



21740 State Route 676, Marietta, Ohio 45750

Adult Technical Training
Phone: 740.373.6283
Toll Free: 800.648.3695
Fax: 740.376.2240
www.mycareerschool.com

Instrumentation and Process Controls

432 Hour Training

Instructors: Pat Hulsey, Jack DeVol, Brad Griffin

Total Cost: \$64,800

\$12,960 per student based on 5 students (Minimum headcount). Cost will be divided progressively per student with a maximum headcount set at 12. Cost per student at 12 students would be \$5,400.

Credentials and Certifications: Washington County Career Center Certificate of Completion

Training Outline:

Instrumentation I 48

1. Describe various forms of matter and energy and the properties of each
2. Describe the common forms of measurement used in industry and an example of each
3. Know the basic terminology used in instrumentation
4. Describe the common types of instrument communication
5. Properly use Direct Read type instruments
6. Calibrate pressure gauges
7. Describe the basic elements of control systems
8. Describe the operation and proper use of industrial temperature sensors
9. Describe the operation and proper use of industrial pressure sensors

Instrumentation II 48

1. Describe the various types of level sensors used in industry, the advantages and disadvantages of each type and examples of where each type is used
2. Discuss the characteristics of flow and the factors that affect flow
3. List the various types of flow sensors used in industry, the advantages and disadvantages of each type and examples of where each type is used
4. List the various types of weight sensors used in industry, the advantages and disadvantages of each type and examples of where each type is used
5. Perform flow calibrations using a Rotameter and Differential Pressure transmitter
6. Calibrate a magnetic flow meter and build a flow control system
7. Describe the use of transmitters in control systems
8. Describe the operation of pneumatic and electronic transmitters
9. Troubleshoot, repair and calibrate pneumatic and electronic transmitters



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10. Describe the functions of recorders and how to properly read data
11. Describe the various types of recorders used in industry, the advantages and disadvantages of each type and examples of where each type is used
12. Set-up, connect and record data on a recorder
13. Calibrate SMART transmitters

Instrumentation III 48

1. Describe the difference between direct and reverse acting controllers
2. Describe each of the control modes including On-Off, Proportional, Integral (Reset) and Derivative (Rate) and how each is used in control systems
3. Describe a Programmable Logic Controller and it's use
4. Describe controller tuning algorithms, basics
5. Describe the function of the final control elements in a control system
6. Describe the types of actuators used in industry, their operating characteristics and an example of where each type is used
7. Describe four types of control loops including Single Element, Cascade, Feedforward and Ratio and an example of where each type is used
8. Properly set up a Cascade control loop
9. Properly set up and tune a level control system

Instrumentation IV 48

1. Describe the types of applications control valves are utilized
2. Describe the functions of control valves and the use of actuators and positioners
3. Describe the types of linear motion control valves and proper application
4. Describe the types of rotary motion control valves and proper application
5. Describe the types of valve actuators used in industry, their operating characteristics, and an application for each
6. Properly disassemble and assemble a control valve and actuator
7. Describe control valve trim and how it affects flow and capacity
8. Describe the valve leakage classifications
9. Describe the types of packing and seals used in control valves
10. Describe control valve safety and the various hazards associated with the use of control valves
11. Describe the principles of fluid flow
12. List the factors to consider when selecting a control valve
13. List the factors to consider when sizing a control valve for liquid flow
14. List the factors to consider when sizing a control valve for gas and vapor flow
15. List the factors to consider when selecting and sizing an actuator



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16. Describe the proper installation and maintenance of an actuator
17. Properly calibrate a valve positioner
18. Properly calibrate instruments using the laptop and AMS system
19. Properly construct and tune a pressure control system
20. Properly construct and tune an electronic cascade control system

Electronics 48

1. Perform basic troubleshooting of simple solid-state circuits.
2. Operate test equipment in a safe manner.
3. Have a basic understanding of personal protective equipment required to perform in an industrial environment.
4. Diagnose diode failures.
5. Have an operating knowledge of basic DC power supplies.
6. Select half or full wave DC power supplies for appropriate applications.
7. Utilize basic test equipment to troubleshoot and repair DC Power supplies.
8. Basic understanding of transducers and their uses in industry.
9. Utilize knowledge gained to select appropriate transducers for specific applications.

P&ID Drawings, Motor Controls 48

1. Properly read and interpret information on a P&ID
2. Describe how an operator controls valves, motors, and controllers through a DCS control console.
3. Properly read and interpret information on a motor control drawing, including ladder logic.
4. Identify the components of a motor control starter
5. Size motor power and control wiring, circuit breaker, and overloads per NEC standards
6. Wire and test a motor control start/stop control circuit
7. Wire and test a reversing motor control forward/reverse/stop circuit
8. Wire and test a motor control circuit utilizing control relays, timing relays and Programmable Logic Controller
9. Troubleshooting motor control circuits

Instrumentation and Control Wiring 48

1. Describe the purpose and function of instrument index and specifications
2. Properly identify data from Vendor documents
3. Properly read instrument loop sheet drawings
4. Describe the proper use of and differences between various types of datacom wiring including coax, Ethernet, and telephone



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5. Properly terminate and test coax and CAT-5 Ethernet cable
6. Understand how to properly install instrument and control wiring including methods, testing and labeling
7. Properly install conduit, junction boxes, terminal strips and pull wiring conductors through conduit.
8. Properly use a Megger to test wiring installations
9. Describe and properly perform functional check-out of discrete control circuits and analog control loops.
10. Describe how fiber optic cable functions.
11. Install and test terminations on Fiber Optic cable

Programmable Logic Controllers I 48

1. Define and explain what a PLC is.
2. Understand the differences between a PLC, Micro and Mini PLC.
3. Perform basic commissioning of a PLC.
4. Understand the different types of I/O and their uses.
5. Select and install specific PLC hardware.
6. Troubleshoot basic hardware problems.
7. Utilize software to program or operate a PLC.
8. Troubleshoot problems using a PC and communications software.
9. Develop simple PLC programs.

Programmable Logic Controllers II 48

1. Develop and implement advanced programming.
2. Perform advanced diagnosis of PLC programs.
3. Implement and install advanced PLC systems.
4. Use advanced logic to implement programming solutions.
5. Complete an advanced project including develop logic, create, and document project overview, create document package, write simulation program, and formally present to class.

Washington County Career Center, Adult Technical Training is Accredited by Accrediting Commission for Career Schools and Colleges (ACCSC). ACCSC holds accreditation with US Dept. of Educ. ACCSC sets multiple Standards of Accreditation by which WCCC must comply to ensure quality programs, experienced instructors, optimal graduation rates, and preferred job placement rates.