LAKESHORE TECHNICAL COLLEGE

ELECTRO-MECHANICAL AUTOMATION TECHNOLOGY

Program Number 10-620-1
Associate Degree in 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 Industry 4.0 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 gotoltc.edu/future-students/transfer.

ADMISSIONS AND FIRST SEMESTER ENROLLMENT STEPS

- Submit online application.
- Complete the online Student Success Questionnaire.
- Complete Student Success Tutorial prior to meeting with your program counselor.
- Schedule your 1st Time Program Counseling/Registration Session with your assigned program counselor to plan your first semester schedule, review your entire plan of study and discuss the results of the Student Success Questionnaire.

**Submit transcripts and test scores (optional, highly recommended): College transcripts, along with high school transcripts and test scores from within the last five years, used for course registration. Official transcripts needed for transferring college credit(s) and for financial aid purposes.*

APPROXIMATE COSTS

$149.50 per credit tuition (WI resident) plus $8.97 per credit student activity fee. Material fee varies depending on course. Other fees vary by program. Visit gotoltc.edu/financial-aid/tuition-and-fees for details.

FINANCIAL AID

This program is eligible for financial aid. Visit gotoltc.edu/Financial-Aid or talk with your Admissions Advisor about how to apply for aid.

RELATED PROGRAMS

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

CONTACT

Lakeshore Admissions Advisor
920.693.1366 • Admissions@gotoltc.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
10620155	Hydraulics and Pneumatics	3
10620122	Industrial Wiring	2
10620169	Robotic Mechanical Maintenance	1
10620124	Microcontroller Programming	1
10462107	Tools and Measurement	1
10801136	English Composition 1	3
		16
	Term 2	
10620110	AC Fundamentals	2
10620138	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
10620147	Electronic Devices/Transducers	2
10620140	Programmable Controllers - Allen Bradley Advanced*	2
10620168	Robotics Introduction*	2
10620194	Touch Screen Applications*	2
10620198	Industrial Networks*	2
10620193	NEC Codes*	1
10620130	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
10620199	Integration of Manufacturing	2
10620196	Industrial Applications	4
10809196	Introduction to Sociology OR 10809144 Macroeconomics OR 10809143 Microeconomics	3
		17
		TOTAL 67

*Class qualifies 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 program counselor for details. The tuition and fees are approximate based on 2024-2025 rates and are subject to change prior to the start of the academic year.

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: 10620110 AC Fundamentals or 10660110 AC Fundamentals, 10620141 Ind Cntrls and Motors, 10620140 PCLs Advanced, 10620194 Touch Screen Apps, 10620147 Elec Devices/Transducers

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 on the application of skills to technical problems. COREQUISITE: Math placement assessment or equivalent

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 communicate with, tune, run, and troubleshoot Allen-Bradley servos; utilize electrical control of hydraulic systems, explore PID control of motor speed; and investigate open and closed loop control systems. PREREQUISITES: 10620104 Fluid Power 2 or 10620155 Hydraulics and Pneumatics COREQUISITE: 10620110 AC Fundamentals or 10660110 AC Fundamentals

ELECTRONIC DEVICES/TRANSDUCERS…prepares the student to relate numbering systems with their functions in Electrical Ladder Diagrams and Data Transmission; gain an understanding of temperature and temperature sensing devices, weighing systems, ultrasonic and radar level detection, measuring flow, and pressure. The student will develop the ability to explain the operation of transducers that measure process variables and the transmitters that interface to industrial control systems. Transmitters will be analyzed, configured and calibrated to properly indicate the physical characteristic being measured and provide the information to control systems. 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. COREQUISITE: Writing placement assessment or equivalent AND Reading placement assessment or equivalent.

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 or Math placement assessment or equivalent

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

INDUSTRIAL APPLICATIONS...prepares the learner to configure, install, troubleshoot and maintain automation equipment in a "real world" setting. Course will include wiring and configuring automation equipment, wiring and configuring industrial networks, wiring, programming and troubleshooting PLCs and touchscreens. Practices will be applied to create and maintain a manufacturing process. Course is highly computer based. PREREQ: 10620140 Prog Cntrls AB Adv, 10620104 Fluid Power 2 or 10620155 Hydraulics/ Pneumatics, 10620194 Touch Screen Appl, 10620168 Robotics Intro, 10620193 NEC Codes, 10620198 Indust Networks and COREQUISITE: 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. COREQUISITE: 10620140 Programmable Controls AB Advanced. This class qualifies for 48 hours of Continuing Education Units (CEUs) for Electricians.

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 student with a detailed examination of automated processes and devices that are integrated together in a manufacturing environment. PREREQUISITE: 10620140 PCLs Advanced, 10620194 Touch Screen Apps, 10620147 Elec Devices/Transducers, 10620141 Ind Ctrls and Motors, and COREQUISITE: 10620198 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. COREQUISITE: Reading placement assessment or equivalent

INTRODUCTION TO SOCIOLOGY...introduces students to 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. COREQ: Rdg placement assessment or equiv

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 student to concepts in basic digital programming, programming logic, electronic components, and Digital and Analog I/O.

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

ORAL/INTERPERSONAL COMMUNICATION...provides students skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. COREQ: Rdg plcmnt assessment or equiv

PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY…prepares the student 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. This class qualifies for 72 hours of Continuing Education Units (CEUs) for Electricians.

PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY ADVANCED… prepares student to develop applications utilizing subroutine instructions, analog modules; gain basic understanding of creating and troubleshooting programs using the ControlLogix, Studio5000 software. Course is highly computer based. PREREQUISITE: 10620138 Prog Cntrls/AB. Class qualifies for 48 hrs of Continuing Education Units (CEUs) for Electricians.

ROBOTIC INTEGRATION…students examine integration of Fanuc robots into industrial automation systems, involving Rockwell touch screens, PLCs, and industrial communication networks. Students 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. COREQS: 10620171 Robotics Adv 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 advanced robot programming commands to include use of Fanuc IRvision on both Fanuc Robotic arm and Delta Robots. Once a student completes both Robotic Intro and Robotics Adv they will be well prepared to take the FanucCertification test by NOCTI. PREREQ: 10620168 Robotics Introduction. This class qualifies for 48 hours of Continuing Education Units (CEUs) for Electricians.

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. This class qualifies 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 student to create, edit, and troubleshoot screens, objects and I/O related to the FactoryTalkME application. Students 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 qualifies for 48 hrs of Continuing Education Units (CEUs) for Electricians. COREQUISITE: 10620140 Programmable Controls AB Advanced