		
1901	Use vocabulary words and terms associated with the fundamental principles of the trasmission of mechanical power.		
1902	Construct simple machines and use them to illustrate mechanical principles.		
1903	Lubricate bearings.		
1904	Install and adjust belt, chain, and gear drives.		
1905	Use brakes and clutches.		
1906	RESERVED		
1907	Set and adjust mechanical stops.		
1908	Calculate speed and torque rates of mechanical equipment components.		
2000	Troubleshooting and Repair Mechanical Power Transmission Systems		
2001	RESERVED		
2002	RESERVED		
2003	RESERVED		
2004	RESERVED		
2005	RESERVED		
2006	RESERVED		
2007	Troubleshoot and repair or replace speed-reduction units.		
2008	Troubleshoot and repair or replace clutches.		
2009	RESERVED		
2010	RESERVED		
2100	Fluid Power Systems		
2101	Interpret electrical and electronic control circuit symbols and schematics for hydraulic systems.		
2102	RESERVED		

Task Number	Description	Hours	Level
2103	Identify fundamentals of hydraulics.		
2104	Connect and operate various pumps.		
2105	Identify types of hydraulic fluid transmission and conditioning.		
2106	Measure oil flow and oil pressure.		
2107	Operate manual and pilot operated directional control valves.		
2108	RESERVED		
2109	RESERVED		
2110	Construct, test and troubleshoot hydraulic control circuits.		
2111	RESERVED		
2112	RESERVED		
2113	RESERVED		
2114	RESERVED		
2115	RESERVED		
2116	RESERVED		
2117	RESERVED		
2118	RESERVED		
2119	RESERVED		
2120	RESERVED		
2121	Perform adjustments to control oil temperature and pressure.		
2122	Conduct routine preventive maintenance on hydraulic equipment in accordance with manufacturer instructions.		
2123	Identify electrical symbols/schematics for pneumatics.		
2124	Apply the fundamental principles of pneumatics.		
2125	Describe the characteristics of air compressors.		
2126	Identify systems used for the distribution and conditioning of air.		
2127	Measure and control air flow and air pressure.		
2128	Identify pneumatic actuators.		
2129	Operate and explain mechanical devices that operate on air pressure.		
2130	Construct, test, and troubleshoot a pneumatic circuit.		
2131	Analyze pneumatic circuits.		
2132	Identify where electronic switches and sensors may be found in pneumatic systems.		
2133	Interpret electric control circuits and devices in pneumatic systems.		
2134	Sketch flow path symbols and air logic schematics.		
2135	Interpret flow path symbols and air logic schematics.		
2136	Select and use properly sized pneumatic piping.		
2137	Use dampers, thermostats, switches, pneumatic positioners, linkage assembles and accessories in pneumatic systems.		
2200	Troubleshoot and Repair Fluid Power Systems and Their Components		
2201	RESERVED		
2202	RESERVED		
2203	RESERVED		

Task Number	Description	Hours	Level
2204	Install, troubleshoot, repair or replace, and adjust pressure regulators.		
2205	Install, troubleshoot, and repair or replace airlines.		
2206	Install, troubleshoot, repair or replace, and adjust pumps.		
2207	Install, troubleshoot, and repair or replace gauges.		
2208	Install, troubleshoot, repair or replace, and adjust cylinders.		
2209	Install, troubleshoot, and repair or replace filters.		
2210	Install, troubleshoot, repair or replace and adjust control valves.		
2211	Install, troubleshoot, and repair or replace actuators.		
2212	Install, troubleshoot, repair or replace, and adjust pressure switches.		
2213	Install, troubleshoot, repair or replace, and adjust relays.		
2214	RESERVED		
2215	RESERVED		
2216	Conduct routine preventive maintenance on pneumatic equipment in accordance with manufacturer instructions.		
2217	Install, troubleshoot, and repair or replace, hydraulic lines.		
2218	Install, troubleshoot, repair or replace, and adjust hydraulic pumps.		
2219	Install, troubleshoot, and repair or replace hydraulic gauges.		
2220	Install, troubleshoot, and repair or replace hydraulic filters.		
2221	Install, troubleshoot, and repair or replace hydraulic directional control valves.		
2222	Install, troubleshoot, repair or replace, and adjust hydraulic pressure control valves.		
2300	Robotics		
2301	Follow safety rules and regulations for working around robots.		
2302	Use vocabulary words and terms specific to robotics.		
2303	Identify major systems of a robot.		
2304	Identify a robots work envelope in a manufacturing cell.		
2305	RESERVED		
2306	Determine the operation of a robot s drive system.		
2307	Determine the mobility of an industrial robot.		
2308	Program a robot.		
2309	Use a robot for industrial applications.		
2400	Works Cells in a Manufacturing System		
2401	Identify the fundamental operating principles used in flexible manufacturing systems.		
2402	RESERVED		
2500	Raceway Systems		
2501	Cut, bend, and install conduit or tubing.		
2502	Install raceway or wire duct.		
**Local Task List*			
VA3513	13.2.11.A- Apply effective speaking and listening skills used in a job interview.		

Task Number	Description	Hours	Level
VA3514	13.2.11.B- Apply research skills in searching for a job. (CareerLink, O-NET, Networking, Newspapers, Professional Associations, Reource Books (OOH), etc.		
VA3515	13.2.11.C-Develop and assemble, for career portfolio placement, career acquisition documents, such as, but not limited to: job application, letter of appreciation, Cover Letter, Resume, Post-Secondary Application, etc.		
VA3516	13.2.11.E- Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: Communication, Health and Safety, Resilience, Integrity, Problem Solving, Teamwork and Communication.		
VA3517	13.3.11.A- Evaluate personal attitudes and work habits that support career retention and advancement, with focus on Resilience, Integrity, Problem Solving, Communication, Teamwork.		
VA3518	13.3.11.B-Evaluate team member roles and describe and illustrate active listening techniques: clarifying, encouraging, reflecting, restating, and summarizing.		
VA3519	13.3.11.C- Evaluate conflict resolution skills as they related to the workplace.: constructive criticism, group dynamics, managing leaderships, mediation, negotiation, problem solving.		
VA3520	13.3.11.D- Develop a personal budget based on career choice, such as but not limited to : fixed/variable expenses, gross pay, net pay, saving, taxes.		