

**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 electro-mechanical technology.

### 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

LTC credits transfer to over 30 universities. For more information visit [gotoltc.edu/future-students/transfer](http://gotoltc.edu/future-students/transfer).

### ADMISSION AND PROGRAM ENROLLMENT STEPS

- Submit online application.
- Submit transcripts (high school & other colleges). NOTE: Official transcripts required for acceptance of transfer credits; Financial Aid may require.
- Complete the online Student Success Questionnaire.
- Schedule a Program Advising Session with your assigned advisor to plan your first semester schedule, review your entire plan of study, discuss the results of the Student Success Questionnaire.

### APPROXIMATE COSTS

- \$136.50 per credit tuition (WI resident) plus \$8.10 per credit student activity fee. \$10 per credit online or hybrid fee. Material fee varies depending on course. Other fees vary by program. Visit [gotoltc.edu/financial-aid/tuition-and-fees](http://gotoltc.edu/financial-aid/tuition-and-fees) for details.

### FINANCIAL AID

This program is eligible for financial aid. Visit [gotoltc.edu/Financial-Aid](http://gotoltc.edu/Financial-Aid) or talk with your Career Coach about how to apply for aid.

### CONTACT

LTC Career Coach  
 920.693.1162 • [CareerCoach@gotoltc.edu](mailto:CareerCoach@gotoltc.edu)

| Catalog No.   | Class Title  | Credit(s)       |
|---------------|--|-----------------|
| <b>Term 1</b> |  |                 |
| 10620122      | Industrial Wiring                                      | 2               |
| 10620103      | Fluid Power 1  | 2               |
| 10620169      | Robotic Mechanical Maintenance                         | 1               |
| 10620105      | DC Fundamentals  | 2               |
| 10804113      | College Technical Math 1A                              | 3               |
| 10462107      | Tools and Measurement                                  | 1               |
| 10620124      | Introduction to Programming Logic                      | 1               |
| 10801195      | Written Communications                                 | 3               |
|               |  | <b>15</b>       |
| <b>Term 2</b> |  |                 |
| 10620104      | Fluid Power 2  | 3               |
| 10620138      | Programmable Controllers - Allen Bradley*              | 3               |
| 10620141      | Industrial Controls and Motors                         | 3               |
| 10620110      | AC Fundamentals  | 2               |
| 10806154      | General Physics 1                                      | 4               |
| 10801196      | Oral/Interpersonal Communication                       | 3               |
|               |  | <b>18</b>       |
| <b>Term 3</b> |  |                 |
| 10620130      | Mechanical Drive Systems                               | 3               |
| 10620140      | Programmable Controllers - Allen Bradley Advanced*     | 2               |
| 10620147      | Electronic Devices/Transducers                         | 2               |
| 10620164      | Electromechanical Systems                              | 2               |
| 10620168      | Robotics Introduction*                                 | 2               |
| 10620193      | NEC Codes*   | 1               |
| 10620194      | Touch Screen Applications*                             | 2               |
| 10620198      | Industrial Networks*                                   | 2               |
|               |  | <b>16</b>       |
| <b>Term 4</b> |  |                 |
| 10620171      | Robotics Advanced*                                     | 2               |
| 10620135      | Electrical Robotic Maintenance                         | 1               |
| 10620195      | Industrial Troubleshooting                             | 1               |
| 10620196      | Industrial Applications                                | 4               |
| 10620197      | Analog Controls  | 2               |
| 10620199      | Integration of Manufacturing                           | 2               |
| 10809196      | Introduction to Sociology OR 10809195 Economics (3 cr) | 3               |
| 10809198      | Introduction to Psychology                             | 3               |
|               |  | <b>18</b>       |
|               |  | <b>TOTAL 67</b> |

\*Class qualifies for continuing education units (CEUs) for electricians.

*Curriculum and Program Acceptance requirements are subject to change. Program start dates vary; check with your advisor for details. The tuition and fees are approximate based on 2019-2020 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 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, 10620141 Ind Cntrls and Motors, 10620140 PCLs Advanced, 10620194 Touch Screen Apps, 10620147 Elec Devices/Transducers

**COLLEGE TECHNICAL MATHEMATICS 1A**...prepares 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. PREREQ: 10834110 Elem Algebra wApps or 10804107 College Math or 31457318 Ind Mtnr Trades Math or 31420320 Mach Tool Math or math plcmnt assmnt equiv

**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

**ELECTRICAL ROBOTIC MAINTENANCE**...investigates error codes using the Fanuc A size cabinet with a R30iB controller. Students will identify the cause of the various codes and be trained in the repair. Students will also be trained in motor / gear replacement and robot mastering. 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 and 10620110 AC Fund or 10660110 AC Fund

**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

**FLUID POWER 1**...prepares the learner to identify hydraulic and pneumatic component symbols; 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. COREQUISITES: 10804115 College Technical Math 1 or 10804114 College Tech Math 1A

**FLUID POWER 2**...enhances the learner's ability to read schematics containing fluid power component symbols; assemble systems using schematics; analyze system's operation using a schematic; evaluate the general characteristics and terms of fluids under pressure, fluid conditioning, conductors, reservoirs, accumulators, pressure control; and troubleshoot malfunctioning pressurized systems. PREREQUISITE: 10620103 Fluid Power 1 or 10620155 Industrial Maintenance Hydraulics and Pneumatics

**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, 10804115 College Tech Math 1, or 10804118 Intermediate Algebra, or Math placement assessment equivalent.

**INDUSTRIAL APPLICATIONS**...prepares the learner to configure, install, troubleshoot and maintain automation equipment in a "real world" setting. This course will include writing 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. PREREQUISITE: 10620140 Prog Cntrls AB Adv, 10620104 Fluid Power 2, 10620194 Touch Screen Appl, 10620168 Robotics Intro, 10620193 NEC Codes, 10620198 Indust Networks and COREQUISITE: 10620195 Industrial 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. PREREQ: 10620122 Ind Wiring & COREQ: 10620110 AC Fund or PREREQ: 10660110 AC Fund

**INDUSTRIAL NETWORKS**...prepares the learner to configure, install and troubleshoot industrial communication networks. This course is highly computer based. COREQUISITES: 10620140 Programmable Controls AB Advanced. This class qualifies for 48 hrs 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 Cntrls & Motors, 10620168 Robotics Intro and COREQUISITE: 10620198 Ind Networks

**INTRODUCTION TO PROGRAMMING LOGIC**...introduces the student to concepts in basic digital programming, programming logic, electronic components, and Digital and Analog I/O.

**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. PREREQUISITE: Reading placement assessment equivalent or COREQUISITE: 10838105 Intro to Reading and Study Skills

**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. COREQUISITE: 10838105 Intro Reading and Study Skills or Reading placement assessment equivalent

**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.

**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 with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. COREQUISITE: 10838105 Intro Reading and Study Skills or Reading placement assessment equivalent

**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. Course is highly computer based. This class qualifies for 64 hrs of Continuing Education Units (CEUs) for Electricians.

**PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY ADVANCED**...prepares the student to develop applications utilizing subroutine instructions, analog modules; gain a basic understanding of creating and troubleshooting programs using the ControlLogix, RSLOGIX5000 software. Course is highly computer based. PREREQUISITE: 10620138 Prog Cntrls/AB. This class qualifies for 48 hrs of Continuing Education Units (CEUs) for Electricians.

**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**...introduce students to advanced robot programming commands to include use of Fanuc vision on the Fanuc Robots. PREREQUISITE: 10620168 Robotics Intro. This class qualifies for 48 hrs 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 hours of Continuing Education Units (CEUs) for Electricians.

**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. PREREQUISITE: 10831103 Intro to College Wrtg or Writing placement assessment equivalent and COREQUISITE: 10838105 Intro Rdg & Study Skills or Reading placement assessment equivalent