



Industrial Maintenance

Program No: 31-462-2

Technical Diploma

Degree Completion Time: Two Terms

In general, an academic year consists of two terms; however, degree completion time may vary based on student scheduling needs and class availability.

2012-2013

Catalog No.	Class Title	Credit(s)
10413100	Basic Electricity for Trades OR 10660105 DC Fundamentals (3 cr) OR 10660110 AC Fundamentals (3 cr)	3.00
31420394	Industrial Maintenance Measurement & Drills	2.00
31457318	Trades Math Industrial Maintenance	2.00
31457388	Industrial Maintenance Print Reading OR 31457385 Machine Tool Print Reading (2 cr)	1.00
31462300	Industrial Maintenance Introduction	2.00
31462302	Industrial Maintenance Layout and Rigging	1.00
31462305	Industrial Maintenance Power Transmission	3.00
31462310	Industrial Maintenance Bearings and Lubrication	2.00
31809362	Psychology for Life	1.00
10413102	Electrical Controls for Trades OR 10620144 Motors and Controls I (3 cr)	1.00
10620157	Hydraulics - Industrial	2.00
10620158	Pneumatics - Industrial	1.00
10620165	Hydraulics Applications	1.00
31420395	Industrial Maintenance Mills & Lathes	2.00
31462308	Industrial Maintenance Pumps, Fluid/Air Handling	2.00
31442346	Industrial Maintenance Welding	1.00
31462312	Industrial Maintenance Introduction to Fabrication	2.00
31462314	Troubleshooting/Machine Repair	3.00
31801359	Communication Skills for the Workplace	2.00
Program Total		34.00

Note: Program start dates vary; check with your counselor for details.

Curriculum and program acceptance requirements are subject to change.

About the Career

Machines are important in our lives—directly or indirectly. Broken or inefficient machines slow the pace of manufacturing and, ultimately, profits. To remain competitive in today's fast-paced industrial/manufacturing environment, equipment needs to be maintained to run at peak performance. If you like to troubleshoot problems, put theory to work hands-on, and have interests in math and mechanical processes, a career in industrial maintenance may be your key to success.

Careers

- Industrial or Maintenance Mechanic
- Machinery Adjuster
- Machinery Assembler
- Machinery Repairer

Admissions Steps

- Application
- Application Fee
- Entrance Assessment Scores
- Transcripts
- Program Advising Session
- Students are required to take the Bennett Mechanical Aptitude Test and the Minnesota Paper Form Board Test for advisement purposes.
- Functional Abilities Statement of Understanding Form

Program Outcomes

You'll learn to:

- Use hand and power tools correctly and safely.
- Disassemble, repair, and assemble industrial equipment from manufacturer's technical guides, service manuals, prints, and schematics.
- Maintain and repair hydraulic and pneumatic equipment.
- Solve problems related to production, installation, and maintenance of industrial equipment.
- Utilize specialized rigging equipment including cranes, hoists, forklift trucks, slings, and chains.

Approximate Costs

- \$126 per credit (resident)
- \$182 per credit (out-of-state resident)
- Other fees vary by program (books, supplies, materials, tools, uniforms, health-related exams, etc.)

Special Notes

- Students need to supply their own safety glasses and welding gloves.
- Classes prepare graduates to apply for a Millwright Apprenticeship through cooperating employer.
- Student are required to take the Bennett Mechanical Aptitude Test and receive a raw score of 45 correct or better.

Functional Abilities

Functional abilities are the basic duties that a student must be able to perform with or without reasonable accommodations. At the postsecondary level, students must meet these requirements, and they cannot be modified. Please view the Functional Abilities Statement of Understanding on the www.gotoltc.edu website (Future Students, Academics, Areas of Study, Industrial Maintenance).

Entrance Assessment Scores

Accuplacer	ACT
Arithmetic - 79	Mathematics - 18
Reading - 55	Reading - 18
Sentence Skills - 60	English - 18

10413100 Basic Electricity for the Trades

...provides practical DC/AC concepts to introduce various components, electrical quantities, and measuring values in DC and AC circuits. Circuit measurement of voltage, current and resistance will be taken with analog and digital meters applying basic concepts. The student will learn about electrical theory, electrical safety, basic circuit design, measuring equipment, general wiring practices, motors, and transformers.

10413102 Electrical Controls for the Trades

...prepares the learner to identify industrial wiring components from their schematic symbols; use a ladder logic diagram to explain the operation of a control circuit; identify industrial motor components; demonstrate knowledge of motor and motor controls; and assemble basic control circuits.

COREQUISITE: 10413100 Basic Electricity for the Trades

10620157 Hydraulics - Industrial

...prepares the learner to identify hydraulic 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 circuits; analyze meter-in, meter-out, and bypass flow control circuits; evaluate the characteristics of hydraulic pumps, motors; directional and control valves; identify basic hydraulic control valves; and assemble hydraulic circuits.

PREREQUISITES: Math equivalency requirements met or 31457318 Trades Math Industrial Maintenance and 31457318T1 Trades Math Industrial Maintenance 1, 31457318T2 Trades Math Industrial Maintenance 2

10620158 Pneumatics - Industrial

...prepares the learner to identify pneumatic component symbols, examine the main parts of a pneumatic system; identify air conditioning and distributing equipment; evaluate the characteristics of physical laws that apply to pneumatics; identify the laws governing pneumatics; adjust pressure regulator to specified pressure; evaluate the general characteristics and terms of pressure drop versus flow relationship; evaluate the general characteristics and term of vacuum generation.

COREQUISITES: 10620157 Hydraulics-Industrial or 10620159 Hydraulics 1

10620165 Hydraulics Applications

...provides participants with hands-on industrial repair and replacement techniques for hydraulic components including: actuators, valves, and maintenance of systems. Students practice safe and environmentally-sound repair techniques. Students will gain basic knowledge of PLC's including components and operation.

COREQUISITE: 10620159 Hydraulics I and 31462308 Industrial Maintenance Pumps, Fluid/Air Handling and 10413102 Electrical Controls for the Trades

31420394 Industrial Maintenance Measurement and Drills

...provides the learner with the skills to: Use precision hand held measuring tools, use semi-precision measuring tools, follow cutoff safety rules, and operate vertical cutoff machines. It prepares the learner to calculate speeds and feeds to match specific material processes, identify attributes of hole-producing cutting tools, follow drilling machine tool safety rules, identify drilling machine tool components, and operate a sensitive drilling machine tool.

31420395 Industrial Maintenance Mills and Lathes

...provides the learner with the skills to: Apply safety rules, identify machine components, select cutting tools, set up the milling machine for work, mill square surfaces, mill precision steps and slots, and mill keyseats on shafts. It prepares the learner to follow engine lathe safety rules, identify engine lathe components, operate engine lathe machine tools, perform facing and center drilling operations, perform turning operations between centers, and perform hole-producing operations.

COREQUISITE: 31420394 Industrial Maintenance Measurement and Drills

31442346 Industrial Maintenance Welding

...introduces the learner to the welding field, including practicing safety and care of equipment and supplies used in all common types of welding processes; practicing and improving welding skills using primarily the oxy-fuel processes; practicing basic operations of SMAW, GMAW, and GTAW equipment and cutting operations; and practicing common joints and positions of all types of welding processes.

31457318 Trades Math Industrial Maintenance

...provides the learner with the necessary skills to use scientific calculators for the application of pre-algebra, algebra, geometry, and trigonometry. The course is designed for individualized student needs and can be taken in one-credit increments. Please refer to the class listing for specific one-credit class offerings.

31457388 Industrial Maintenance Print Reading

...prepares the learner to read prints; make sketches; interpret orthographic projections to include sections, auxiliary views, threads, and fasteners; and to solve problems in metal trades, fabrication, and troubleshooting.

31462300 Industrial Maintenance Introduction

...prepares the learner to apply the basic elements of safety, mechanics, force, friction, work, and energy; to identify, use, and develop skills with all hand and portable power tools, as well as threaded fasteners, to learn terminology; and to operate a lift truck while applying the basics as it pertains to industrial maintenance and forklift operation. Participants will obtain lift truck operation certification upon successful completion.

31462302 Industrial Maintenance 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.

COREQUISITE: 31462300 Industrial Maintenance Introduction; **COREQUISITE:** 31457318 Trades Math Industrial Maintenance or 31457318T1 Trades Math Industrial Maintenance I and 31457318T2 Trades Math Industrial Maintenance II; or 31457320 Machine Tool Math

31462305 Industrial Maintenance 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, riveted chains, bevel gears, worm gears, helical gears, spur gears, couplings, and alignment with emphasis on identification, installation, repair, and maintenance.

PREREQUISITES: 31462300 Industrial Maintenance Introduction and 31462310 Industrial Maintenance Bearings and Lube

31462308 Industrial Maintenance 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.

PREREQUISITE: 31462300 Indust Mtn Intro, 31457388 Ind Mtn Print Rdg, 31457318 Trades Math Ind Mtn or 31457318T1 Trades Math Ind Mtn1 or 31457318T2 Trades Math Ind Mtn 2 or 31457320 Mach Tool Math & **COREQUISITE:** 10620158 Pneumatics-Indust

31462310 Industrial Maintenance Bearings and Lubrication

...prepares the learner to identify, install, repair, and maintain bearings, including lubrication applications and to understand plane, roller, ball, linear, tapered and thrust bearings; various mountings and housings; and terminology and properties of lubrication.

COREQUISITE: 31462300 Industrial Maintenance Introduction; and 31457318 Trades Math Industrial Maintenance or 31457318T1 Trades Math Industrial Maintenance I and 31457318T2 Trades Math Industrial Maintenance II or 31457320 Machine Tool Math

31462312 Industrial Maintenance Introduction to Fabrication

...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. Repair practice of home and shop projects is encouraged for skill development.

PREREQUISITE: 31462300 Indust Maint Intro; and 31462301 Indust Maint Wldg or 30442300 Wldg Intro or 31442300 Wldg Intro or 0442300IN Wldg Intro; and 31457388 Indust Maint Print Rdg **COREQUISITE:** 31442346 Industrial Maintenance Welding

31462314 Troubleshooting/Machine Repair

...prepares the learner to perform essential troubleshooting and repair 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: 31462300 IM Intro; 31462302 IM Layout/Rig **COREQUISITE:** 31462307 IM Power Trans 2, 31462305 IM Pwr Trans, 31462306 IM Elec Cntrls or 10413102 Elect Cntrls-Trades and 31462308 IM Pmps, Fld/Air Hndlg & 31462310IM Bearings/Lube

31801359 Communication Skills for the Workplace

...prepares the student to develop paper job-search tools and job-related writing skills to increase job stability; introduces the students to team-building skills to resolve organizational problems; introduces the student to the skills of effective listening; prepares the student to respond to workplace criticism and praise; and introduces the student to interpersonal relationship skills, including effective interviewing skills, customer relations, and management/employee relations.

31809362 Psychology for Life

...prepares the learner to select behavior modification techniques, demonstrate techniques for enhancing memory, analyze expressions of emotion, use conflict for common good, employ techniques to reduce conflict/frustration, use several methods to reduce stress, interpret personality types, ascertain contributors to perception, and apply methods of problem-solving.