

Controls Technician Certificate

The Controls Technician program prepares individuals for a future in an advanced manufacturing environment. The Controls Technician concentrates on how machines coordinate and communicate in the assembly process. Topics covered include programming and troubleshooting of Programmable Logic Controllers (PLCs) and Human Machine Interface (HMI) devices. Motor control with Variable Frequency Drive (VFD) technology and part tracking utilizing Radio Frequency Identification (RFID) are also covered in this program. Controls Technicians must be creative and analytical in their approaches when working with modern production processes.

Upon successful completion, a FANUC Handling Tool Operation and Programming certification will be issued and a student may choose to take a Siemens Mechatronic Systems Certification Level 1 exam.

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
CELC 8022	Electronic Sensors	24	3
CMNF 8269	Fluid Power Fundamentals	40	5
CMNF 8241	FANUC Robotics Operations	40	5
CMNF 8247	Basic PLC	40	5
CMNF 8285	Intermediate PLC - 1	40	5
CMNF 8279	Intermediate PLC - 2	40	5
CMNF 8280	Advanced PLC Maintenance and Troubleshooting	40	5
CMNF 8287	Allen Bradley HMI Programming	40	5
CMNF 8282	VFD Programming and Troubleshooting – VFD Power Flex	16	2
CMNF 8281	RFID – Radio Frequency Identification	24	3
A certificate of completion will be awarded to students who successfully complete the above courses.		464 hours	58 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.

Electronic Sensors– CELC 8022 – 24 hours***Prerequisite: CELC 8013/Electrical Fundamentals***

This twenty-four (24) hour course introduces the student to the newest and the most important electronic automation (Must Know Technology) of today, and the future. The student will be introduced to the many types and boundary ranges of sensors. Adjusting and alignment of sensors where needed will be included in the coursework. Sinking and sourcing explanations along with NPN and PNP types of sensors are included in the class. Interfacing sensors with PLC inputs and troubleshooting field wiring will also be covered.

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.

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.

Basic PLC – CMNF 8247 – 40 hours***Prerequisite: 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.

Intermediate PLC-1 – CMNF 8285 – 40 hours***Prerequisite: CMNF 8247/Basic PLC***

PLC Intermediate 1: This course builds on the foundations of the PLC Basics course to include importing and exporting files, introduction to Ethernet and DeviceNet communication protocols. Students will also configure RSLinx serial drivers and work with the BootP server. Ladder logic components and tag assignment programming elements are also introduced along with online editing capabilities.

Intermediate PLC-2 – CMNF 8279 – 40 hours***Prerequisite: CMNF 0007/Intermediate PLC-1***

PLC Intermediate 2 is the third course in the PLC progression of courses with an emphasis how machines communicate with each other. Topics comprise toggling bits, trending and forcing programming elements. The configurations of I/O and communication modules plus rack arrangements and properties are also covered. File management and RSNetworx. DNT configuration file creation are included in this course.

Advanced PLC Maintenance and Troubleshooting – CMNF 8280 – 40 hours***Prerequisite: CMNF 0008/Intermediate PLC-2***

This forty (40) hour course is designed to provide advanced skills in PLC. The course provides an understanding of PLC hardware, system architecture and programming software. Course topics include setup, instruction sets, hardware, advanced software programming and troubleshooting.

Allen Bradley HMI Programming – CMNF 8287 - 40 hours***Prerequisite: None***

This forty (40) hour course is designed to provide the skills in HMI fundamentals. The course provides an understanding of HMI functions hardware and applications. Course topics include PLC to HMI instructions, hardware, HMI graphics, and creating troubleshooting messages displayed on HMI.

VFD Programming and Troubleshooting - VFD Power Flex – CMNF 8282 – 16 hours***Prerequisite: None***

This sixteen (16) hour training course covers the basics of control loops. Students learn the basic functionality of servo systems and their practical applications and programming of the Allen Bradly PowerFlex VFD.

RFID - Radio Frequency Identification - CMNF 8281 - 24 hours***Prerequisite: None***

This twenty-four (24) hour class covers the use of Radio Frequency Identification (RFID) tags common in major corporations throughout the world. The major reasons for adopting this technology will be covered by looking at use cases in the pharmaceutical, retail, manufacturing, supply chain and security industries. This training will look at how RFID works technically, and how a company can find sound business reasons to adopt this technology. Participants will develop an understanding of the advantages and disadvantages of each using the latest technology.

Optional Courses:

CBPR 8012	Blueprint Reading and GD&T	CMNF 8053	Hydraulics Fundamentals
CQLY 8142	Metrology	CMNF 8207	Pneumatics Fundamentals
CELC 8020	Electro Hydraulics and Pneumatics	CMNF 8239	Automated Systems Troubleshooting
CMNF 8166	Mechanical Systems/ Power Transmission		
