

## Electrical Maintenance Specialist Certificate

The Electrical Maintenance Specialist program is for students who want to concentrate on a wide spectrum of applied electrical topics. Courses in this pathway include an introduction to robot programming along with electrical courses ranging from fundamentals to digital electronics and motor drives and controls. Power transmission in the industrialized environment also part of this program. The Electrical Maintenance Specialist is an individual who brings a valuable skill set to the diverse needs of today's complex industrial applications. Upon successful completion, a FANUC Handling Tool Operation and Programming certification will be issued.

Please note: The Manufacturing Essentials Program is a pre-requisite to entering this program. This pre-req may be waived based on experience or successful completion of a hands-on assessment in these areas. Assessment to be completed at the expense of the student.

Non-Credit Course Code	Course Title	Hours	Days
CELC 8013	Electrical Fundamentals	40	5
CELC 8012	Motor Controls & Drives	40	5
CELC 8016	Digital Electronics	40	5
CMNF 8269	Fluid Power Fundamentals	40	5
CMNF 8241	FANUC Robotics Operations	40	5
CMNF 8247	Basic PLC	40	5
CMNF 8166	Mechanical Systems/ Power Transmission	40	5
CMNF 8239	Automated Systems Troubleshooting	40	5
A certificate of completion will be awarded to students who successfully complete the above courses.		320 hours	40 days

### Non-Credit Course Descriptions

#### Electrical Fundamentals– CELC 8013 – 40 hours

**Prerequisite: None**

This forty (40) hour training course covers the basics of AC (Alternating Current) and DC (Direct Current) theory and fundamentals. The student will first gain an understanding of the concepts of electrical schematics, components, voltage, current and resistance. These fundamentals will then be applied through Ohm's Law to basic circuit design and analysis. Power, magnetism and DC generation will also be introduced to complete the theories of DC applications.

#### Motor Controls & Drives– CELC 8012 – 40 hours

**Prerequisite: CELC 8013/Electrical Fundamentals**

This forty (40) hour course is designed to provide the basic skills in AC / DC motors and motor controls. The course provides an understanding of the operation of AC and DC motors and motor control circuits. Course topics include AC / DC motor operations, control circuit components, motor control wiring, connections, ladder diagrams, and interpretation of electronic motor control schematics.

#### Digital Electronics– CELC 8016 – 40 hours

**Prerequisite: CELC 8013/Electrical Fundamentals**

This forty (40) hour training course covers the basics of digital electronics fundamentals and troubleshooting digital circuits. Course topics include concepts of logic gates, Boolean expressions, schematics for logic gates, inverters, amplifiers, digital electronic circuits, and troubleshooting analysis.

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**Fluid Power Fundamentals – CMNF 8269 - 40 hours**

**Prerequisite:** *CMTH 8008/Shop Math*

This forty (40) hour course is designed to provide the basic skills in fluid power. This course provides an understanding of fluid power symbols, basic components of fluid power systems including basic laws and formulas for fluid power calculations. Course topics include pumps, control valves, actuators, and maintenance procedures of fluid power systems.

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**FANUC Robotics Operations – CMNF 8241 – 40 hours**

**Prerequisite:** *None*

This forty (40) hour course is designed to provide the basic skills needed to operate and program FANUC robots. Course topics include robotic safety, controls, operations, and handling tool programming.

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**Basic PLC – CMNF 8247 – 40 hours**

**Prerequisite:** *CELC 8016/Digital Electronics and CELC 8013 Electrical Fundamentals and CELC 8012 Motor Controls & Drives*

This forty (40) hour course is designed to provide skills in programmable logic controllers (PLC) fundamentals. The course provides a general understanding of PLC hardware, applications, and logic. Course topics include PLC hardware, navigation of PLC controller software, use of simple logic instructions, and basic trouble-shooting.

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**Mechanical Systems/Power Transmission – CMNF 8166 – 40 hours**

**Prerequisite:** *None*

This forty (40) hour course is designed to provide skills in mechanical power transmission systems. The course provides an understanding of mechanical systems and drives of power transmission mechanical equipment. Course topics include safety, chain drives, sprockets, belt drives, gears, motors, clutches, and couplings.

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**Automated Systems Troubleshooting – CMNF 8239 - 40 hours**

**Prerequisite:** *CELC 8013/Electrical Fundamentals, CMNF 8241/FANUC Robotics Operations, CMNF 8053/Hydraulics and CMNF 8207/Pneumatics or CMNF 8269/Fluid Power Fundamentals*

This forty (40) hour training course covers system level training and system integration fundamentals. Course topics include trouble-shooting programmable logic controllers (PLC's) integrated with electro-mechanical systems; Trouble-shooting integrated fluid power systems; Trouble-shooting integrated welding systems; Using electrical and fluid/pneumatic power schematics in trouble-shooting.

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**Optional Courses:**

CELC 8020	Electro Hydraulics and Pneumatics	CMNF 8280	Advanced PLC Maintenance and Troubleshooting
CMNF 8285	Intermediate PLC - 1	CMNF 8053	Hydraulics Fundamentals
CMNF 8279	Intermediate PLC - 2	CMNF 8207	Pneumatics Fundamentals

Upon successful completion of the Electrical Maintenance Specialist Pathway and the optional courses, a student may choose to take a Siemens Mechatronic Systems Certification Level 1 exam.

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