LAKESHORE TECHNICAL COLLEGE

ELECTRO-MECHANICAL MAINTENANCE TECHNICIAN

Program Number 10-462-2
Associate Degree in Applied Science • Four Terms

ABOUT THE PROGRAM

Times are changing in the field of maintenance. Facilities are running with both manual and automated equipment and both need to be maintained and repaired. If you like to troubleshoot, work with your hands, and have an interest in math and electrical and mechanical processes, a career in maintenance is for you. Your expertise and knowledge is needed in today's modern, automated facilities.

PROGRAM OUTCOMES

- Demonstrate safe work procedures.
- Install industrial and robotic equipment and systems.
- Maintain industrial and robotic equipment and systems.
- Troubleshoot industrial and robotic equipment and systems.
- Repair industrial and robotic equipment and systems.
- Communicate technical information.

CAREER AND EDUCATION ADVANCEMENT OPPORTUNITIES

LTC 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.
- 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.*

FUTURE SEMESTER ENROLLMENT STEPS

- Complete online Student Success Tutorial prior to registering for second semester.

APPROXIMATE COSTS

- $146.20 per credit tuition (WI resident) plus $8.77 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.

SPECIAL NOTE

Students may need to supply their own safety glasses and welding gloves.

RELATED PROGRAMS

- Electro-Mechanical Automation Technology
- Millwright Apprenticeship
- Industrial Electrician Apprenticeship
- Maintenance Technician Apprenticeship

CONTACT

LTC Admissions Advisor
920.693.1162 • Admissions@gotoltc.edu

Catalog No.	Class Title	Credit(s)
	Term 1	
10804113	College Technical Math 1A OR 10804198 Calculus 1* (4 cr)	3
10462109	Maintenance Introduction	1
10462111	Maintenance Print Reading	2
10462107	Tools and Measurement	1
10620122	Industrial Wiring	2
10420194	Machine Tool Introduction	2
10442100	Safety and Welding Fundamentals	1
10457103	Fabrication Introduction	1
10462115	Layout and Rigging	1
		14
	Term 2	
10462123	Pumps, Fluid/Air Handling	2
10620155	Hydraulics and Pneumatics	3
10420103	Lathes 1	1
10420105	Mills 1	1
10462127	Bearings and Lubrication	2
10462117	Power Transmission	3
10462121	Troubleshooting and Machine Repair	3
10801196	Oral/Interpersonal Communication	3
		18
	Term 3	
10620169	Robotic Mechanical Maintenance	1
10620124	Microcontroller Programming	1
10620168	Robotics Introduction	2
10620105	DC Fundamentals	2
10809198	Introduction to Psychology	3
10801195	Written Communication	3
		12
	Term 4	
10620151	Electrical Robotic Maintenance	2
10620110	AC Fundamentals	2
10620164	Electromechanical Systems	2
10620138	Programmable Controllers - Allen Bradley	3
10620141	Industrial Controls and Motors	3
10620147	Electronic Devices/Transducers	2
10809195	Economics	3
		17
		TOTAL 61

*Calculus 1 is designed for students planning to transition to a 4-year college following LTC 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 2023-2024 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 Fund or 10660105 DC Fund

BEARINGS AND LUBRICATION...prepares the learner to properly identify, remove, install, and maintain both plain and rolling element bearings used with either a radial or axial load, including ball, cylindrical roller, tapered roller, linear, and thrust bearings; use manufacturers' resources for proper usage and life of bearings; and look at proper types, properties, and application methods of lubrication. PREREQUISITES: 10804113 College Tech Math 1A and 10462109 Maintenance Intro or 31462309 Industrial Maintenance Intro

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. COREQUISITE: Math placement assessment or equivalent

DC FUNDAMENTALS...prepares 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. COREQ: 10804113 Coll Tech Math 1A or 10804115 Coll Tech Math 1 or 10804198 Calculus 1 or 10804118 Interm Algebra w/ Apps

ECONOMICS...provides participant with an overview of how a market-oriented economic system operates, and it surveys the factors which influence national economic policy. Basic concepts and analyses are illustrated by reference to a variety of contemporary problems and public policy issues. Concepts include scarcity, resources, alternative economic systems, growth, supply and demand, monetary and fiscal policy, inflation, unemployment and global economic issues. COREQUISITE: Reading placement assessment or equivalent

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. PREEQUISITES: 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. PREREQUISITES: 10660110 AC Fundamentals or 10620110 AC Fundamentals

FABRICATION INTRODUCTION...introduces the learner to various types of structural steel, sheet metal, and pipe, and prepares the learner to perform fabrication from assembly prints, including cutting, welding, bending, straightening, and repair. COREQ: 10442100 Welding Intro or PREREQS: 31442346 Ind Maint Intro to Welding or 31442300 Welding Intro

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. PREREQUISITES: 10804113 College Tech Math 1A

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 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.

INTRODUCTION TO PSYCHOLOGY...introduces students to a survey of the multiple aspects of human behavior. 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. Directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings. PREREQ: Rdg plcmnt assmnt equiv or COREQ: 10838105 Intro to Rdg & Study Skills

LATHES 1…introduces the student to the characteristics and attributes of turning tools: follow engine lathe safety rules, identify engine lathe components, perform facing and center drilling operations, perform turning operations. COREQUISITE: 10462107 Tools & Msrmnt or PREREQUISITE: 31462325 Maint Tools & Msrmnt or CONDITION: 324571 Welding Fab

LAYOUT AND RIGGING…prepares the learner to perform layout skills for industrial maintenance to include machine layout, proper rigging, installation, and leveling with emphasis on baseline layout, machine rigging and installation, machine leveling, and alignment procedures. Participants will obtain lift truck operation certification upon completion. COREQUISITE: 10462109 Maintenance Intro

MACHINE TOOL INTRODUCTION...prepares the learner with the skills to identify basic types of machining processes, follow standard shop safety rules, use semi-precision and precision measuring tools, perform workpiece layout procedures, identify metal composition and classification, follow cutoff machine safety rules, operate vertical and horizontal cutoff machines, follow sensitive drill press safety rules, identify drill press components, interpret attributes of hole-producing tools, and operate a sensitive drill press.

MAINTENANCE INTRODUCTION…prepares the learner to apply basic safety, mechanics, force, friction, work, and energy; learn terminology related to maintenance; introduction to threaded and non-threaded fasteners and concrete anchoring; learn to use precision measuring tools; introduction to single-phase and three-phase motor wiring. PREREQUISITE: 31462325 Maintenance Tools and Measurement or COREQUISITE: 10462107 Tools and Measurement

MAINTENANCE PRINT READING…prepares the learner to read prints; make isometric sketches; interpret orthographic projection drawings, to include sections, surface finishes, and tolerancing. The course when delivered in the evening is self-paced, open-entry/exit, and designed for individualized student needs.

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

MILLS 1…prepares the learner to identify vertical milling machine components, select cutting tools and workholding device(s), apply safety rules, set up the vertical milling machine, and mill square surfaces. COREQUISITE: 10462107 Tools and Measurement or PREREQUISITE: 31462325 Maintenance Tools and Measurement or CONDITION: 324571 Welding Fab

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. COREQUISITE: Reading placement assessment or equivalent

POWER TRANSMISSION..introduces the learner to belt, chain, and gear drives used in industrial maintenance applications, including v-belts, flat belts, timing belts, conveyor chains, roller chains, bevel gears, worm gears, helical gears, spur gears, couplings, and alignment with emphasis on identification, installation, repair, and maintenance. COREQUISITE: 10462127 Bearings and Lubrication or PREREQUISITE: 10462119 Bearings and Lubrication

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.

PUMPS, FLUID/AIR HANDLING...prepares the learner to identify, install, repair, and maintain common pumps and plumbing applications, including centrifugal pumps, diaphragm pumps, packing and seals, tubing, and installing hose and piping used with fluid and air handling. COREQUISITE: 10620155 Hydraulics & Pneumatics and 10462119 Power Transmission

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 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.

SAFETY AND WELDING FUNDAMENTALS...introduces the learner to the world of welding, weld shop safety practices, welding terminology, and welding machine setup to industry standards. Learners will be introduced to the three major welding processes: SMAW, GMAW, and GTAW and will build skills welding with each process in the flat and horizontal positions while using the common welding joints found in industry. The learner will process material using the two major hand-held cutting processes - Oxyfuel and PAC.

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

TROUBLESHOOTING AND MACHINE REPAIR...prepares the learner to perform essential troubleshooting, repair, and preventive maintenance of various machine tools and installations used in industrial maintenance and to integrate the skills learned in the other maintenance courses to perform complete repair of machine tools. PREREQUISITE: 10620122 Industrial Wiring and 10462119 Power Transmission OR COREQUISITE: 10462117 Power Transmission AND 10462123 Pumps, Fluid/Air Handling

WRITTEN COMMUNICATION...teaches the writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, the student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills are required for this course. It also develops critical reading and thinking skills through the analysis of a variety of written documents. COREQUISITE: Writing placement assessment or equivalent AND Reading placement assessment or equivalent