

ELECTROMECHANICAL ENGINEERING TECHNOLOGY



Program / Hours: CIP 15.0403 – 2 Year Program

Course Description: A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in developing and testing automated, servomechanical, and other electromechanical systems. Includes instruction in prototype testing, manufacturing and operational testing, systems analysis and maintenance procedures, and report preparation.

Learning Activities / Modes of Assessment:

- Small Group
- Large Group
- Independent Work
- One-on-One
- Classwork Activities
- Presentations
- Research Projects
- Research Papers
- Technology Use
- Tests and Quizzes

Individual Resources:

- Textbooks
- Workbooks
- Online Resources
- PowerPoint Presentations
- Computer Applications (Simulation + Amatrol + Careersafe)
- Proprietary Allen -Bradley Software
- Electromechanical Technology Milwaukee and other Equipment and Tools
- Electromechanical Technology AMATROL & FESTO Lab Simulations

Year / MP	Task #	K - Know	U - Understand	D - Do
Yr 1- MP 1	101	Complete technical reports.	Understand the importance of completing technical reports clearly and accurately.	Complete a basic technical report using proper information and format.
Yr 1 – MP 1	102	Identify the common components of technical documents.	Understand how technical documents are organized and why each part is important.	Identify and explain the main parts of a technical document.
Yr 1- MP 1	103	Maintain a daily journal or timecard.	Understand the importance of keeping accurate daily records of work and time.	Complete a daily journal or timecard accurately and on time.
Yr 1- MP 1	201	Practice accident prevention.	Understand the importance of preventing workplace accidents through proper safety procedures.	Identify potential hazards and demonstrate safe practices.
Yr 1 – MP 1	202	Practice safe work habits.	Understand how safe work habits reduce risks and injuries.	Explain consistent safe work habits during lab activities.
Yr 1- MP 1	203	Use hand tools.	Understand how to safely and effectively use hand tools.	Use hand tools correctly
Yr 1 – MP 1	204	Use portable power tools.	Understand how to operate portable power tools safely.	Operate a portable power tool correctly with PPE.
Yr 1- MP 1	205	Use a drill press.	Understand proper setup, operation, and safety procedures for the drill press.	Set up and safely drill a hole using a drill press.
Yr 1 – MP 1	209	Describe the use of fire extinguishers for different classes of fires.	Understand the different classes of fires and which extinguisher to use for each.	Use a fire extinguisher correctly
Yr 1- MP 1	210	Collect Safety Data Sheets (SDS) information.	Understand how to find and interpret SDS information for safety.	Locate and explain key sections of an SDS for a specific material.
Yr 1 – MP 1	211	Follow arc flash protection and National Fire Protection Administration 70E.	Understand NFPA 70E arc flash requirements and safety procedures.	Demonstrate correct selection and use of PPE for arc flash protection.
Yr 1- MP 1	212	Execute lock out/tag out procedure.	Understand why and how to safely perform lockout/tagout procedures.	Perform a complete lockout/tagout on a piece of equipment.
Yr 1 – MP 1	301	Interpret electrical symbols, notes, details, and components on schematics.	Understand how to read and interpret electrical schematics.	Identify components and connections on a schematic diagram.
Yr 1- MP 1	302	Draw schematics for electrical circuits.	Understand how to represent circuits using proper symbols and layout.	Create a clear and accurate schematic drawing.
Yr 1 – MP 1	402	Describe the application of a magnetic force.	Understand how magnetic forces apply in electrical systems.	Explain real-world examples of magnetic force applications.

Yr 1- MP 1	403	Describe the atomic structure for materials.	Understand how atomic structure affects electrical properties.	Draw the atom and tell how it conducts electricity.
Yr 1 – MP 1	404	Describe the direction of electron flow in circuits.	Understand conventional and electron flow in electrical circuits.	Draw and explain direction of current in a basic circuit.
Yr 1- MP 1	405	List the effect of electric current flow.	Understand what happens when current flows through a conductor.	List and explain effects such as heat, light, and magnetic fields.
Yr 1 – MP 1	406	Construct simple circuits.	Understand the components and connections required to build basic circuits.	Build a working simple electrical circuit.
Yr 1- MP 1	407	Define voltage, current, resistance, and power.	Understand the basic electrical terms and their relationships.	Correctly define and give examples of each term.
Yr 1 – MP 1	410	Describe the characteristics and purposes of good conductors of electricity.	Understand why certain materials are good conductors.	Identify good conductors and explain their applications.
Yr 1- MP 1	411	Use prefixes in the metric system of measurement.	Understand metric system prefixes and how they apply in electrical calculations.	Convert and use metric prefixes correctly in calculations.
Yr 1 – MP 1	413	Apply Ohm's law.	Understand the relationship between voltage, current, and resistance.	Solve Ohm's law problems.
Yr 1- MP 1	414	Apply Watt's law.	Understand the relationship between power, voltage, and current.	Solve Watt's law problems.
Yr 1 – MP 1	415	Build and test a series circuit.	Understand how series circuits operate and behave.	Construct and measure values in a series circuit.
Yr 1- MP 1	416	Build and test a parallel circuit.	Understand how parallel circuits operate and behave.	Construct and measure values in a parallel circuit.
Yr 1 – MP 1	417	Build and test a series/parallel circuit.	Understand how series/parallel circuits operate and behave.	Construct and measure values in a series/parallel circuit.
Yr 1- MP 1	418	Troubleshoot series and parallel circuits.	Understand how to identify and fix common issues in circuits.	Use testing tools to locate and correct faults in circuits.
Yr 1 – MP 1	419	Calculate voltage, current, and resistance.	Understand how to calculate electrical values in circuits.	Do correct electrical calculations using formulas.
Yr 1- MP 1	501	Use an analog and a digital multimeter to measure voltage, amperage, and resistance.	Understand how to properly use multimeters for measurements.	Measure voltage, current, and resistance accurately.
Yr 1 – MP 1	502	Use a non-contact voltage tester to detect voltage.	Understand the purpose and function of non-contact voltage testers.	Check for live voltage safely.

Yr 1 – MP 1	503	Perform a continuity test.	Understand the importance of continuity testing for safe circuits.	Use a meter to test circuit continuity.
Yr 1 – MP 2	601	Follow regulations for wiring.	Understand basic wiring regulations and safety requirements.	Apply wiring regulations during electrical installations.
Yr 1 – MP 2	602	Follow NEC code for sizes and types of wire conductors, raceways, and boxes.	Understand how NEC code defines wire sizing and types of raceways and boxes.	Select proper wire sizes and raceways following NEC standards.
Yr 1 – MP 2	603	Follow NEC rules for grounding and bonding.	Understand the purpose and procedures of grounding and bonding.	Show how to do grounding and bonding the right way according to NEC.
Yr 1 – MP 2	604	Follow NEC rules for over-current protection devices.	Understand the role of over-current protection and its NEC requirements.	Select and apply the correct over-current protection devices.
Yr 1 – MP 2	605	Locate the NEC code for motor circuit wiring.	Understand how to use NEC to find motor circuit requirements.	Locate and reference NEC motor wiring sections correctly.
Yr 1 – MP 2	606	Use the NEC reference book to locate regulations for industrial electrical installations.	Understand how to navigate the NEC for industrial applications.	Locate and apply NEC industrial installation rules.
Yr 1 – MP 2	703	Describe how length, thickness, temperature, and material of a conductor affect resistance.	Understand how physical factors affect resistance in a conductor.	Explain how changing conductor properties alters resistance.
Yr 1 – MP 2	710	Explain the differences and uses of a potentiometer and rheostat.	Understand how potentiometers and rheostats function and their applications.	Compare and demonstrate use cases for potentiometers and rheostats.
Yr 1 – MP 2	715	Identify values for color-coded resistors.	Understand resistor color code standards.	Read and identify resistor values using color codes.
Yr 1 – MP 2	901	Connect a capacitor in a circuit.	Understand how capacitors work and how they are connected in circuits.	Correctly wire a capacitor into a circuit.
Yr 1 – MP 2	902	Calculate the time required to charge and discharge a capacitor.	Understand time constant calculations for charging and discharging.	Perform calculations using RC time constant formulas.
Yr 1 – MP 2	903	Identify capacitive and inductive circuits.	Understand characteristics of capacitive and inductive circuits.	Identify circuit types based on their components.
Yr 1 – MP 2	904	Calculate total capacitance and inductance of series and parallel circuits.	Understand how to calculate total values in series and parallel configurations.	Perform capacitance and inductance calculations correctly.
Yr 1 – MP 2	905	Perform calculations for capacitive and inductive reactance.	Understand how reactance is related to frequency and component values.	Calculate capacitive and inductive reactance accurately.
Yr 1 – MP 2	906	Analyze the effect of an inductor in a direct current and alternating current circuit.	Understand how inductors behave under DC and AC conditions.	Explain and demonstrate inductor effects in DC and AC circuits.

Yr 1 – MP 2	907	Analyze the effect of a capacitor in a direct current and alternating current circuit.	Understand how capacitors behave under DC and AC conditions.	Explain and demonstrate capacitor effects in DC and AC circuits.
Yr 1 – MP 2	802	Apply the theory of operation of a direct current motor.	Understand how DC motors work and their basic theory of operation.	Explain DC motor operation through diagrams and examples.
Yr 1 – MP 2	803	Operate and test a series, shunt, and compound direct current motor.	Understand how different types of DC motors operate.	Operate and test series, shunt, and compound motors safely.
Yr 1 – MP 2	805	Perform calculations for horsepower, speed, and torque for direct current motors.	Understand the relationship between horsepower, torque, and speed.	Solve problems involving motor performance calculations.
Yr 1 – MP 2	806	Measure performance and efficiency of a direct current motor.	Understand how to measure motor performance and efficiency.	Use instruments to measure and calculate motor efficiency.
Yr 1 – MP 2	807	Use technical terms to describe the construction of direct current motors.	Understand the construction and components of DC motors.	Identify and describe DC motor components accurately.
Yr 1 – MP 2	808	Determine the operations of variable speed control for direct current motors.	Understand how variable speed control works for DC motors.	Demonstrate how to control the speed of a DC motor using appropriate methods.
Yr 1 – MP 3	1001	Explain the theory of operation of alternating current motors.	Understand how AC motors operate and their basic principles.	Explain AC motor theory using diagrams and real-world applications.
Yr 1 – MP 3	1002	Calculate the synchronous speed of an alternating current motor.	Understand how synchronous speed is determined by frequency and poles.	Perform synchronous speed calculations accurately.
Yr 1 – MP 3	1004	Connect and operate split-phase, capacitor-start, capacitor-run, and dual capacitor motors.	Understand the wiring and operation of single-phase motors.	Wire and operate different types of single-phase motors.
Yr 1 – MP 3	1005	Reverse the rotation of a split phase, capacitor-start, capacitor-run, and dual capacitor motors.	Understand how to reverse motor rotation safely.	Reverse motor rotation following proper procedures.
Yr 1 – MP 3	1007	Determine operating characteristics of universal motors.	Understand how universal motors operate and their applications.	Identify and explain universal motor characteristics.
Yr 1 – MP 3	1008	Connect and operate a three-phase, squirrel cage motor.	Understand three-phase motor wiring and operation.	Wire and operate a three-phase squirrel cage motor.
Yr 1 – MP 3	1009	Reverse the rotation of a three-phase motor.	Understand how to reverse three-phase motor rotation.	Reverse rotation of a three-phase motor by swapping leads.
Yr 1 – MP 3	1201	Identify symbols and terms used in electromechanical motor control circuits.	Understand standard motor control symbols and terminology.	Identify and correctly use motor control symbols.
Yr 1 – MP 3	1202	Identify relays, contactors, and motor starters.	Understand the function of control components in motor circuits.	Identify and describe relays, contactors, and starters.

Yr 1 – MP 3	1203	Read schematic wiring diagrams of motors and their controls.	Understand how to interpret motor control schematics.	Read and explain motor control schematics accurately.
Yr 1 – MP 3	1204	Wire a simple two- and three-wire motor control circuit.	Understand how two- and three-wire motor control circuits work.	Wire and test two- and three-wire control circuits.
Yr 1 – MP 3	1205	Wire a reversing starter.	Understand reversing starter circuits and their components.	Wire and operate a motor reversing starter.
Yr 1 – MP 3	1206	Wire multiple push button/jogging control circuits.	Understand jogging control and multiple pushbutton operations.	Wire and test jogging control circuits.
Yr 1 – MP 3	1207	Wire sequential control circuits.	Understand sequential control principles.	Wire and test sequential control circuits.
Yr 1 – MP 3	1208	Wire and test electrical control circuits.	Understand how to assemble and verify electrical control circuits.	Wire and test various control circuits for proper function.
Yr 1 – MP 3	1209	Perform preventive maintenance on motor controls.	Understand preventive maintenance procedures for motor controls.	Inspect, clean, and maintain motor control systems.
Yr 1 – MP 3	1212	Use conductor ampacity to select wire size and wire type for a specific wiring application.	Understand how ampacity affects wire selection.	Select the correct wire size and type for specific applications.
Yr 1 – MP 3	1213	Label control and power wiring.	Understand labeling standards and safety importance.	Label wiring correctly according to standards.
Yr 1 – MP 3	1215	Connect and operate alternating current and direct current variable speed drives.	Understand how VSDs operate and how to wire them.	Wire and operate both AC and DC variable speed drives.
Yr 1 – MP 3	1501	Troubleshoot and repair motor controls.	Understand common motor control problems and solutions.	Identify and repair issues in motor control circuits.
Yr 1 – MP 3	1502	Troubleshoot and replace relays.	Understand relay operation and failure modes.	Diagnose and replace faulty relays.
Yr 1 – MP 3	1503	Troubleshoot and replace sensors.	Understand how sensors function in control circuits.	Diagnose and replace faulty sensors.
Yr 1 – MP 3	1504	Troubleshoot and replace limit switches.	Understand how limit switches work and common faults.	Diagnose and replace limit switches safely.
Yr 1 – MP 3	1505	Troubleshoot and replace power supplies.	Understand power supply function and failure symptoms.	Test, diagnose, and replace faulty power supplies.
Yr 1 – MP 3	1507	Troubleshoot alternating current and direct current variable speed drives.	Understand common VSD issues and how to fix them.	Find and fix VSD problems in AC and DC systems.

Yr 1 – MP 4	1702	Convert between binary, BCD, hexadecimal, and decimal number systems.	Understand how different number systems work and their relationships.	Perform conversions between binary, BCD, hexadecimal, and decimal systems.
Yr 1 – MP 4	1706	Construct logic circuits containing and, or, nand, nor, and not gates.	Understand how basic logic gates function and interact.	Build and test circuits using AND, OR, NAND, NOR, and NOT gates.
Yr 1 – MP 4	1707	Create truth tables for and, or, nand, nor, and not logic.	Understand the logical behavior of basic gates and their outputs.	Develop and verify truth tables for different logic gate combinations.
Yr 1 – MP 4	1801	Explain where programmable logic control (PLC) networks may be used in the manufacturing process.	Understand how PLCs integrate into automated systems.	Explain common manufacturing applications of PLC networks.
Yr 1 – MP 4	1802	Identify the parts and operating principles of PLCs.	Understand the components and basic operation of a PLC.	Identify and describe PLC parts and their functions.
Yr 1 – MP 4	1803	Use number systems and codes for PLCs.	Understand how PLCs use number systems for processing and control.	Apply number systems and codes in PLC programming tasks.
Yr 1 – MP 4	1804	Create a relay logic diagram.	Understand the structure and function of relay logic.	Design and draw relay logic diagrams.
Yr 1 – MP 4	1805	Create PLC logic gate functions in PLCs.	Understand how to implement logic functions in a PLC environment.	Program and simulate logic gate functions in PLC software.
Yr 1 – MP 4	1806	Explain PLC logic and math functions.	Understand logic and math operations performed by PLCs.	Describe and demonstrate PLC logic and math functions.
Yr 1 – MP 4	1807	Explain PLC timer and counter functions.	Understand the purpose and configuration of PLC timers and counters.	Explain and demonstrate timer and counter functions in PLCs.
Yr 1 – MP 4	1808	Explain PLC jump, compare, and sub-routine functions.	Understand advanced PLC instructions and their uses.	Explain and identify PLC jump, compare, and sub-routine operations.
Yr 1 – MP 4	1809	Edit PLC programs.	Understand how to navigate and modify PLC programs safely.	Edit and update PLC programs to meet operational requirements.
Yr 1 – MP 4	1810	Troubleshoot a PLC system.	Understand common PLC faults and troubleshooting methods.	Diagnose and repair faults in PLC systems.
Yr 2 – MP 1	1301	Connect and operate a transformer.	Understand transformer function and connections.	Wire and operate a transformer correctly.
Yr 2 – MP 1	1302	Calculate the voltage-and-turns ratio.	Understand how voltage and turns are related in a transformer.	Perform voltage-to-turns ratio calculations.

Yr 2 – MP 1	1303	Connect a step-up and a step-down transformer in a circuit.	Understand the difference between step-up and step-down transformers.	Wire and test both step-up and step-down transformers.
Yr 2 – MP 1	1304	Identify transformer windings and related output voltages.	Understand primary and secondary windings and voltage relationships.	Identify and label transformer windings and output voltages.
Yr 2 – MP 1	1305	Calculate volt-amps of a single-phase and three-phase transformer.	Understand transformer power ratings.	Perform VA calculations for single- and three-phase transformers.
Yr 2 – MP 1	1306	Measure single-phase transformer voltage and currents.	Understand how to measure voltage and current safely.	Use instruments to measure transformer voltage and current.
Yr 2 – MP 1	1307	Measure series/parallel transformer voltages and currents.	Understand how transformers behave in series and parallel connections.	Measure and record transformer voltage and current values.
Yr 2 – MP 1	1308	Demonstrate knowledge of three-phase transformers.	Understand three-phase transformer theory and operation.	Explain three-phase transformer operation.
Yr 2 – MP 1	1309	Wire and analyze three-phase transformers.	Understand three-phase transformer wiring configurations.	Wire and test a three-phase transformer system.
Yr 2 – MP 1	1508	Troubleshoot and replace a transformer.	Understand transformer function and common faults.	Diagnose and replace a faulty transformer.
Yr 2 – MP 1	1401	Use and care for soldering equipment.	Understand safe and proper soldering techniques.	Properly maintain and use soldering tools.
Yr 2 – MP 1	1402	Implement soldering techniques for splicing conductors.	Understand how to splice conductors securely using solder.	Solder spliced conductors following safety practices.
Yr 2 – MP 1	1403	Implement soldering techniques for terminals.	Understand soldering procedures for terminal connections.	Solder terminals cleanly and effectively.
Yr 2 – MP 1	1404	Remove and install components on a printed circuit board.	Understand PCB soldering and desoldering techniques.	Remove and install PCB components safely.
Yr 2 – MP 1	2501	Cut, bend, and install conduit or tubing.	Understand how to properly measure, bend, and install conduit.	Cut, bend, and install conduit accurately.
Yr 2 – MP 1	2502	Install raceway or wire duct.	Understand the function of raceways and ducts in wiring systems.	Install raceways and ducts according to specs.
Yr 2 – MP 2	1601	Interpret electronic symbols shown on diagrams and schematics.	Understand standard electronic symbols and their meanings.	Read and interpret electronic schematics.
Yr 2 – MP 2	1602	Identify the function of diodes.	Understand how diodes function in circuits.	Identify and explain diode functions.

Yr 2 – MP 2	1603	Identify the function of Zener diodes.	Understand how Zener diodes regulate voltage.	Identify and explain Zener diode functions.
Yr 2 – MP 2	1604	Identify the function of transistors.	Understand transistor operation in circuits.	Identify and explain transistor functions.
Yr 2 – MP 2	1605	Identify the function of power supplies.	Understand how power supplies provide energy to circuits.	Identify and explain power supply functions.
Yr 2 – MP 2	1606	Identify the function of filters.	Understand filter operation in electronic circuits.	Identify and explain filter applications.
Yr 2 – MP 2	1607	Identify the function of half-wave, full-wave, and three-phase rectifiers.	Understand rectification methods and their uses.	Identify and explain rectifier functions.
Yr 2 – MP 2	1608	Identify the function of thyristors.	Understand how thyristors control current flow.	Identify and explain thyristor functions.
Yr 2 – MP 2	1609	Identify the function of single-phase and three-phase inverters.	Understand inverter operation in AC/DC conversion.	Identify and explain inverter functions.
Yr 2 – MP 2	2301	Follow safety rules and regulations for working around robots.	Understand robotic safety standards and proper operating procedures.	Follow all safety protocols when working around robots.
Yr 2 – MP 2	2302	Use vocabulary words and terms specific to robotics.	Understand key terms used in robotics.	Use correct robotics terminology in technical discussions.
Yr 2 – MP 2	2303	Identify major systems of a robot.	Understand the structure and function of robotic subsystems.	Identify and describe the main systems of a robot.
Yr 2 – MP 2	2304	Identify a robot's work envelope in a manufacturing cell.	Understand how a work envelope defines the operational area of a robot.	Locate and describe the work envelope of a robot.
Yr 2 – MP 2	2306	Determine the operation of a robot's drive system.	Understand how different drive systems control robot movement.	Explain the operation of a robot's drive system.
Yr 2 – MP 2	2307	Determine the mobility of an industrial robot.	Understand types of mobility and how they affect robot applications.	Describe and evaluate the mobility of an industrial robot.
Yr 2 – MP 2	2308	Program a robot.	Understand the basics of robot programming and control.	Write and run basic robot programs.
Yr 2 – MP 2	2309	Use a robot for industrial applications.	Understand how robots are integrated in manufacturing.	Operate a robot in a simulated or real industrial process.
Yr 2 – MP 2	2401	Identify the fundamental operating principles used in flexible manufacturing systems.	Understand how flexible manufacturing systems (FMS) work and why they're used.	Identify and explain the principles of FMS in manufacturing.

Yr 2 – MP 3	1901	Use vocabulary words and terms associated with the fundamental principles of the transmission of mechanical power.	Understand basic terminology related to mechanical power transmission.	Use correct vocabulary and terms when describing mechanical systems.
Yr 2 – MP 3	1902	Construct simple machines and use them to illustrate mechanical principles.	Understand fundamental mechanical principles and how simple machines work.	Build and demonstrate simple machines to show mechanical principles.
Yr 2 – MP 3	1903	Lubricate bearings.	Understand proper lubrication methods and their importance in reducing friction and wear.	Grease bearings the right and safe way.
Yr 2 – MP 3	1904	Install and adjust belt, chain, and gear drives.	Understand how belt, chain, and gear drives function and are aligned.	Install and adjust mechanical drive systems properly.
Yr 2 – MP 3	1905	Use brakes and clutches.	Understand how brakes and clutches operate in mechanical systems.	Safely operate brakes and clutches in practical applications.
Yr 2 – MP 3	1907	Set and adjust mechanical stops.	Understand the role of mechanical stops in controlling machine movement.	Accurately set and adjust mechanical stops.
Yr 2 – MP 3	1908	Calculate speed and torque rates of mechanical equipment components.	Understand the relationship between speed, torque, and mechanical power.	Perform accurate speed and torque calculations.
Yr 2 – MP 3	2007	Troubleshoot and repair or replace speed-reduction units.	Understand the function and common issues of speed reducers.	Diagnose, repair, or replace faulty speed-reduction units.
Yr 2 – MP 3	2008	Troubleshoot and repair or replace clutches.	Understand how clutches operate and common failure points.	Diagnose and repair or replace faulty clutches.
Yr 2 – MP 4	2101	Interpret electrical and electronic control circuit symbols and schematics for hydraulic systems.	Understand hydraulic control circuit symbols and how to interpret them.	Read and explain hydraulic control circuit diagrams.
Yr 2 – MP 4	2103	Apply fundamentals principles of hydraulics.	Understand basic hydraulic principles and their applications.	Apply hydraulic principles in practical systems.
Yr 2 – MP 4	2104	Connect and operate various pumps.	Understand how different hydraulic pumps work.	Connect and operate pumps safely and correctly.
Yr 2 – MP 4	2105	Identify types of hydraulic fluid transmission and conditioning.	Understand types and functions of hydraulic fluids and conditioning methods.	Identify and explain types of hydraulic fluids and conditioning equipment.
Yr 2 – MP 4	2106	Measure oil flow and oil pressure.	Understand hydraulic flow and pressure measurement methods.	Measure oil flow and pressure accurately using proper instruments.
Yr 2 – MP 4	2107	Operate manual and pilot operated directional control valves.	Understand directional control valve operation and applications.	Operate manual and pilot operated valves safely.

Yr 2 – MP 4	2110	Construct, test and troubleshoot hydraulic control circuits.	Understand hydraulic circuit construction and troubleshooting techniques.	Build, test, and troubleshoot hydraulic circuits.
Yr 2 – MP 4	2121	Perform adjustments to control oil temperature and pressure.	Understand how temperature and pressure affect hydraulic systems.	Adjust oil temperature and pressure as needed.
Yr 2 – MP 4	2122	Conduct routine preventive maintenance on hydraulic equipment in accordance with manufacturer instructions.	Understand hydraulic preventive maintenance procedures.	Perform routine preventive maintenance on hydraulic systems.
Yr 2 – MP 4	2123	Identify electrical symbols/schematics for pneumatics.	Understand pneumatic schematic symbols.	Read and interpret pneumatic diagrams.
Yr 2 – MP 4	2124	Apply the fundamental principles of pneumatics.	Understand how pneumatic systems operate.	Apply pneumatic principles in practical settings.
Yr 2 – MP 4	2125	Describe the characteristics of air compressors.	Understand compressor types and their functions.	Identify and describe compressor characteristics.
Yr 2 – MP 4	2126	Identify systems used for the distribution and conditioning of air.	Understand air distribution and conditioning systems.	Identify and explain pneumatic distribution and conditioning components.
Yr 2 – MP 4	2127	Measure and control air flow and air pressure.	Understand pneumatic measurement methods.	Measure and adjust air flow and pressure accurately.
Yr 2 – MP 4	2128	Identify pneumatic actuators.	Understand actuator types and functions.	Identify and describe pneumatic actuators.
Yr 2 – MP 4	2129	Operate and explain mechanical devices that operate on air pressure.	Understand the operation of air-powered devices.	Operate and explain pneumatic devices.
Yr 2 – MP 4	2130	Construct, test, and troubleshoot a pneumatic circuit.	Understand pneumatic circuit construction and troubleshooting methods.	Build, test, and troubleshoot pneumatic circuits.
Yr 2 – MP 4	2131	Analyze pneumatic circuits.	Understand how pneumatic circuits function.	Analyze and explain pneumatic circuit operation.
Yr 2 – MP 4	2132	Identify where electronic switches and sensors may be found in pneumatic systems.	Understand sensor applications in pneumatic systems.	Identify and explain locations of sensors and switches.
Yr 2 – MP 4	2133	Interpret electric control circuits and devices in pneumatic systems.	Understand control circuits and devices used with pneumatics.	Read and interpret electrical control circuits for pneumatics.
Yr 2 – MP 4	2134	Sketch flow path symbols and air logic schematics.	Understand how to represent pneumatic flow paths.	Sketch air logic and flow path diagrams.
Yr 2 – MP 4	2135	Interpret flow path symbols and air logic schematics.	Understand how to interpret air logic diagrams.	Read and explain air logic schematics.

Yr 2 – MP 4	2136	Select and use properly sized pneumatic piping.	Understand selection criteria for pneumatic piping.	Select and install pneumatic piping correctly.
Yr 2 – MP 4	2137	Use dampers, thermostats, switches, pneumatic positioners, linkage assemblies and accessories in pneumatic systems.	Understand pneumatic accessories and their functions.	Install and use pneumatic accessories correctly.
Yr 2 – MP 4	2204	Install, troubleshoot, repair or replace, and adjust pressure regulators.	Understand how pressure regulators function and fail.	Install, troubleshoot, and adjust pressure regulators.
Yr 2 – MP 4	2205	Install, troubleshoot, and repair or replace airlines.	Understand airline installation methods and common faults.	Install and repair airlines.
Yr 2 – MP 4	2206	Install, troubleshoot, repair or replace, and adjust pumps.	Understand pump operation and maintenance.	Install, troubleshoot, and repair pumps.
Yr 2 – MP 4	2207	Install, troubleshoot, and repair or replace gauges.	Understand gauge operation and maintenance.	Install and repair gauges.
Yr 2 – MP 4	2208	Install, troubleshoot, repair or replace, and adjust cylinders.	Understand cylinder operation and maintenance.	Install and repair pneumatic cylinders.
Yr 2 – MP 4	2209	Install, troubleshoot, and repair or replace filters.	Understand filter function and common issues.	Install and repair filters.
Yr 2 – MP 4	2210	Install, troubleshoot, repair or replace and adjust control valves.	Understand valve operation and troubleshooting.	Install and repair control valves.
Yr 2 – MP 4	2211	Install, troubleshoot, and repair or replace actuators.	Understand actuator function and faults.	Install and repair actuators.
Yr 2 – MP 4	2212	Install, troubleshoot, repair or replace, and adjust pressure switches.	Understand pressure switch operation and troubleshooting.	Install and repair pressure switches.
Yr 2 – MP 4	2213	Install, troubleshoot, repair or replace, and adjust relays.	Understand relay operation and maintenance.	Install and repair relays.
Yr 2 – MP 4	2217	Install, troubleshoot, and repair or replace, hydraulic lines.	Understand hydraulic line installation and faults.	Install and repair hydraulic lines.
Yr 2 – MP 4	2218	Install, troubleshoot, repair or replace, and adjust hydraulic pumps.	Understand hydraulic pump operation and troubleshooting.	Install and repair hydraulic pumps.
Yr 2 – MP 4	2219	Install, troubleshoot, and repair or replace hydraulic gauges.	Understand hydraulic gauge operation and troubleshooting.	Install and repair hydraulic gauges.
Yr 2 – MP 4	2220	Install, troubleshoot, and repair or replace hydraulic filters.	Understand hydraulic filter function and common issues.	Install and repair hydraulic filters.

Yr 2 – MP 4	2221	Install, troubleshoot, and repair or replace hydraulic directional control valves.	Understand hydraulic directional control valve operation and faults.	Install and repair hydraulic directional control valves.
Yr 2 – MP 4	2222	Install, troubleshoot, repair or replace, and adjust hydraulic pressure control valves.	Understand hydraulic pressure control valve operation.	Install, troubleshoot, and adjust hydraulic pressure control valves.