

**Program Number 50-413-1**

**4-Year Contract**

**Work Hours (including related instruction): 8320**

**Related Instruction Hours: 720 • Night School Hours: 8**

### ABOUT THE APPRENTICESHIP

Apprenticeships are employer-sponsored training programs. You must have a contract before being invited to school. A special application process is used for these programs. Please contact the Apprenticeship Office for the proper forms. Apprenticeship means you earn while you learn. If you want a career in a skilled trade, apprenticeship is the best way to get there. You'll combine on-the-job training with on campus learning—you'll have the best of both worlds when it comes to learning the skills you need to get ahead. And even better, you'll earn a paycheck while you learn those skills.

### ABOUT THE CAREER

Industrial electricians maintain and repair many different types of electrical equipment. In addition, they modify and install electrical equipment such as motors, transformers, generators, controls, instruments, lighting systems, and power distribution. Typical duties of this trade include performing preventative maintenance; replacing units or parts such as wiring, fuses, circuit breakers, coils or switches; measuring, cutting, bending, threading and installing conduits; using such devices as test lamps, volt-ohm meters and oscilloscopes; working from blueprints, drawings, and diagrams; making mathematical computations to determine the current carrying capacities of electrical wire and equipment; and troubleshooting AC and DC drives and programmable logic controllers.

### CAREERS

Graduates of LTC's Industrial Electrician Apprenticeship program work as journey-level industrial electricians in commercial, industrial, and public establishments.

### INDUSTRIAL APPRENTICE APPLICATION REQUIREMENTS

- Determined by employer
- Wisconsin Apprentice Contract

### PROGRAM OUTCOMES

- Apply AC and DC theory to an industrial setting.
- Apply the National Electric Code requirements to industrial equipment and facilities.
- Apply operational and troubleshooting principles to a transformer installation.
- Maintain electric motors and motor controls.
- Test solid-state electronic system components.
- Apply operational and troubleshooting principles to power systems and variable speed drives.
- Apply operational and troubleshooting principles to programmable logic controllers and automation equipment.
- Apply operational and troubleshooting principles to fluid power systems.
- Interpret industrial equipment drawings and electrical prints.
- Communicate trade and occupational-related information effectively.

### APPROXIMATE COSTS

Contact the LTC Apprenticeship Office or visit [www.gotoltc.edu/apprenticeship](http://www.gotoltc.edu/apprenticeship) for detailed information.

### SPECIAL NOTE

You must have a sponsoring employer and contract before attending school.

### CAREER & 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).

Catalog No.	Class Title	Credit(s)
<b>Term 1</b>		
50413750	DC Electricity for IE Part 1	1
50413773	Safety and Print Reading for IE	0.5
50413762	Industrial Electrician Motor Controls 1	1
50413752	Codes for IE 1: Intro to the NEC	0.5
		<b>3</b>
<b>Term 2</b>		
50413774	DC Electricity for IE Part 2	1
50413763	Industrial Electrician Motor Controls 2	1
50413753	Codes for IE 2: OCPD and Electrical Device	0.5
		<b>2.5</b>
<b>Term 3</b>		
50413751	AC Electricity for IE Part 1	1
50413764	Industrial Electrician Motor Controls 3	1
50413754	Codes for IE 3: Article 250 Part A	0.5
		<b>2.5</b>
<b>Term 4</b>		
50413775	AC Electricity for IE Part 2	1
50413769	IE Programmable Logic Controllers 1	1
50413755	Codes for IE 4: Article 250 Part B	0.5
		<b>2.5</b>
<b>Term 5</b>		
50413760	Industrial Electrician Transformers	1
50413770	IE Programmable Logic Controllers 2	1
50413759	Codes for IE 8: Transformers	0.5
		<b>2.5</b>
<b>Term 6</b>		
50413761	IE Motors and Generators	1
50413771	IE Programmable Logic Controllers 3	1
50413758	Codes for IE 7: Motors and Generators	0.5
		<b>2.5</b>
<b>Term 7</b>		
50413768	IE Solid State Electronics	2
50413767	Fluid Power systems for IE - Hydraulics	0.5
50413766	Fluid Power Systems for IE- Pneumatics	0.5
		<b>3</b>
<b>Term 8</b>		
50413765	Power Systems & Variable Speed Drives for IE	2
50413757	Codes for IE 6: Conductors, Raceways, Data Cables	0.5
50413756	Codes for IE 5: Article 300 Cords/Cables	0.5
		<b>3</b>
		<b>TOTAL 21.5</b>

*Curriculum and Program Acceptance requirements are subject to change. Program start dates vary; check with the Apprenticeship Office for details. The tuition and fees are approximate based on 2020-2021 rates and are subject to change prior to the start of the academic year.*

**AC ELECTRICITY FOR IE PART 1**...introduces the industrial electrical apprentice to the basic concepts of alternating current. Emphasis is placed on circuit analysis and the problem solving skills necessary for the maintenance of the modern industrial electric systems. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**AC ELECTRICITY FOR IE PART 2**...introduces the industrial electrical apprentice to the basic concepts of alternating current. Emphasis is placed on circuit analysis and the problem solving skills necessary for the maintenance of the modern industrial electric systems. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 1: INTRO TO THE NEC**...introduces apprentice to the layout and purpose of the National Electric Code (NEC). It also strives to teach the apprentice proper methodology to research a code question and correctly interpret what they are reading. Apprentices will research the structure of the NEC and define the requirements of the code that are common to all electrical installations. Apprentices will examine the installation requirements for fire pumps, emergency systems and fire alarms. CONDITION: 504131 Ind Electrician Apprentice or 504641 Maint Tech Apprentice requirements met

**CODES FOR IE 2: OCPD AND ELECTRICAL DEVICE**...introduces the industrial electrical apprentice how to plan for the installation of overcurrent protection devices and how to select the proper boxes, cabinets and conduits for industrial electrical codes. This is the second of 8 course modules on the NEC. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 3: ARTICLE 250 PART A**...examines the application of grounding to industrial electrical situations as required by the NEC and other electrical codes. CONDITION: 504131 Ind Electrician Appr or 504641 Maint Tech Apprentice reqs met

**CODES FOR IE 4: ARTICLE 250 PART B**...examines course four of eight on the NEC Article 250 and grounding applications for industrial electrical installants. Apprentices will complete their review of this portion of the NEC and examine additional related electrical codes in effect across Wisconsin. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 5: ARTICLE 300 CORDS/CABLES**...examines course five of eight, article 300 of the NEC and wiring methods for industrial electrical applications. In addition, apprentices will determine sizing requirements for cords and cables for installations common to industrial facilities. Finally, the course will identify code requirements for equipment installations in hazardous locations. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maint Technician Apprentice requirements met

**CODES FOR IE 6: CONDUCTORS, RACEWAYS, DATA CABLES**...examines course six of eight covering selection of proper conductors and raceways for industrial electrical installations as required by the NEC and other electrical codes. In addition, course competencies will include examining the installation requirements for data and communication cables. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 7: MOTORS AND GENERATORS**...examines course seven of eight which reviews the code requirements for the selection of electrical components for typical industrial electrical motor installations. Course module includes sizing of controls, conductors, switches, branches, and more. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 8: TRANSFORMERS**...examines course eight of eight which reviews the electrical code requirements which provide for the protection of various industrial transformer installations. Course competencies include developing plans, sizing equipment and components, safety, and references to applicable sections of the NEC. CONDITION: 504131 Ind Electrician Appr or 504641 Maint Tech Apprentice reqs met

**DC ELECTRICITY FOR IE PART 1**...introduces the fundamental concepts of and computations related to DC electricity. Emphasis is placed on circuit analysis and the problem solving skills necessary for the maintenance of modern industrial electric systems. Competencies related to metering and safe use of measuring devices are included. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**DC ELECTRICITY FOR IE PART 2**...introduces the fundamental concepts of and computations related to DC electricity. Emphasis is placed on circuit analysis and the problem solving skills necessary for the maintenance of modern industrial electric systems. Competencies related to metering and safe use of measuring devices are included. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**FLUID POWER SYSTEMS FOR IE - HYDRAULICS**...examines hydraulics course customized for industrial electricians and relates the basics of hydraulic theory and hydraulic components. Safety and the interrelationship between hydraulic power with electrical control is emphasized. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**FLUID POWER SYSTEMS FOR IE - PNEUMATICS**...examines pneumatics customized for industrial electrician apprentices who deal with fluid power systems. This course will relate the basics of pneumatic theory and pneumatic components. Safety and the interrelationship between hydraulic power with electrical control is emphasized. CONDITION: 504131 Ind Electrician Appr or 504641 Maint Tech Apprentice reqs met

**IE MOTORS AND GENERATORS**...introduces the industrial electrician apprentices to explore motor controls. This course introduces concepts, terminology, and safety. In addition, this is designed to give the Industrial Electrician Apprentice the knowledge required by industry to maintain electric motors and generators. This course material will cover DC motors and generators, single-phase and three-phase motors, as well as alternators. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**IE PROGRAMMABLE LOGIC CONTROLLERS 1**...designed to teach the fundamentals of programmable logic controller and its programming software. The first course of 3 will introduce terminology, concepts, print reading and safety. CONDITION: 504131 Ind Electrician Apprentice or 504641 Maint Tech Apprentice requirements met

**IE PROGRAMMABLE LOGIC CONTROLLERS 2**...examines second of three courses for industrial electrician apprentices. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**IE PROGRAMMABLE LOGIC CONTROLLERS 3**...examines third course of three for industrial electrician apprentices. PLC applications and assessment projects are planned. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Tech Apprentice requirements met

**IE SOLID STATE ELECTRONICS**...provides apprentice with the skills and knowledge for troubleshooting basic solid-state devices and circuits. The construction, identification, and operating characteristics of solid-state devices are investigated. The apprentice builds test circuits, gathers and analyzes data, and follows safety procedures. Methods for locating defective component are applied. Replacement of printed circuit board components is performed. Also examined is the effect of temperature on devices. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Tech Apprentice requirements met

**INDUSTRIAL ELECTRICIAN MOTOR CONTROLS 1**...introduces learner through the fundamentals of electric motor control. Will learn to recognize and draw the basic symbols, the language of motor controls, and how to apply these symbols into current industrial format. Will also learn to draw ladder and wiring diagrams. Introduced to the logic used in motor control and be required to apply this logic in order to correctly interpret, design and wire control circuits. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**INDUSTRIAL ELECTRICIAN MOTOR CONTROLS 2**...examines second course of three and examines motor controls applicable to the industrial electrician trade. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**INDUSTRIAL ELECTRICIAN MOTOR CONTROLS 3**...examines third of three courses examining motor controls applicable to the industrial electrician trade. Applications and assessment activities are intended in this course. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**INDUSTRIAL ELECTRICIAN TRANSFORMERS**...introduces Industrial Electrician Apprentice to the basic concepts of single and three-phase transformers. The course will cover transformer theory, turns, current and voltage ratios as well as proper connections and use of various transformers. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**POWER SYSTEMS AND VARIABLE SPEED DRIVES FOR IE**...provides opportunity for students to learn about power systems and variable speed drives (VSD's). Topics include electricity, electronics, power transmissions, motor operations, AC and DC motor drives, servo and stepper drives, peripherals and communication. Will also explore closed loop control, feedback devices, and drive maintenance and the troubleshooting of VSD's. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**SAFETY AND PRINT READING FOR IE**...acquaints the apprentice with the interpretation of "prints" (blueprints) and other engineering and manufacturing documentation. The primary focus of the course will be on the basics of prints and how they are used to convey information to technicians. Application of electrical prints from industrial settings will be studied. CONDITION: 504131 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met