

**Program Number 50-464-1**

**5-Year Contract**

**Work Hours (including related instruction): 10,000**

**Related Instruction: 1,296 hours • Night School: 8 hours**

## ABOUT 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

Maintenance Technicians work in industrial manufacturing and safely perform mechanical and electrical duties to keep machines, equipment, or the structure of a facility in repair. The Maintenance Technician Apprenticeship program is employer sponsored. This program combines the on-the-job hands-on training with related training at the technical college. Some hands-on training is used to reinforce the related training. Thus, skills are developed to help the technician keep machines and equipment operating and productive. If you like to maintain, repair, and troubleshoot problems and put theory to work, a career as a maintenance technician may be your ticket to success.

## CAREERS

Graduates of LTC's Maintenance Technician Apprenticeship program work as journey-level maintenance technicians in a variety of industrial and organizational settings.

## INDUSTRIAL APPRENTICE APPLICATION REQUIREMENTS

- Determined by employer
- Wisconsin Apprentice Contract

## PROGRAM OUTCOMES

- Demonstrate proper rigging techniques.
- Select an appropriate power transmission system for a given application.
- Identify suitable pumps for given applications.
- Recommend bearings for given applications.
- Plan for fabricating parts and assemblies according to specifications.
- Apply operational and troubleshooting principles to fluid power systems.
- Lay out an equipment installation plan.
- Plan maintenance schedules for a given system.
- 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 & 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>		
50423710	Math for the MMMP Trades	1
50423713	Precision Measurements for the MMMP Trades	0.5
50423717	Electricity for the MMMP Trades	0.5
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>5</b>
<b>Term 2</b>		
50423711	Print Reading for the MMMP Trades	1
50423726	Safety/Tools/Torque for the MMMP Trades	0.25
50423712	Fasteners for the MMMP Trades	0.5
50423723	Adhesives and Sealants for the MMMP Trades	0.25
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>4.5</b>
<b>Term 3</b>		
50423737	Equipment Installation for the MMP Trades	0.75
50423727	Concrete for the MMP Trades	0.25
50423714	Rigging for the MMP Trades	1
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>4.5</b>
<b>Term 4</b>		
50423738	Sheet Metal & Structural Steel for the MMMP Trades	0.75
50423716	Metallurgy for the MMMP Trades	0.5
50423715	Welding for the MMMP Trades	0.75
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>4.5</b>
<b>Term 5</b>		
50423735	Mechanical Power Transmission for the MMMP Trades	0.75
50423733	Belts, Sheaves, Pulleys, & Drives for the MMMP Trades	0.5
50423736	Conveyors for the MMMP Trades	0.25
50423734	Gears, Gearboxes, and Gear Assemblies for the MMMP Trades	0.5
50413760	Industrial Electrician Transformers	1
50413770	IE Programmable Logic Controllers 2	1
50413759	Codes for IE 8: Transformers	0.5
		<b>4.5</b>
<b>Term 6</b>		
50423731	Couplings and Alignment for the MMMP Trades	0.5
50423730	Bearings for the MMMP Trades	0.75
50423725	Machine Lubrication for the MMMP Trades	0.25
50423724	Preventative and Predictive Maintenance for the MMMP Trades	0.5
50413761	IE Motors and Generators	1
50413771	IE Programmable Logic Controllers 3	1
50413758	Codes for IE 7: Motors and Generators	0.5
		<b>4.5</b>
<b>Term 7</b>		
50423720	Pipefitting and Valves for the MMMP Trades	0.75
50423722	Packings, Seals, & Gaskets for the MMMP Trades	0.5
50423732	Pumps for the MMMP Trades	0.75
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>5</b>
<b>Term 8</b>		
50423721	Hydraulics for the MMMP trades	1
50423718	Pneumatics & Compressed Air for the MMMP Trades	0.75
50423719	Vacuum Systems for the MMMP Trades	0.25
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>5</b>
		<b>TOTAL 37.5</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 Ind Electrician Appr or 504641 Maintenance Technician Appr req 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 Ind Electrician Appr or 504641 Maintenance Technician Appr reqs met

**ADHESIVES AND SEALANTS FOR MMMP TRADES...**compares adhesives and sealant types and applications. The apprentice skills will be developed related to applying adhesives and sealants to repair applications, interpreting SDS information, and handling hazardous materials. CONDITION: 504231 Millwright Appr or 504641 Maintenance Technician Appr reqs met

**BEARINGS FOR THE MMMP TRADES...**will examine bearing types and applications, and compare equipment bearings. Then learners will develop skills related to bearing inspection, selection, removal, mounting, lubrication and diagnosing bearing failures. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**BELTS, SHEAVES, PULLEYS AND DRIVES FOR MMMP...**compares different belt types and drive components. Apprentices will develop skills related to inspecting, troubleshooting, removing, selecting, and installing belt drive systems. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CODES FOR IE 1: INTRO TO THE NEC...**introduces the 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. In addition, apprentices will examine the installation requirements for fire pumps, emergency systems and fire alarms. CONDITION: 504131 Industrial Electrician Appr or 504641 Maintenance Technician Apprentice requirements met

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

**CONCRETE FOR THE MMMP TRADES...**examines the principles of concrete as well as anchoring. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**CONVEYORS FOR THE MMMP TRADES...**examines chain, belt, and other types of conveyors and related components. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**COUPLINGS AND ALIGNMENT FOR MMMP TRADES...**compares different coupling types and examines common misalignment problems. Apprentices will develop skills related to inspecting, troubleshooting, lubricating, and preparing couplings for removal and installation by using dial indicators and laser aligners. This course will also discuss types and principles of clutches and brakes. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Appr requirements 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

**ELECTRICITY FOR THE MMMP TRADES...**examines basic electrical terms and theory. Apprentices will learn motor wiring, multimeter use as well as lockout tagout as it applies to electricity. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**EQUIPMENT INSTALLATION FOR THE MMMP TRADES...**will layout equipment installations, plan for moving equipment, and set and level equipment. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**FASTENERS FOR MMMP TRADES...**provides apprentices with a chance to compare fasteners and their uses, analyze fastener failures, and install mechanical fasteners. This course also covers drilling and tapping application. CONDITION: 504231 Millwright 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 Ind Electrician Appr or 504641 Maint Tech Appr 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 Industrial Electrician Apprentice or 504641 Maintenance Technician Apprentice requirements met

**GEARS, GEARBOXES, GEAR ASSEMBLIES FOR MMMP...**compares gear types and applications. Apprentices will develop skills inspecting gear assemblies, troubleshooting gear problems, removing gears and components, and reassembling gear drive systems. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**HYDRAULICS FOR MMMP TRADES...**provides instruction to apprentices concerning many aspects of inspecting, servicing, and troubleshooting hydraulic systems and components. Apprentices will learn safety related issues and be taught proper safety procedures for working with hydraulic systems and components. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements 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 Industrial Electrician Apprentice or 504641 Maintenance Technician 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 Appr 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 Technician 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 Technician Appr 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

**MACHINE LUBRICATION FOR THE MMMP TRADES...**examines the types, principles and applications of machine lubricants and lubricating systems. CONDITION: 504231 Millwright Apprentice or 504641 Maint Tech Appr requirements met

**MATH FOR MMMP TRADES...**examines math concepts as they relate to millwrights and machine maintenance. Apprentices will develop skills related to converting fractions to decimals; using both standard and metric systems; applying basic algebra to solving problems; computing area, volume, mass, and torque; using trigonometry; and using math charts, tables and references in support of common work processes. CONDITION: 504231 Millwright Appr or 504641 Maint Technician Appr requirements met

**MECHANICAL POWER TRANSMISSION FOR MMMP TRADES...**examines drive transmission systems and their applications, including roller chains. Apprentices will develop skills inspecting power transmission systems and troubleshooting mechanical drive systems. CONDITION: 504231 Millwright Appr or 504641 Maintenance Technician Appr requirements met

**METALLURGY FOR MMMP TRADES...**develops apprentice skills regarding metallurgical concepts. Apprentices will compare various metals and their applications, apply metallurgical techniques to work processes, test metals for hardness, and examine heat treating applications. CONDITION: 504231 Millwright Appr or 504641 Maint Technician Appr requirements met

**PACKINGS, SEALS, GASKETS FOR MMMP TRADES...**will examine packings, seals, and gaskets and compare materials and applications. The skills in layout, cutting, inspecting, removing, and installing these components will be developed. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**PIPEFITTING AND VALVES FOR MMMP TRADES...**introduces apprentices to principles, application and types of pipe, materials, fittings, tubing, and valves, and develops skills related to layout, installation, and maintenance. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**PNEUMATICS AND COMPRESSED AIR FOR MMMP TRADES...**provides instruction to apprentices concerning many aspects of inspecting, servicing, and troubleshooting pneumatic systems and components. Apprentices will learn safety related issues and be taught proper safety procedures for working with pneumatic systems and components. CONDITION: 504231 Millwright 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

**PRECISION MEASUREMENTS FOR MMMP TRADES...**develops apprentice skills in precision measurement. Types of measuring instruments will be compared and then measuring skills using lapses, steel rules, micrometers, calipers, indicators, and gauges will be developed. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**PREVENTIVE AND PREDICTIVE MAINTENANCE FOR MMMP TRADES...**examines both preventive and predictive maintenance concepts as they apply to millwright work processes and machine maintenance including vibration and lubrication analysis. Apprentices will develop skills related to assessing machine conditions and faults based on both preventative and predictive maintenance. CONDITION: 504231 Millwright Appr or 504641 Maintenance Technician Apprentice reqs met

**PRINT READING FOR MMMP TRADES...**explores reading prints commonly used by millwrights and machine maintenance workers. Course competencies include comparing types of prints, interpreting structural drawings, identifying parts from prints, and developing apprentice sketching drawing skills. CONDITION: 504231 Millwright Appr or 504641 Maint Tech Appr reqs met

**PUMPS FOR THE MMMP TRADES...**compares different pump types including centrifugal, diaphragm, gear, vane and their applications. Apprentices will complete a field inspection of pumps and learn how to troubleshoot, remove, overhaul, and install and perform preventative maintenance on pumps. CONDITION: 504231 Millwright Appr or 504641 Maint Tech Appr reqs met

**RIGGING FOR MMMP TRADES...**will compare types of rigging equipment and their uses; determine safe loads, rig and crib loads, and move a load with cranes and hoists, including signaling. Course will also cover usage and the safety of ladders and scaffolding. CONDITION: 504231 Millwright 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

**SAFETY, TOOLS AND TORQUE FOR MMMP TRADES...**examines safety as it relates to hand and power tools as well as theory and application of torque in the Maintenance/Millwright trade. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**SHEET METAL AND STRUCTURAL STEEL FOR MMMP TRADES...**compares types of sheet metal and tools used by the trade. Apprentices will develop skills related to fabricating sheet metal and structural steel, including layout, bending and forming, as well as erecting structural steel. CONDITION: 504231 Millwright Appr or 504641 Maint Tech Appr requirements met

**VACUUM SYSTEMS FOR MMMP TRADES...**introduces principles of vacuum systems and interpreting vacuum system schematics. Apprentices will then develop skills related to installing, repairing, replacing and applying troubleshooting principles to vacuum systems and components. Course examines preventive maintenance techniques commonly used on the job. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met

**WELDING FOR MMMP TRADES...**compares common welding processes and develops apprentice skills related to welding, cutting, heating and using oxy-gas. Welding with arc, MIG and TIG is included, along with common cutting and joining techniques. CONDITION: 504231 Millwright Apprentice or 504641 Maintenance Technician Apprentice requirements met