

# MECHATRONICS

Certificate program now at MVCC

## What is it?

**Mechatronics** is an interdisciplinary program focused on mechanics, electronics, motor control systems, and automation, which drive the design, operation and maintenance of all modern complex machinery. The certificate program is designed to help students develop the technical skills needed to support the installation, maintenance, repair, calibration, and troubleshooting of control circuitry and machine networks.

## Where is MECHATRONICS?

Housed in MVCC's **STEM Center**, this hands-on program is one of only a few in the region to offer this training, which prepares students for entry-level positions that involve the operation

and maintenance of **electro-mechanical systems** commonly found in the **advanced manufacturing industry**. Systems-level analysis, assembly, and troubleshooting techniques are stressed with hands-on laboratory experiences to complement classroom-based instruction.

Upon completion of the program, graduates will be qualified to work in the operations, installations, and maintenance of automated and robotically controlled systems. **ALL CREDITS EARNED WILL** also **TRANSFER** to the **Electrical Service Technician - Electrical Maintenance Associate in Occupational Studies (AOS) degree** if students decide to pursue that path. Students completing the Mechatronics certificate will also be prepared to take tests for industry-recognized certifications.

## EMPLOYMENT

The Mechatronics certificate program prepares students for immediate entry-level employment as local and regional manufacturers are looking to grow their businesses. For example, the **Nano Utica Project on the SUNY Polytechnic** campus is expected to create an additional **1,500 jobs in the local community** in the advanced manufacturing semiconductor industry.

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MOHAWK VALLEY COMMUNITY COLLEGE

MVCC is an equal educational opportunity institution.

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TRAINING  
AND EDUCATION  
IN ADVANCED  
MANUFACTURING

This program was made possible by the U.S. Department of Labor through a Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant awarded to SUNY, which provided funding to equip the labs.

# MVCC'S MECHATRONICS CERTIFICATE PROGRAM PREPARES STUDENTS FOR A CAREER IN ADVANCED MANUFACTURING IN JUST ONE YEAR!

## First Semester

### MA105 Technical Mathematics 1

4 credits

This course covers the four fundamental operations on integers, rational numbers, and real numbers. It includes the study of weights and measures, exponents and radicals, factoring, and linear equations, with an emphasis on technical applications. Two class hours and four lab hours weekly.

### ET111 Electrical Systems

4 credits

This course provides the basic knowledge and skills necessary within any electrical service technician program. It includes an in-depth study of electrical units and prefixes, Ohm's Law, series and parallel DC resistive circuits, as well as electrical energy and power relationships in DC circuits. It investigates AC sine wave generation, mutual inductance, inductive and capacitive reactance, instantaneous values of voltage and current, as well as real and apparent power. Troubleshooting techniques and strategies to identify, localize, and correct malfunctions are examined. Practical application of each topic is included in laboratory. Three class hours and two lab hours weekly. Prerequisite: MA105 Technical Mathematics 1.

### ET127 Modern Industrial Practices

3 credits

This course presents a broad introduction of topics related to industrial and manufacturing environments. Key principles of safety and workplace hazard awareness, quality practices and measurement methods, modern manufacturing processes and production methods, and an awareness of maintenance procedures in manufacturing environments are discussed. Three class hours and two lab hours weekly.

### MT149 Pneumatic and Hydraulic Systems

3 credits

This course presents a study of fluid power technology using fluids or compressed air as the transfer media. Complete hydraulic and pneumatic systems are studied, including power sources, reservoirs, pumps, compressors, lines, valves, and actuators. Troubleshooting strategies used to identify, localize and correct malfunctions in pneumatic and hydraulic systems are presented. Preventative maintenance and safety issues are discussed. Two class hours and two lab hours weekly.

## Second Semester

### ET104 Systems Diagrams

3 credits

This course covers the types, application, and use of electrical/electronic drawings. It covers schematic diagrams and symbols as well as the operation of electro-mechanical devices. The course differentiates between schematics and wiring diagrams. It develops the use of block diagrams, schematics, ladder-logic diagrams, wiring diagrams, assembly drawings, and bills of material. Topics include Programmable Logic Controllers (PLCs), Basic Relay PLC Instructions, PLC Timers and Counters, and PLC programs in the form of PLC ladder diagrams. Two class hours and two lab hours weekly. Prerequisite: ET111 Electrical Systems.

### ET131 Electrical Machinery and Controls 1

4 credits

This introductory course investigates the construction, operation, and control of electrical equipment installed and maintained by the various electrical trades. Topics pertain to direct current equipment and include shunt, series, and compound motors and generators, manual and automatic DC controllers, stepping motors, and DC meters. It emphasizes the practical aspects of magnetic flux, counter-electromotive force, armature and field currents, motor and generator loading conditions, and the relationship of these electrical characteristics to specific types of mechanical, electrical, and electronic controllers. Two class hours and four lab hours weekly. Prerequisites: ET111 Electrical Systems and MA105 Technical Mathematics 1.

### MT139 Mechanical Systems

4 credits

This course is a study of the basic mechanical components in a complex mechatronics system. Topics covered include basic functions and physical properties of mechanical components and the roles they play in the system, such as materials, lubrication requirements and surface properties. Troubleshooting techniques and strategies used to identify, localize and correct malfunctions are presented. Concepts in systematic preventative maintenance and mechanical component safety are presented, and technical documentation, such as data sheets and specifications of mechanical elements, are also covered. Two class hours and four lab hours weekly.

### ET251 Mechatronic Systems

3 credits

This course provides hands-on experience in the control, maintenance, and simulation of a mechatronics system in a team environment to promote learning a broad array of job-ready troubleshooting skills in integrated technologies. Topics covered include: system level programming/ troubleshooting, applications and calibration of hall-effect sensors, vacuum grippers, pneumatic robots, material feeding system, magnetic sensors, photoelectric sensors, magnetic reed switches, limit switches, inductive sensors, capacitive sensors, ultrasonic sensors, synchronous belt drives, ball screw drives, part rejection/transfer, stepper motors, homing sensors, GMR (Giant Magnetoresistive) sensors, pneumatic screw feeders, pick and place assembly, gravity feeders, servo robotics, and parts transfer. Two class hours and two lab hours weekly.

### Technology Elective

3 credits

May be fulfilled by MT155 Intro to Solid Modeling, MT107 Basic Machine Shop, or BM150 Principles of Entrepreneurship.

For information about MVCC student outcomes, financial aid, debt, employment, and more, visit [www.mvcc.edu/consumer](http://www.mvcc.edu/consumer).