

# BUSINESS & INDUSTRY SOLUTIONS

ALAMO COLLEGES TECHNICAL INSTITUTE



## ACTI CATALOG



**INCREASE  
PRODUCTIVITY**



**IMPROVE  
MORALE**



**REDUCE TURNOVER  
RATES**



**IMPACT  
PERFORMANCE**



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Economic & Workforce Developme

**GET STARTED**



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**Strengthen Your Skills & Develop Your Workforce**

# OSHA 10 – 12 HOURS



## OSHA 10

General industry workers need information about their rights, employer responsibilities, and how to file a complaint as well as how to identify, abate, avoid and prevent job related hazards on a job site. Learn a variety of general industry safety and health hazards which a worker may encounter as well as an emphasis on hazard identification, avoidance, control and prevention, to OSHA standards.

## OSHA Elective (3 hours) - Recommended

- Hazardous Materials (Flammable and Combustible Liquids)
- Ergonomics
- Fall Protection

## SUBJECTS:

- Introduction to OSHA
- Walking and Working Surfaces
- Electrical Safety
- Hazard Communication
- Exit Routes, Emergency Action Plans, Fire Prevention Plans, and Fire Protection
- Personal protective equipment

## OSHA Optional

- Forklift Familiarization Safety

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Demonstrate a working knowledge of basic general industry safety requirements in the workplace. Display a general knowledge of OSHA rules and what OSHA is about. Express a working knowledge of potential hazards in general industry. Know proper use and care of personnel protective equipment. Gain knowledge on how to locate and stay abreast of current safety information.



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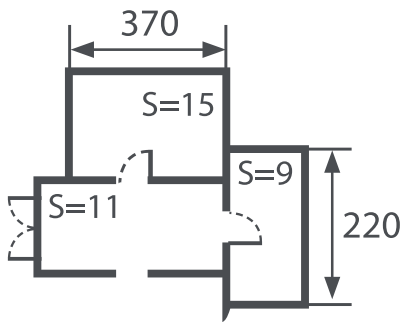
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# TECHNICAL MATHEMATICS & BLUEPRINT READING - 40 HOURS



## TECHNICAL MATHEMATICS & BLUEPRINT READING

Technical math and blueprint reading go hand-in-hand. Get skills training with an emphasis on numbering systems, calculations, and problem-solving skills needed to solve electronic circuit parameters and to read blueprints.



## SUBJECTS:

- Math Operations
- Exponents and Radicals
- Basic Trigonometry
- Introduction to Print Reading including prints, lines title blocks
- View and Sectioning Conventions
- Dimensioning Practices
- Tolerance as a method of control
- Schematics Reading
- Symbols and Drawings in Electrical Systems
- Symbols and Drawings in HVAC Systems
- Symbols and Wiring in Industrial Control Systems
- Symbols and Drawings in Fluid Power

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Demonstrate basic math operations, including geometry and trigonometry. Reform math conversions and interpret basic blue print drawings. Distinguish diverse types of lines and their application and explain schematics and drawings in electrical, pneumatic and hydraulic application.

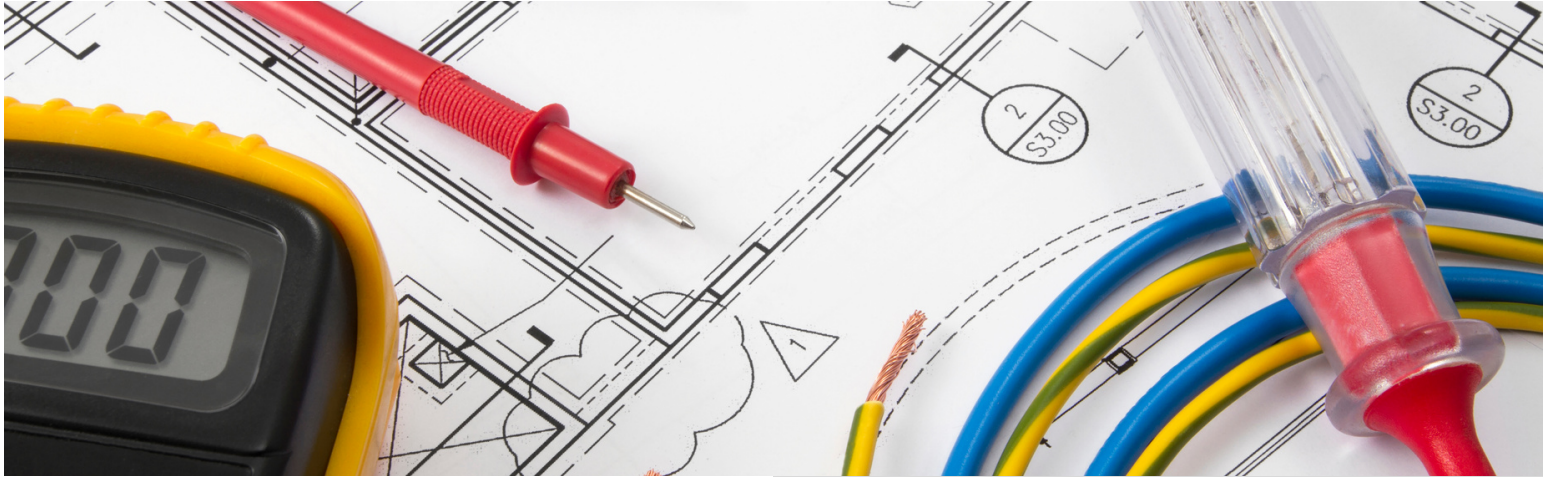


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# ELECTRICITY DC FUNDAMENTALS – 40 HOURS



## ELECTRICITY DC FUNDAMENTALS

Gain fundamental knowledge of electrical theory and skills required in the industrial or manufacturing industry. Learn Direct Current (DC) including Ohm's Law, Kirchhoff's law, and circuit analysis techniques, Emphasis is on analysis of resistive networks and DC voltage measurements.

## PREREQUISITE

Technical Math and Blueprint Reading

## SUBJECTS:

- Introduction to Electricity
- Metric Prefixes
- Scientific and Engineering Notation
- Current/Amperage
- Voltage/Volts
- Resistor/Resistance
- DC Circuit Problem Solving
- DC Series Circuits
- DC Parallel Circuits
- Combination Circuits (Series-Parallel)
- Wheatstone Bridge
- Metering Circuits (multi-meter)

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Understand the fundamentals of DC circuits and how Direct Current works. Understand Ohm's Law, Kirchhoff's Voltage Law and Kirchhoff's Current Law. Understand DC series/parallel/combination circuits.



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# ELECTRICITY AC FUNDAMENTALS – 40 HOURS



## ELECTRICITY AC FUNDAMENTALS

Understanding alternating current (AC) circuits is a required skill. Learn the fundamentals of alternating current (AC), capacitance, inductance, power, transformers, and fundamentals of DC/AC motors.

## PREREQUISITE

Technical Math and Blueprint Reading; DC fundamentals.

## SUBJECTS:

- Principles of Alternating Current
- Oscilloscope
- Function Generator
- Capacitor/Capacitance
- Inductor/Inductance
- Power in AC Circuits
- RLC Circuits
- Single-Phase Transformers
- Three-Phase Systems
- Fundamentals of DC/AC Motors

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Understand the fundamentals of AC/DC circuits: how they differ and how they are similar. Demonstrate how electrical energy is turned into heat energy and understand the difference in AC circuits: resistance versus impedance. Understand how oscilloscope and function generators operate and how AC works. Understand phase shift and how transformers function. Demonstrate basic knowledge of AC inductive and AC capacitive circuits and gain a fundamental knowledge of DC/AC motors.

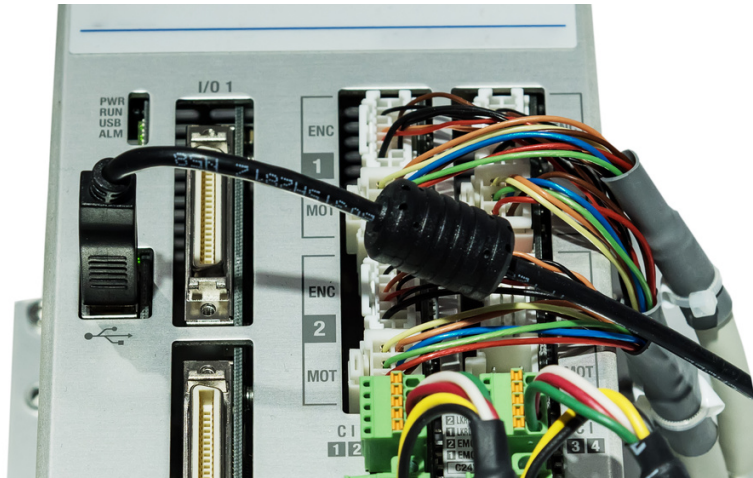


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# DC/AC MOTOR CONTROLS – 80 HOURS



## DC/AC MOTOR CONTROLS

Get skilled in the fundamentals of electric motors with an emphasis on starting, and speed control as well as braking systems. Understand the various concepts of motor controls, circuits and components that are needed to accomplish different controls.

## PREREQUISITE

Technical Math and Blueprint Reading; DC and AC fundamentals.

## SUBJECTS:

- DC Power Supplies
- DC Generators
- DC Armatures
- DC Motors
- Single Phase AC Motors
- Control Pilot Devices
- Circuit Layout
- Connections and Symbols
- Basic Control Circuits
- Jogging (Inching) Control Circuits
- Basic Motors troubleshooting skills
- Multi-meters

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Understand the different types of motors (DC vs. AC) and identify types of motor maintenance. Identify characteristics of a motor maintenance program and safety procedures to use during motor maintenance. Understand motor control components and gain knowledge of different theories of operation. Interpret electrical diagrams and demonstrate industrial motor control knowledge through hands -on learning. Troubleshoot a failed component during learning lab practical assignments.



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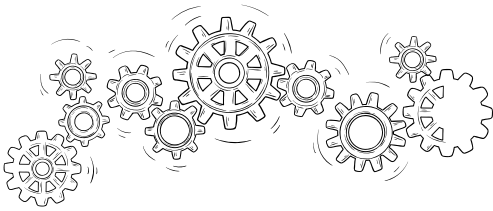


# MECHANICAL DRIVES – 40 HOURS



## MECHANICAL DRIVES

Get the necessary knowledge and firsthand experience for initial entry into machine drive maintenance and repair.



## PREREQUISITE

Technical Math and Blueprint Reading

## SUBJECTS:

- Introduction to Mechanical Drive Systems
- Belt Drives
- Chain Drives
- Gear Drives
- Lubrication
- Couplings
- Shaft Alignment
- Bearings
- Ball Screws
- Linear Bearings
- Gasket and Seals
- Clutches
- Brakes

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify the characteristics of seals, bearings, lubricants, and fasteners. Install seals, fasteners and gear drives. Apply various lubricants in accordance with preventive and corrective maintenance requirements. Operate hand and power tools, belt and chain drive systems, and gear drive operations.

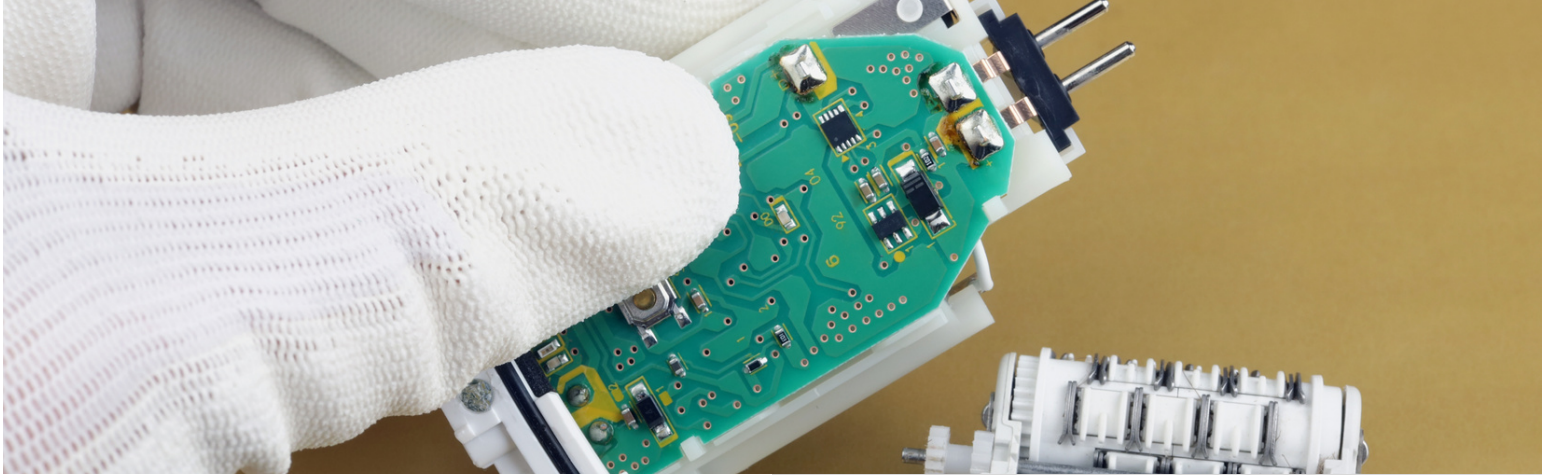


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# ELECTRO-MECHANICAL DEVICES – 40 HOURS



## ELECTRO-MECHANICAL DEVICES

This course is a study of electro-mechanical devices for manufacturing including motion control systems, process control systems, components of motors, various switches, sensors, photo eyes and electromagnetic relays.

## PREREQUISITE

Technical Math and Blueprint Reading; DC Fundamentals; AC Fundamentals

## SUBJECTS:

- Classification and characteristics of motion control systems Open-loop systems and closed-loop systems and how they differ
- Four control modes
- Major components of DC motors
- Motor action, main field, communication, torque, and other characteristics of motors
- How heat and pressure affect process
- Several types of standard electronic and pneumatic transmission signals
- Limit switches
- Inductive and capacitive proximity sensors
- Photo electric sensors and photo eyes
- Electro-magnetic relay
- Feedback devices

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Understand two classifications of control systems, three common characteristics of motion control systems, and two categories of process control systems. Identify the differences between open-loop and closed-loop systems and describe the elements of a closed-loop system. Understand the four control modes used by industrial controllers and describe how varying heat and pressure levels affect a process. Provide the different types of standard electronic and pneumatic transmission signals and their numerical signs. Understand types of control valves, describe their characteristics and applications, and describe the operation of a limit switch. Explain operations of a limit switch and explain operations of an inductive proximity sensor. Describe the operation of a captive proximity detector, and Hall Effect proximity sensor; phot electric sensor; and various photo eyes; electromagnetic relay.



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# HYDRAULIC FUNDAMENTALS – 40 HOURS



## HYDRAULIC FUNDAMENTALS

Manufacturing systems use the power of fluids. Learn the principles of fluid power energy and its controlled applications in this modularized entry level course.

## PREREQUISITE

Technical Math and Blueprint Reading

## SUBJECTS:

- Hydraulic system safety
- Various hydraulic components including power unit, relief valve, flow control valve, directional control valve, Pascal's Law
- Flow rate and velocity
- Meter-in, meter-out and bypass flow control circuit
- Force, work, power, and efficiency of a hydraulic system
- Cylinders in series
- Cylinders in parallel
- Regenerative circuit
- Accumulators, hydraulic motors, pressure reducing valves and remotely controlled relief valves

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify hydraulic symbols and hydraulic components and schematics drawings. Understand the basic physical concepts and build basic lab applications. Demonstrate knowledge of the advantages/disadvantages of hydraulic components. Understand basic electricity hydraulics circuits.



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# PNEUMATICS FUNDAMENTALS – 40 HOURS



## PNEUMATICS FUNDAMENTALS

A strong command of pneumatic components is vital to a successful industrial career. This is a modularized entry level course in the principles of pneumatic energy and its controlled application that consists in an introductory and an advanced training module. Learn to build basic Electro-pneumatic Circuits and apply faulty finding techniques.

## PREREQUISITE

Technical Math and Blueprint Reading; DC Fundamentals; AC Fundamentals; DC/AC Motor Controls

## SUBJECTS:

- Pneumatics Trainer, Pneumatics Power, Conditioning Unit and its components Basic pneumatics physical concept; Pressure vs. Force; Pressure vs. Volume; Pressure Drop vs. Flow; and Vacuum Generation
- Directional Control Values
- Directional and Speed Control of Cylinders
- Cylinders in Series
- Cylinders in Parallel
- Pneumatic Motor Circuit
- Basic Electro-pneumatic circuit

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify pneumatic symbols and identify pneumatic components and schematic drawings. Understand the basic physical concepts and build basic lab applications. Demonstrate knowledge of the advantages/disadvantages of pneumatic components and identify pumps. Understand basic motor circuits and the fundamentals of electricity. Understand the construction and function of the components in electro-pneumatic control systems. Identify and use control schematics.

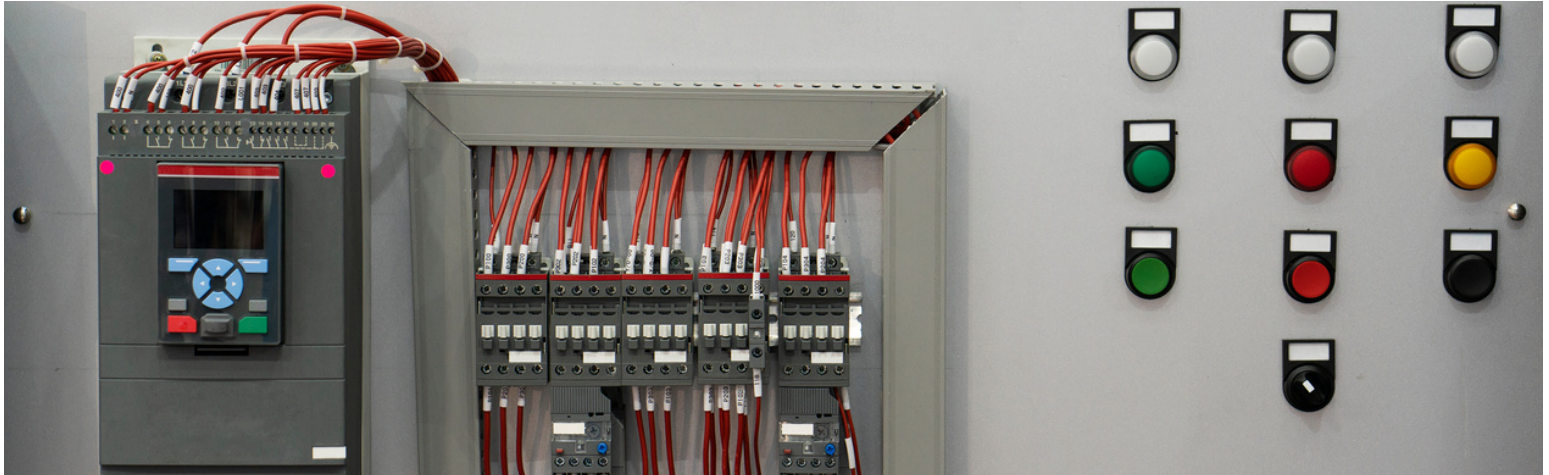


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# INTRODUCTION TO PLC – 80 HOURS



## INTRODUCTION TO PLC

Programmable Logic Controllers are used throughout the manufacturing industry. Learn the maintenance, programming and troubleshooting of Allen Bradley PLC systems. Including power supplies, discrete input/output (I/O) modules, programming devices, processors, basic logic elements, PLC programming, timers, counters, program control instructions, data manipulation instructions, data manipulation instructions and math instructions.

## PREREQUISITE

Technical Math and Blueprint Reading; DC Fundamentals; AC Fundamentals; DC/AC Motor Controls

## SUBJECTS:

PLC Safety, PLCs vs. Relay Logic, Advantages and Disadvantages of PLC, Basic Instruction, Number Systems, Normally open/closed contact inputs, Coils Outputs, Basic PLC Operations, And/Or/Combination Circuits, I/O Wiring, Allen Bradley Control Logix 1200 Hardware and Software, Basics of PLC Programming, Fundamentals of Logic , Timers/Counters and Basic Program Control Instructions

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Understand the fundamental principles of PLC hardware structure and programming.  
Understand design programming and the fundamental principles and PLC operations.  
Demonstrate an understanding of programming software and the fundamentals of timers, counters, and other different instructions. Demonstrate an understanding of PLC programming using distinct functions and basic troubleshooting skills for Allen Bradley PLCs.

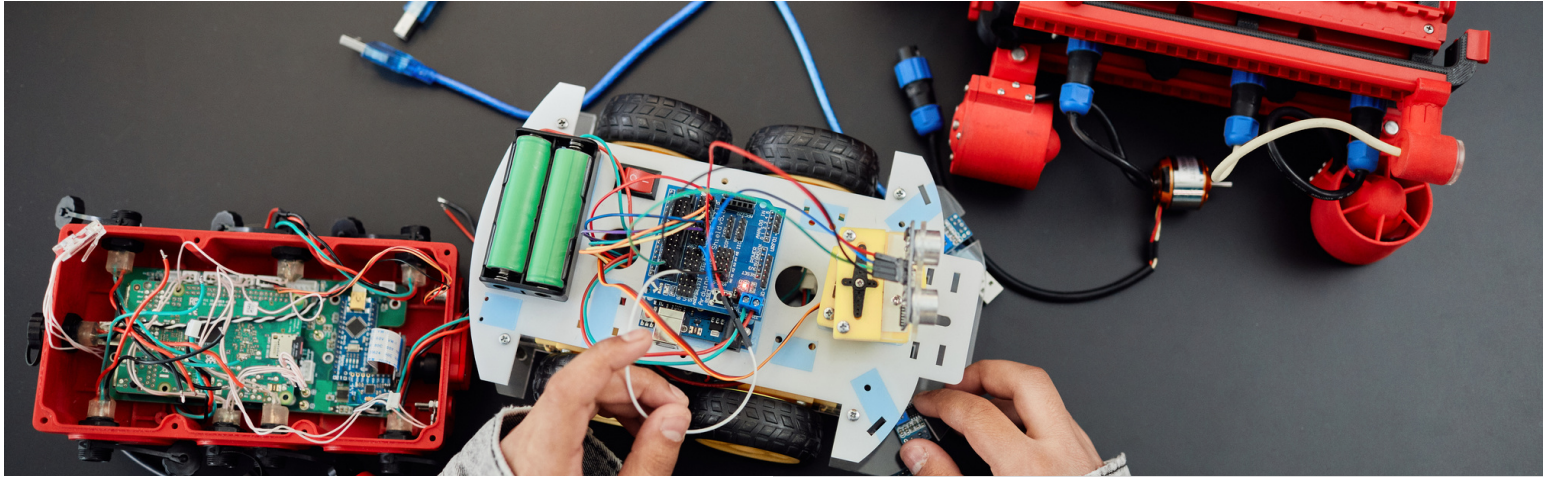


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# ROBOTICS FUNDAMENTALS – 40 HOURS



## ROBOTICS FUNDAMENTALS

Robotics is used by companies as a means for increased production. Learn the fundamentals of robotics used in manufacturing with an emphasis on safety, robot operations, programming, applications in manufacturing, and general industry.

## PREREQUISITE

DC Fundamentals; AC Fundamentals; DC/AC Motor Controls; Electro-mechanical Devices; Pneumatics Fundamentals and Introduction to PLC

## SUBJECTS:

- Safety with Robotics in Industry
- Work envelopes/work areas
- Robotic Systems and Operation
- Teach Pendants
- Start Up Procedures
- Programming using Teach Pendant
- Virtual Programming
- Fanuc Specific Tools:
  - Error & Fault Recovery
  - Frames/Motion Programs
  - Motion Instructions
  - Copying and Editing Programs
  - Branching Programs
  - Instructions
  - Position Registers
  - Input/output

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify and discuss the differences between the maximum and work envelope of a robotic system. Identify safety features/devices in robotic systems. List the five major systems and six degrees of freedom and associate movements. Identify at least two of the three types of actuators drives and explain their operations. Be familiar with teach pendant and Fanuc LR Mate 200ic robot. Understand instructions and commands in teaching pendant and Fanuc robot.

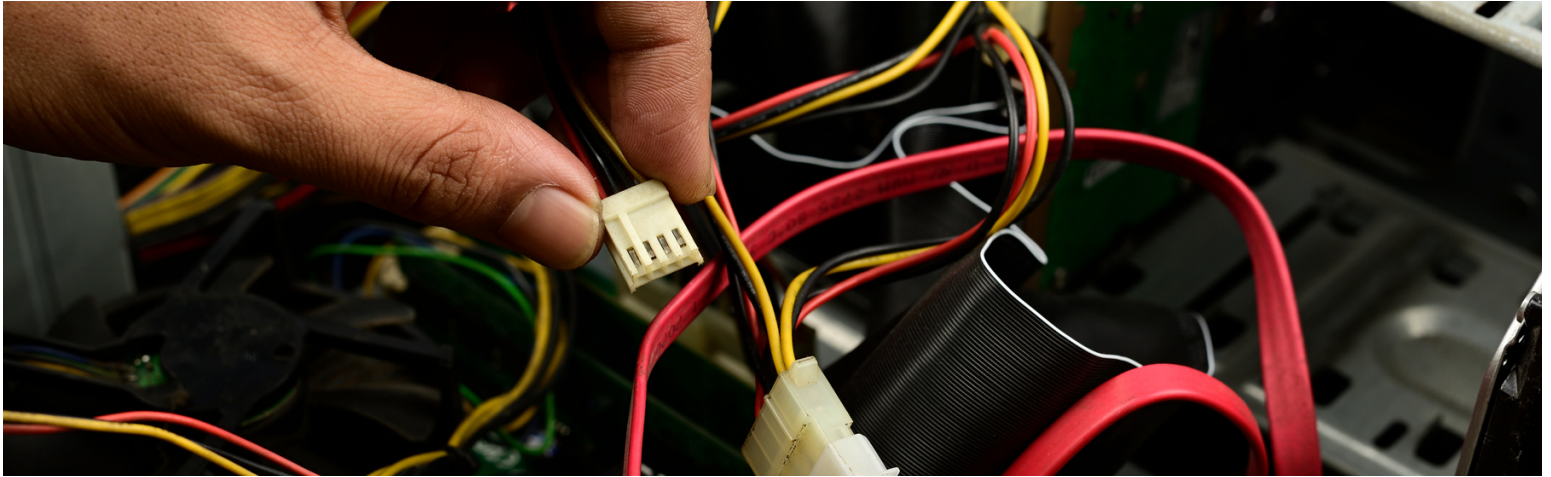


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# INDUSTRIAL WIRINGS WITH NEC – 40 HOURS



## INDUSTRIAL WIRINGS WITH NEC

Get a basic overview and introduction to the 2023 National Electrical Code (NEC). Learn the structure of the various articles of the NEC, how to navigate these complex articles, understand major changes, and basic application of the major articles. Cover the major articles found in the current 2023 edition of the NFPA 70 National Electrical Code.

### BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify key terms associated with the NEC. Identify the nine chapters associated with the NEC. Identify basic requirements covered by the four general chapters of the NEC. Demonstrate an understanding of how to identify 2023 NEC updates. Interpret electrical blueprints/drawings. Compute circuit sizes and overcurrent protection for the installation of branch circuits, feeders, and service entrance conductors. Explain the proper installation of wiring devices according to electrical codes. Demonstrate grounding methods. Identify industrial wiring methods, including conduit bending. Demonstrate proper safety procedures.

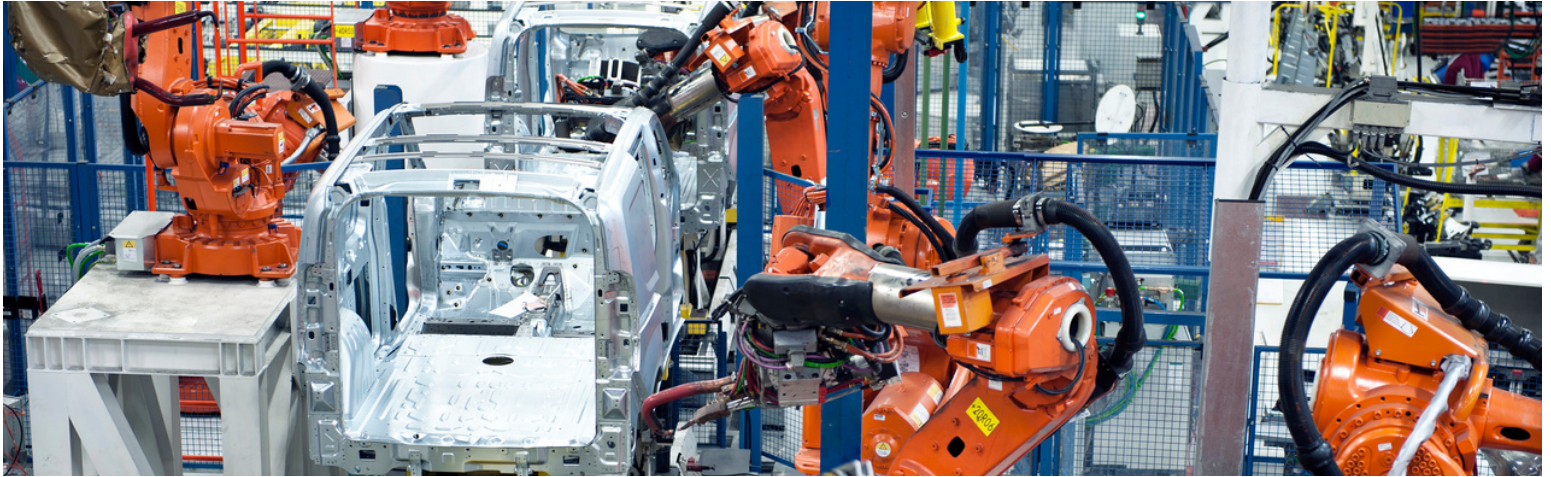


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# INTEGRATED SYSTEMS TROUBLESHOOTING - 80 HOURS



## INTEGRATED SYSTEMS TROUBLESHOOTING

If there is one indispensable skill needed in the manufacturing environment, basic-troubleshooting is it. Experience this capstone class that utilizes the AMTEC Manufacturing Simulator to provide an introduction to troubleshooting skills using the integrated systems approach for advanced integrated automation systems used in today's industrial manufacturing. You will focus on the overview/familiarization of sophisticated manufacturing systems, learning various factors and skills for troubleshooting systems and the subsystems.

## PREREQUISITE

Technical Math and Blueprint Reading; DC Fundamentals; AC Fundamentals; DC/AC Motor Controls; Hydraulic Fundamentals; Pneumatics Fundamentals; Electro-mechanical Devices and Introduction to PLC

## BY THE COMPLETION OF THE TRAINING, PARTICIPANTS WILL BE ABLE TO:

Identify troubleshooting safety hazards. Demonstrate the numerous factors of the troubleshooting process and standard process for reducing machines from the systems to their subsystems. Demonstrate the philosophies of troubleshooting in an industrial environment.



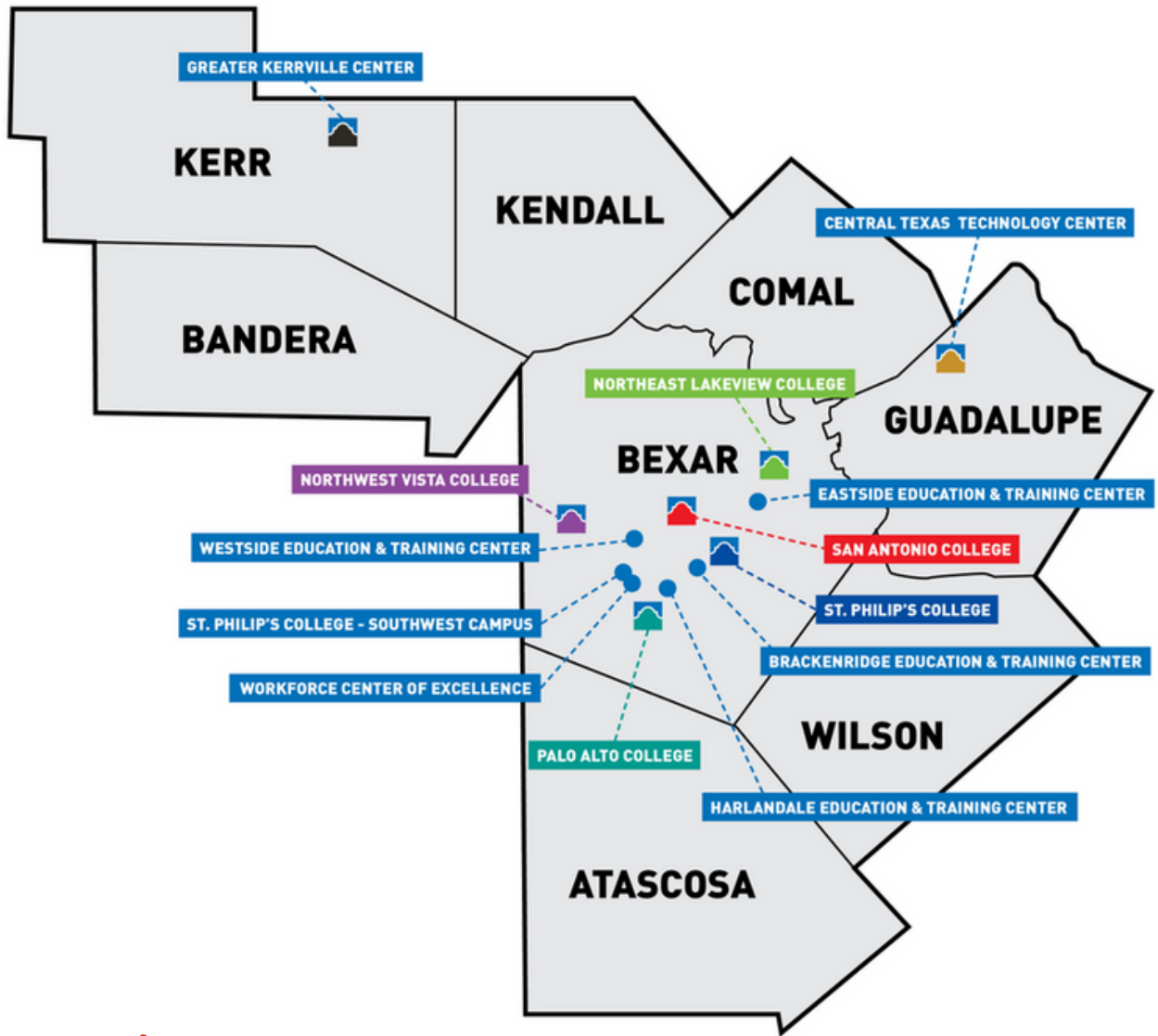
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