

INDUSTRIAL TECHNICAL MAINTENANCE I

Industrial Technical Maintenance I, includes classroom and practical experiences that prepare students to apply technical knowledge and skills to repair and maintain industrial machinery and equipment. Instructional activities develop diagnostic and problem-solving skills related to electric circuits, wiring, motors, robotics, hydraulics, and pneumatics. Additional areas of instruction should include plumbing, rigging, basic machining, welding and cutting.

- DOE Code: 5686
- Recommended Grade Level: Grades 11- 12
- Recommended Prerequisites: Introduction to Advanced Manufacturing
- Credits: 2 semester course, 2 semesters required, 2-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

Domain – Maintenance Operations

Core Standard 1 Students apply appropriate safety, health, and environmental procedures to all operations per state, federal, and industrial guidelines to safely perform operations.

Standards

- ITMI-1.1 Perform safety procedures as proscribed by industry, state, and federal regulation
- ITMI-1.2 Perform machine operations to meet safety and production goals

- ITMI-1.3 Locate and interpret data output from various machines
- ITMI-1.4 Perform planned and unscheduled machine maintenance procedures in accordance with a company-approved maintenance plan
- ITMI-1.5 Perform a preventive maintenance procedure for a given machine to extend machine life and minimize downtime
- ITMI-1.6 Perform predictive maintenance on a given machine to extend machine life and minimize downtime
- ITMI-1.7 Read and interpret technical drawings of parts and assemblies with tolerances and basic GD&T
- ITMI-1.8 Use hand tools to inspect, adjust/tighten and assemble/disassemble equipment support preventive maintenance, inspection and troubleshooting activities
- ITMI-1.9 Use hoists and other tools to safely handle and move parts and equipment
- ITMI-1.10 Select and use troubleshooting methodologies to find malfunctions in machine systems to return the system to reliable, productive use in the shortest time possible

Domain – Basic Mechanical Systems

Core Standard 2 Students evaluate the fundamentals of mechanical systems to perform maintenance and repair procedures.

Standards

- ITMI-2.1 Identify safety, health and environmental rules and regulations for mechanical power transmission systems
- ITMI-2.2 Use measurement hand tools to inspect dimensions of shafts and other components
- ITMI-2.3 Describe the process for installing and aligning a shaft couplings (types flexible, flange, grid and chain) using rim/face, feeler gauge, and laser methods.
- ITMI-2.4 Install, align and tension a belt drive using v-belts, timing and HTP types
- ITMI-2.5 Install, align and tension a chain drive, including single and multiple chain systems
- ITMI-2.6 Install, align and adjust a spur gear drive and a right angle gear drive
- ITMI-2.7 Install, align and adjust a pillow and flange block bearing
- ITMI-2.8 Identify all lubrication points on a machine, select lubricant and apply lubricant to machine according to maintenance schedule
- ITMI-2.9 Apply troubleshooting techniques for shaft couplings

Domain – Basic Hydraulic Systems

Core Standard 3 Students analyze basic hydraulic systems to complete repair and maintenance tasks.

Standards

- ITMI-3.1 Adhere to safety, health and environmental rules and regulations for fluid power systems
- ITMI-3.2 Read and interpret basic fluid power schematics
- ITMI-3.3 Start up and shut down a hydraulic system and adjust hydraulic pressure control valves in a system that uses a fixed displacement pump
- ITMI-3.4 Select and adjust hydraulic actuator speed using a flow control valve
- ITMI-3.5 Inspect and change a hydraulic filter to maximize hydraulic fluid cleanliness

- ITMI-3.6 Inspect, add and change a hydraulic fluid
- ITMI-3.7 Connect, adjust and disconnect flexible and rigid hydraulic conductors
- ITMI-3.8 Install and test the operation of components in a basic hydraulic linear or rotary actuator circuit given a schematic
- ITMI-3.9 Troubleshoot a basic hydraulic linear or rotary actuator circuit

Domain – Basic Pneumatic Systems

Core Standard 4 Students establish an understanding of basic pneumatic systems to repair and maintain equipment.

Standards

- ITMI-4.1 Adhere to safety, health and environmental rules and regulations for fluid power systems
- ITMI-4.2 Determine and adjust pneumatic system operating pressure using a regulator
- ITMI-4.3 Select and adjust pneumatic actuator speed using a flow control valve
- ITMI-4.4 Inspect, drain and change a pneumatic filter
- ITMI-4.5 Inspect, fill and adjust a pneumatic lubricator
- ITMI-4.6 Connect, adjust and disconnect flexible and rigid pneumatic conductors
- ITMI-4.7 Startup and shutdown a reciprocating air compressor and adjust operating pressure using a pressure switch
- ITMI-4.8 Install and test the operation of components in a basic pneumatic linear or rotary circuit given a schematic
- ITMI-4.9 Install and test the operation of components in a basic pneumatic circuit that uses vacuum generators given a Schematic
- ITMI-4.10 Troubleshoot a basic pneumatic linear or rotary actuator circuit