

## 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 TO DO'S

- Work with Career Coach to:
  - Submit application and \$30 fee.
  - Submit official transcripts (high school and other colleges).

### PROGRAM TO DO'S

- Work with Academic Advisor to:
  - Complete an assessment for placement (Accuplacer or ACT).
  - Complete Functional Abilities Statement of Understanding form.
  - Meet to plan your first semester schedule, review your entire plan of study, discuss placement assessment results and complete Program To Do's.

### APPROXIMATE COSTS

- \$134.20 per credit tuition (WI resident) plus \$7.38 per credit student activity fee. \$10 per credit online 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
10660105	DC Fundamentals	2
10804113	College Technical Math 1A	3
10620120	Basic Tools and Measurement	1
10620135	Electrical Robotic Maintenance	1
10801195	Written Communication OR 10801197 Technical Reporting	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
10660110	AC Fundamentals	2
10801196	Oral/Interpersonal Communication	3
10806154	General Physics 1	4
		<b>18</b>
<b>Term 3</b>		
10620130	Mechanisms Mechanics Introduction to	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
10620192	Frequency Drives	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>

*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 2018-2019 rates.*



**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. PREREQUISITES: 10660105 DC Fundamentals

**ANALOG CONTROLS**...introduces instrumentation used for process control. Student will test, calibrate, install, & 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

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

**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. PREREQUISITES: 10834110 Elementary Algebra w Apps or placement assessment equivalents, or 10804107 College Mathematics, 31457318 Ind Mtnr Trades Math or 31420320 Machine Tool Math

**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. COREQ: 10804115 College Tech Math 1 or 10804113 College Tech Math 1A

**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. COREQUISITE: 10620169 Robotic Mech Maint

**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 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. 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 Fund

**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 10804113 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

**FREQUENCY DRIVES**...prepares the learner to explain the function, construction and troubleshoot frequency drives as well as select and change parameters to meet operational characteristics for the drive application. PREREQUISITE: 10620141 Ind Controls & Motors

**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 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: 10620192 Freq Drives & 10620195 Indust Troubleshooting

**INDUSTRIAL CONTROLS AND MOTORS**...prepares 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. COREQUISITE: 10660110 AC Fund & PREREQUISITE: 10620122 Ind Wiring

**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

**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 and Motors, 10620168 Robotics Intro and COREQUISITE: 10620192 Frequency Drives, 10620198 Industrial 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. PREREQUISITE: Reading placement assessment 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 5 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 equivalent

**MECHANISMS MECHANICS INTRODUCTION TO**...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 student to National Electric Codes NFPA 70. Prepares the learner to apply NFPA 70 to motor and control installations and repairs. PREREQUISITE: 10620141 Industrial Control & Motors

**ORAL/INTERPERSONAL COMMUNICATION**...provides students with skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. COREQUISITE: 10838105 Intro Read & Study Skills or 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. This course is highly computer based.

**PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY ADVANCED**...prepares student to develop applications utilizing subroutine instructions, analog modules; gain a basic understanding of creating and troubleshooting programs using the ControlLogix, RSLOGIX5000 software. This course is highly computer based. PREREQUISITE: 10620138 Prog Cntrls/AB

**ROBOTIC MECHANICAL MAINTENANCE**...introduces the students to the robot teach pendant and robot joggng. 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 vision on the Fanuc Robots. 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.

**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. COREQUISITES: 10620140 Programmable Controls AB Advanced

**WRITTEN COMMUNICATION**...teaches the writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, student will analyze audience and purpose, research and organize ideas, and format & design documents based on subject matter and content. Keyboarding skills are required for this course. Develops critical reading & thinking skills through the analysis of a variety of written documents. PREREQUISITE: 10831103 Intro to College Wrtg equiv and COREQUISITE: 10838105 Intro Rdg and Study Skills or equivalent