LAKESHORE COLLEGE

ELECTRO-MECHANICAL AUTOMATION TECHNOLOGY

Program Number 10-620-1
Associate Degree of Applied Science • Four Terms

ABOUT THE PROGRAM

Change is constant. Change is rapid. In the world of manufacturing, technology change brings more complex systems of assembly, control measurement, and material processing of manufactured products. If you're good at problem solving, like working with automated manufacturing equipment, and you're looking forward to work that continuously challenges you to keep growing your knowledge and skills—consider an always-evolving career in our Electro-Mechanical Technology program.

PROGRAM OUTCOMES

- Perform work safely.
- Troubleshoot electrical and mechanical systems and devices.
- Repair electrical and mechanical systems.
- Communicate technical information.
- Integrate electrical and mechanical systems and devices.

CAREER AND EDUCATION ADVANCEMENT OPPORTUNITIES

Lakeshore credits transfer to over 30 universities. For more information visit lakeshore.edu/future-students/transfer.

ADMISSIONS AND FIRST SEMESTER ENROLLMENT STEPS

- Submit online application.
- Complete the online Student Success Questionnaire.
- Complete Get Started at Lakeshore appointment.

**Submit high school transcripts, college transcripts, and test scores (optional, highly recommended). Official transcripts will be needed for transferring college credit(s) and for financial aid purposes.*

ACADEMIC PREPAREDNESS/FUTURE SEMESTER ENROLLMENT STEPS

If applicable, complete program-specific academic preparedness requirements and enrollment steps prior to enrolling in occupational or core courses. Students will be notified if there is a program waitlist. View the college's program webpage for details: https://lakeshore.edu/programs-and-courses/career-areas/manufacturing/electro-mechanical-automation-technology.

APPROXIMATE COSTS

$157.45 per credit tuition (WI resident) plus $9.45 per credit student activity fee. Material fee varies depending on course. Other fees vary by program. Visit https://lakeshore.edu/paying-for-college/tuition-and-fees for details.

FINANCIAL AID

This program is eligible for financial aid. Visit lakeshore.edu/Financial-Aid or talk with your College Recruiter about how to apply for aid.

SPECIAL NOTE

Accelerate your learning, earn credit for what you know, and get personalized support to reach your goals. The full CBE definition may be found at lakeshore.edu/CBE.

RELATED PROGRAMS

- Maintenance Mechanic
- Electro-Mechanical Maintenance Technician
- Manufacturing Engineering Technology
- Industrial Electrician Apprenticeship
- Maintenance Technician Apprenticeship

CONTACT

Lakeshore College Recruiter
920.693.1366 • Recruitment@lakeshore.edu

Catalog No.	Class Title	Credit(s)
	Term 1	
10804113	College Technical Math 1A OR 10804198 Calculus 1** (4 cr)	3
10620105	DC Fundamentals	2
10620255	Hydraulics and Pneumatics*	3
10620122	Industrial Wiring	2
10620169	Robotic Mechanical Maintenance	1
10620224	Microcontroller Programming*	1
10462207	Tools and Measurement*	1
10801136	English Composition 1	3
		16
	Term 2	
10620110	AC Fundamentals	2
10620238	Programmable Controllers-Allen Bradley*#	3
10620141	Industrial Controls and Motors	3
10806154	General Physics 1	4
10809198	Introduction to Psychology	3
10801196	Oral/Interpersonal Communication	3
		18
	Term 3	
10620164	Electromechanical Systems	2
10620247	Electronic Devices/Transducers*	2
10620240	Programmable Controllers - Allen Bradley Advanced*#	2
10620168	Robotics Introduction#	2
10620294	Touch Screen Applications*#	2
10620298	Industrial Networks*#	2
10620293	NEC Codes*#	1
10620230	Mechanical Drive Systems*	3
		16
	Term 4	
10620195	Industrial Troubleshooting	1
10620197	Analog Controls	2
10620171	Robotics Advanced#	2
10620151	Electrical Robotic Maintenance	2
10620185	Robotic Integration	1
10620299	Integration of Manufacturing*	2
10620196	Industrial Applications	4
10809196	Introduction to Sociology OR 10809144 Macroeconomics OR 10809143 Microeconomics	3
		17
		TOTAL 67

*CBE delivery only

#Class may qualify for continuing education units (CEUs) for electricians.

**Calculus 1 is designed for students planning to transition to a 4-year college following Lakeshore program completion.

Curriculum and program acceptance requirements are subject to change. Program start dates vary; check with your Academic Counselor for details. The tuition and fees are approximate based on 2026-2027 rates and are subject to change prior to the start of the academic year.

LAKESHORE COLLEGE

AC FUNDAMENTALS...prepares the student to analyze electrical circuits using AC math, analyze AC waveforms, measure and analyze AC power, analyze capacitors and inductors in DC and AC circuits, analyze AC circuits containing reactance and calculate resonance, apply the elements and properties of basic measuring circuits, and describe transformer characteristics. PREREQUISITE: 10620105 DC Fundamentals or 10660105 DC Fundamentals

ANALOG CONTROLS...introduces instrumentation used for process control. The student will test, calibrate, install, and commission transmitters in varied processes. PREREQUISITE: 10660110 AC Fund or PREREQS: 10620110 AC Fund, 10620141 Indust Controls & Motors, 10620140 Prog Contr AB Adv,10620194 Touch Screen App, 10620147 Electronic Devi/ Transducers, 10620198 Industr Networks or COREQ: 10620298 Industr Networks

COLLEGE TECHNICAL MATHEMATICS 1A...prepares the student to solve linear, quadratic, and relational equations; graph; formula rearrangement; solve systems of equations; percent; proportions; and operations on polynomials. Emphasis will be on the application of skills to technical problems. Discuss math academic course support with your Counselor.

DC FUNDAMENTALS...prepares the student to convert values to scientific and engineering notations; calculate math quantities; describe basic atomic theory; identify basic electrical terms; use established symbols standards; describe DC voltage characteristics and current sources and electrical resistance; measure and analyze electrical quantities in series and parallel circuits; and desolder/solder single lead components. COREQUISITE: 10804113 College Tech Math 1A or 10804115 College Tech Math 1 or 10804198 Calculus 1 or 10804118 Interm Algebra with Apps

ELECTRICAL ROBOTIC MAINTENANCE...introduces students to causes of error codes and their repair with Fanuc R30iB controller. Students will also be trained in DCS, Ethernet communication and I/O. PREREQUISITES: 10620169 Robotic Mechanical Maintenance, 10620122 Industrial Wiring and 10620168 Robotics Introduction

ELECTROMECHANICAL SYSTEMS...prepares the student to tune, run, utilize electrical control of hydraulic systems, explore PID control of motor speed; and investigate open and closed loop control systems. PREREQUISITE: 10620104 Fluid Power 2 or 10620155 or 10620255 Hydraulics and Pneumatics and COREQUISITE: 10620110 or 10660110 AC Fundamentals

ELECTRONIC DEVICES/TRANSDUCERS...prepares students to learn the operation of transducers that measure process variables such as temperature, pressure, and level. Students will investigate input transducers and determine how they interface with industrial control systems. Transmitters will be analyzed, configured, and calibrated to properly indicate the physical characteristic being measured. PREREQUISITE: 10660110 AC Fundamentals or COREQUISITE: 10620110 AC Fundamentals

ENGLISH COMPOSITION 1...is designed for learners to develop knowledge and skills in all aspects of the writing process. Planning, organizing, writing, editing and revising are applied through a variety of activities. Students will analyze audience and purpose, use elements of research, and format documents using standard guidelines. Individuals will develop critical reading skills through analysis of various written documents. Discuss reading and writing academic course support with your Counselor.

GENERAL PHYSICS 1...presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversions and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves. PREREQUISITE: 10804113 College Tech Math 1A. Discuss math academic course support with your Counselor.

HYDRAULICS AND PNEUMATICS...prepares the learner to identify hydraulic and pneumatic component symbols and terms, adjust a pressure relief valve, analyze the operation of a pilot operated relief valve; analyze Pascal's law; evaluate flow, velocity, work and power in industrial hydraulic and pneumatic circuits; analyze meter-in, meter-out, and bypass flow control circuits; identify basic hydraulic and pneumatic control valves; and assemble hydraulic circuits. COREQUISITE: 10804113 College Tech Math 1A or 10804115 College Technical Math 1 or 10804198 Calculus 1 or 10804118 Intermediate Algebra with Apps

INDUSTRIAL APPLICATIONS...prepares the learner to configure, install, troubleshoot and maintain automation equipment in a "real world" setting. This course will include wiring and configuring automation equipment, wiring and configuring industrial networks, wiring, programming and troubleshooting PLCs and touchscreens. These practices will be applied to create and maintain a manufacturing process. This course is highly computer based. PREREQUISITES: 10620104 Fluid Power 2 or 10620155 or 10620255 Hydraulics/Pneumatics, & 10620194 or 10620294 Touch Screen Appl & 10620168 Robotics Intro & 10620198 or 10620298 Industrial Networks & 10620193 NEC Codes & COREQ: 10620195 Indust Troubleshooting

INDUSTRIAL CONTROLS AND MOTORS...prepares the learner to select control devices by function and operation; illustrate electrical circuits using symbols, diagrams, and abbreviations; explain the operation of magnetic solenoids and apply motor control techniques and introduces the student to three-phase power motor circuits for industrial applications. PREREQUISITE: 10620122 Industrial Wiring and COREQUISITE: 10620110 AC Fundamentals or PREREQUISITE: 10660110 AC Fundamentals

INDUSTRIAL NETWORKS...prepares the learner to configure, install and troubleshoot industrial communication networks. This course is highly computer based. Class may qualify for 48 hours of Continuing Education Units (CEUs) for Electricians. PREREQUISITE: 10620140 Programmable Controls AB Advanced or COREQUISITE: 10620240 Programmable Controls AB Advanced

INDUSTRIAL TROUBLESHOOTING...prepares the learner to conduct effective machine control troubleshooting techniques with an understanding of preventive maintenance methods designed to minimize motor and controls issues between preventive maintenance measures. PREREQUISITE: 10620141 Industrial Controls and Motors

INDUSTRIAL WIRING...prepares the learner to follow safety procedures; maintain a safe and healthy work environment; construct electrical circuits; measure electrical quantities using a VOM and/or DVM; analyze measured values using electrical circuit laws; construct typical industrial control circuits; and analyze typical industrial control circuits.

INTEGRATION OF MANUFACTURING...provides the learner with a detailed examination of automated processes and devices that are integrated together in a manufacturing environment. PREREQUISITES: 10620140 Prog Contr AB Adv, 10620194 Touch Screen Apps, 10620147 Elec Devices/Transducers, 10620141 Ind Ctrls & Motors, 10620198 Ind Networks or COREQUISITE: 10620298 Ind Networks

INTRODUCTION TO PSYCHOLOGY...introduces students to a survey of the multiple aspects of human behavior. It involves a survey of the theoretical foundations of human functioning in such areas as learning, motivation, emotions, personality, deviance and pathology, physiological factors, and social influences. It directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings. Discuss reading academic course support with your Counselor.

INTRODUCTION TO SOCIOLOGY...introduces students to the basic concepts of sociology: culture, socialization, social stratification, multi-culturalism, and the five institutions, including family, government, economics, religion, and education. Other topics include demography, deviance, technology, environment, social issues, social change, social organization, and workplace issues. Discuss reading academic course support with your Counselor.

MECHANICAL DRIVE SYSTEMS...prepares the learner to use tools and fasteners safely; identify belt and chain drive components; install and adjust belt and chain drives; apply bearing and lubrication information; perform coupling alignment using straight edge, feeler gauge, and dial indicator and laser methods; identify various gear drives; calculate gear ratios; and analyze first-, second-, and third-class levers.

MICROCONTROLLER PROGRAMMING...introduces the learner to concepts in basic digital programming, programming logic, electronic components, and Digital and Analog I/O.

NEC CODES...introduces the learner to National Electric Codes NFPA 70. Prepares the learner to apply NFPA 70 to motor and control installations and repairs. Class may qualify for 24 hours of Continuing Education Units (CEUs) for Electricians. PREREQUISITE:10620141 Industrial Controls and Motors

ORAL/INTERPERSONAL COMMUNICATION...provides students with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. Discuss reading academic course support with your Counselor.

PLCS ADVANCED...prepares the learner to develop applications utilizing subroutine instructions, analog modules; gain a basic understanding of creating and troubleshooting programs using the ControlLogix, Studio5000 software. This course is highly computer based. Class may qualify for 48 hours of Continuing Education Units (CEUs) for Electricians. PREREQUISITE: 10620138 Prog Cntrls/AB

PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY...prepares the learner to understand basic PLC structure and terminology; learn to create and troubleshoot basic PLC programs using the RSLOGIX 500 software and the RSLINX communication software; become familiar with communicating with programming SLC-500 PLCs. This course is highly computer based. Class may qualify for 64 hours of Continuing Education Units (CEUs) for Electricians.

ROBOTIC INTEGRATION...students will examine the integration of Fanuc robots into industrial automation systems, involving Rockwell touch screens, PLCs, and industrial communication networks. Students will be required to complete an integration project using a Fanuc robotic cell. The project will tie everything learned during their time together – safety, machine integration, vision systems, machine applications for robotics, troubleshooting, and work documentation. PREREQUISITE: 10620298 or 10620198 Industrial Networks and COREQUISITES: 10620171 Robotics Advanced and 10620151 Electrical Robotic Maintenance

ROBOTIC MECHANICAL MAINTENANCE...introduces the students to the robot teach pendant and robot jogging. Students will be taught to replace servo motors, recalibrate the robot and back up robot software and programs.

ROBOTICS ADVANCED...introduces students to adv robot programming commands to include use of Fanuc IRvision on both Fanuc Robotic arm and Delta Robots. Once a student completes both Robotic Introduction and Robotics Advanced they will be well prepared to take the Fanuc Certification test by NOCTI. Class may qualify for 48 hours of Continuing Education Units (CEUs) for Electricians. PREREQUISITE: 10620168 Robotics Introduction

ROBOTICS INTRODUCTION...introduces the student to robotic axes, movement control, navigating the teach pendant, robotic frames, basic programming commands such as conditional branching, wait and call instructions. Class may qualify for 48 hours of Continuing Education Units (CEUs) for Electricians.

TOOLS AND MEASUREMENT...prepares the learner to use hand tools, precision measuring instruments, and torque tools.

TOUCH SCREEN APPLICATIONS...prepares the learner to create, edit, and troubleshoot screens, objects and I/O related to the FactoryTalkME application. Learners will create, edit and communicate with Allen-Bradley PLC programs for real-time control utilizing the touchscreen applications. This course is highly computer based. This class may qualify for 48 hours of Continuing Education Units (CEUs) for Electricians. PREREQUISITE: 10620140 Programmable Controls AB Advanced or COREQUISITE: 10620240 Programmable Controls AB Advanced