

INTEGRATED ENGINEERING TECHNOLOGY (IET)

IET 102 (2 credit hours)

Preventive Maintenance

Introduces how routine work is done to keep equipment in good working order and to optimize its efficiency and accuracy. Addresses regular routine cleaning, lubricating, testing, checking for wear and tear and eventually replacing components to avoid breakdown. Introduces students to the various types and styles of predictive and preventive maintenance components, principles, and practices used in industrial applications. Lecture/Lab: 2.0 credits (40.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 104 (2 credit hours)

Blueprint Reading/Schematics

Introduces the fundamental information in drafting necessary to retrieve read, manipulate and understand a mechanical part print. Instructs students to recognize, identify, describe, and relate the components used in schematics, along with their symbols and connectors, to describe electrical, electronics, pneumatics, hydraulics, and piping circuits, as well as welding and joining symbols interpretation. Lecture/Lab: 2.0 credits (37.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 107 (3 credit hours)

Basic Electricity/Electronics

Introduces the various elements of basic electricity including the identification of electrical symbols as well as interpretation of schematics, cross referencing prints, tracing circuits, interpreting sequential function charts, line drawings and time charts. Introduces the student to electrical measurement instruments, including digital and analog multimeters, clamp-on ammeters, megohmmeters, and the oscilloscope. Concentrates on control logic components and circuit function. Introduces the student to solid state devices and applications. Lecture/Lab: 3.0 credits (67.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 109 (3 credit hours)

Safety

Introduces OSHA and the OSHA regulations that apply to the auto manufacturing industry. Introduces safety rules and issues in the use of overhead cranes, hoists, rigging equipment, attachment components, calculating sling angle stresses, and safe lifting and turning loads. Provides the knowledge and skills necessary to help sustain life and minimize the consequences of injury or sudden illness to meet the various training needs of those in workplace, school or community settings. Lecture/Lab: 3.0 credits (60 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 110 (4 credit hours)

Welding and Fabrication

Introduces the power sources used in shielded metal arc welding (SMAW) and gas metal arc welding (GMAW), along with equipment and filler metals used to produce a welded joint and welding principles along with the metallurgy of steel and welding. Covers shielded metal arc welding safety and shielded metal arc welding processes including flat, horizontal, vertical, and overhead welding techniques. Provides knowledge of theory, safety practices, equipment and techniques required for gas metal arc welding including different transfer methods and position welding. Introduces oxy-fuel welding and cutting, including safety, setup and maintenance of oxy-fuel welding and cutting equipment. Includes cutting, brazing, and welding techniques. Lecture/Lab: 4.0 credits (100.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 111 (1 credit hours)

Lean Safety Culture

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Provides students with intense hands-on laboratory instruction of lean safety culture concepts and the importance of developing a culture of continuous safe work habits. Institutes the ability to predict safety issues through hazard prevention. Analyzing accidents, along with human barriers to safety-based intervention, guides students to actively and effectively measure and evaluate safety procedures as a component of continuous improvement. Charges students with risk assessment activities and development of visual safety displays and delivering individual and group presentation to stakeholders. Integrated Lecture/Lab: 1 credit (30 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 112 (1 credit hours)

Lean Manufacturing Concepts -TPS

Instructs students in Lean Manufacturing concepts which will encompass the instructional methodologies of this course. Introduces the student to Lean Manufacturing concepts that provide the techniques for streamlining missions in any manufacturing environment. Implements hands-on processes to Lean Manufacturing. Provides the student with an understanding of workflow, velocity, and lead-time. Discusses how waste affects both profit and customer satisfaction. Guides students toward developing and quantifying lean strategies at every step of the manufacturing process. Instructs in the concepts and tools of Lean Manufacturing including types of waste, visual management, value stream analysis, flow, just-in-time, pull, and Kaizen. Integrated Lecture/Lab: 1 credit (30 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 113 (1 credit hours)**Lean 5S Methodology**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Provides students with intense hands-on laboratory instruction of lean 5S principles and methods for implementing workplace organization. Instructs students on the lean 5S tools applied to organizing and maintaining workplace environments. Builds on the foundation of lean manufacturing concepts and culture by delivering a hands-on approach to the development of a safe organized working environment. Produces an understanding of the purpose and benefits behind Lean 5S methodology. Instructs the students on the importance of professionalism, teamwork, and communication skills. Participate in group activities and assignments to provide the student with workplace organization skills that are expected by employers upon employment entry. Integrated Lecture/Lab: 1 credit (30 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 114 (1 credit hours)**Lean Problem Solving Methodology**

struicts students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Provides students with intense hands-on laboratory instruction of lean problem-solving principles and methods. Instructs students on the Lean 8-Step Problem Solving process based on the Toyota Business Practice model. Imparts a systematic approach to addressing performance and behavioral qualities that are needed for effective and efficient problem-solving outcomes. Instructs the students how to clarify and break down a problem, set achievable targets, analyze the root cause, develop countermeasures, evaluate results processes, standardize the results, and learn from failures. Fosters the development of a customer first philosophy involving all the stakeholders. Instructs the students on the importance of professionalism, teamwork, and communication skills. Participate in group activities and assignments to provide the student with problem solving skills that are expected by employers. Integrated Lecture/Lab: 1 credit (30 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 115 (1 credit hours)**Lean Machine Reliability**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Provides students with intense hands-on laboratory instruction of lean machine reliability concepts. Describes predictive and corrective maintenance and explains how these differ from preventive maintenance. Breaks down proactive maintenance and the underlying tools and integral operations and procedures. Instructs the students in the various individual units in a system and the steps in evaluating failure mode risks and countermeasures. Integrated Lecture/Lab: 1 credit (30 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 120 (4 credit hours)**Machine Tool Operations**

Introduces machining operations, procedures and machines used by multi-skilled industrial maintenance technicians. Introduces the safe and correct operation of lathes, milling machines, drill presses, metal saws and hand and power tools. Requires students to work with various measuring and layout tools found in industrial environments. Lecture/Lab: 4.0 credits (102 credit hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 121 (4 credit hours)**Basic Electricity**

Introduces the various elements of basic electricity and electronics including ohms law, the identification of electrical symbols, interpretation of schematics, cross-referencing prints, tracing circuits, interpreting sequential function charts, line drawings, and time charts. Introduces the student to AC and DC series and parallel circuits consisting of resistive, inductive, and capacitive loads. Discusses operation of particular electronic devices such as diodes and their applications. Demonstrates troubleshooting, safety, and the appropriate use of electrical measurement instruments, including digital and analog multimeters, voltmeters, and clamp-on ammeters. Instructs on basic control circuit configurations and components to provide the student with practical concepts of basic electrical circuits. Implementation of lean manufacturing concepts encompass the instructional methodologies of this course. Lecture: 2 credits (30 contact hours). Laboratory: 2 credits (60 contact hours).

Pre-requisite: MAT 126 or higher-level math course.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 128 (3 credit hours)**Introduction to Machine Tool Operation**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Introduces machining operations, procedures, and machines used by multi-skilled industrial maintenance technicians. Introduces the safe and correct operation of lathes, milling machines, drill presses, metal saws, and hand and power tools. Requires students to work with various measuring and layout tools found in industrial environments. Lecture: 1 credit (15 contact hours) Laboratory: 2 credits (60 contact hours).

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 200 (1 credit hours)**General Tools**

Introduces safe and effective use of hand and power tools. Emphasizes the application and maintenance of the most common tools used by multi-skilled industrial maintenance technicians. Integrated Lecture/Lab: 1 credit (19.5 contact hours).

Attributes: Technical

Components: LAI: Integrated Laboratory, LEI: Integrated Lecture

IET 201 (6 credit hours)**Electrohydraulics/Pneumatics**

Explains the fundamental concepts of fluid power and electro-fluid power systems. Covers the principles of fluid power, calculations of physical properties of fluids and their ability to do work. Introduces the various fluid power components, symbols, circuits. Introduces troubleshooting of fluid power components and systems with an emphasis on safety. Addresses fluids, filters, reservoirs, piping, pumps, actuators, accumulators, control valves, and combination circuits.

Lecture/Lab: 6.0 credits (120 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 202 (4 credit hours)**Motor Controls and Sensing Devices**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Covers the diversity of motor control circuits and devices including: theory of operation and applications in automation control, troubleshooting, and repair. Introduces identification, installation, replacement, and troubleshooting of electronic input and output sensing devices, relays, motor starters, and contactors. Provides an introduction of proportional integral and derivative control. Includes automation output devices including AC, DC, relays, and motor starters along with sizing of components for various applications. Lecture: 2 credits (30 contact hours.) Laboratory: 3 credits (60 contact hours).

Pre-requisite: IET 121, or EET 119, or ELT 110 or (IMT 110 and IMT 111).

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 203 (5 credit hours)**Programmable Logic Controllers**

Introduces Programmable Logic Controllers (PLC) and elements needed for an automated industrial control system. Introduces memory and project organization within a PLC and provides instruction in basic numbering systems, computer and PLC terminology. Introduces PLC control functions, program structures, language standards, wiring and troubleshooting methods, as well as, real world communications. Requires the student to program a PLC which may include a combination of ladder logic, structured text, sequential function chart and/or function block languages. Includes various protocols of industrial communications used between PLC controlled machines, PLC to PLC, PLC to computer, and computer to computer. Lecture/Lab: 5.0 credits (109.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 204 (6 credit hours)**Automated Motor Controls**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Introduces principles, applications, and elements needed for an integrated automated industrial control system. Integrates Programmable Logic Controllers (PLC) with AC and DC electric motor speed control using variable speed drives, variable frequency drives, and soft starters. Includes installation practices, logic fundamentals, and numbering systems relative to PLC programming of inputs, outputs, timers and counters, comparators, basic data manipulation, and safety circuits as well as, programming practices for VFD and VSD systems. Lecture: 3 credits (45 contact hours). Laboratory: 3 credits (90 contact hours).

Pre-requisite: [IET 121 or ELT 110 or EET 119 or (IMT 110 and IMT 111) with a minimum letter grade of "C"] and [IET 201 or (EET 270 and 271) or (IMT 220 and 221) with a minimum letter grade of "C"] or consent of Integrated Engineering Technology program coordinator.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 205 (4 credit hours)**Robot Maintenance**

Introduces robotics in regard to industrial robotic safety standards, applications, types of classes for industrial robots, basic system components, robotic motion concepts, key programming techniques, definitions and the common terms associated with computer integrated manufacturing (CIM) as it relates to robotic cells. Instructs students on the mastering concepts of preventive maintenance techniques required for a robot and their backup systems in addition to recovery procedures needed to interpret robot error codes and perform a safe recovery start up procedure on robotics equipment, as well as integrating robotic applications in a PLC-controlled, automated system. Lecture/ Lab: 4.0 credits (82.5 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 206 (5 credit hours)**Controls and Instrumentation**

Covers the diversity of control devices including: theory of operation, applications in automation control and troubleshooting and repair. Introduces identification, installation, replacement, and troubleshooting of automation controller circuit boards and modules. Includes the installation, maintenance and troubleshooting of common input devices. Provides for discussion of methods of motor controls including on-off, proportional, integral, and derivative including PID loop tuning and quality. Covers automation output devices including AC, DC, and servo motors, variable speed drives, relays, motor starters and sizing of components for various applications. Lecture/Lab: 5.0 credits (105 contact hours).

Attributes: Course Also Offered in Modules, Technical

Components: LEC: Lecture

IET 207 (4 credit hours)**Electro-Hydraulics and Pneumatics**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Explains the fundamental concepts of fluid power and electro-fluid power systems. Covers the principles of fluid power, calculations of physical properties of fluids, and their ability to do work. Introduces the various fluid power components, symbols, and circuits. Introduces troubleshooting of fluid power components and systems with an emphasis on safety. Addresses fluids, filters, reservoirs, piping, pumps, actuators, accumulators, control valves, and combination circuits. Lecture: 2 credits (30 contact hours) Laboratory: 2 credits (60 contact hours).

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 208 (4 credit hours)**Mechanical Drives**

Instructs students in lean manufacturing concepts which will encompass the instructional methodologies of this course. Introduces safety, maintenance techniques, and procedures used to maintain industrial equipment, including industrial couplings, chains, sprockets, belts, bearings, shafts, brakes, clutches gears, and cams. Addresses the principles of power transmission, calculations of speed and force transmission. Lecture: 2 credits (30 contact hours) Laboratory: 2 credits (60 contact hours).

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

IET 1091 (0.7 credit hours)**Basic OSHA Safety**

Introduces OSHA and the OSHA regulations that apply to the auto manufacturing industry. Lecture/Lab: 0.7 credits (12 contact hours).

Components: LEC: Lecture

IET 1092 (0.4 credit hours)**Hoists and Cranes**

Introduces the basic concepts and safety rules and issues related to the use of overhead cranes and hoists. Lecture/Lab: 0.4 credit (6 contact hours).

Components: LEC: Lecture

IET 1093 (1.2 credit hours)**Rigging Awareness & Fundamentals**

Introduces the basic concepts and safety rules and issues related to the use of rigging equipment, attachment components, calculating sling angle stresses, and safe lifting and turning loads. Lecture/Lab: 1.2 credits (25.5 contact hours)

Components: LEC: Lecture

IET 1094 (0.7 credit hours)**First Aid, CPR, & AED**

Provides knowledge and skills necessary to help sustain life and minimize the consequences of injury or sudden illness until advanced medical help arrives. Includes first aid, CPR and AED lessons to meet the various training needs of those in workplace, school or community settings. Lecture/Lab: 0.7 credits (16.5 contact hours).

Components: LEC: Lecture

IET 1101 (0.5 credit hours)**Introduction to Arc Welding**

Introduces the power sources used in shielded metal arc welding (SMAW) and gas metal arc welding (GMAW), along with equipment and filler metals used to produce a welded joint and welding principles along with the metallurgy of steel and welding. Lecture: 0.5 credits (7.5 contact hours).

Attributes: Due to Inactivity

Components: LEC: Lecture

IET 1201 (0.1 credit hours)**Intro to Machining Operations**

Introduces machining operations. Focuses on the safe application of the most common machining procedures and machines used by multi-skilled industrial maintenance technicians. Lecture: 0.1 credits (1.5 contact hours).

Components: LEC: Lecture

IET 1202 (0.6 credit hours)**Turning**

Introduces safe operation of lathes, primarily engine and tool room lathes. Addresses various types of lathes used in industry, their component parts, and associated safety precautions. Emphasizes the most common lathe operations required by multi-skilled industrial maintenance technicians. Lecture/Lab: 0.6 credits (16.5 contact hours).

Components: LEC: Lecture

IET 1203 (0.8 credit hours)**Milling**

Introduces safe operation of milling machines, primarily vertical milling machines. Addresses the various types of milling machines used in industry, their component parts, and associated safety precautions. Emphasizes the most common milling operations required by multi-skilled industrial maintenance technicians. Lecture/Lab: 0.8 credits (22.5 contact hours).

Components: LEC: Lecture

IET 1204 (0.5 credit hours)**Drill Press**

Introduces safe operation of drill presses, primarily the sensitive drill press. Addresses the various types of drilling machines used in industry, their component parts, and associated safety precautions. Emphasizes the most common drilling operations required by multi-skilled industrial maintenance technicians. Lecture/Lab: 0.5 credits (13.5 contact hours).

Components: LEC: Lecture

IET 1205 (0.4 credit hours)**Saws**

Introduces safe operation of saws, primarily the horizontal and contour band saw. Addresses the various types of metal saws used in industry, their component parts, and associated safety precautions. Emphasizes the most common sawing operations required by multi-skilled industrial maintenance technicians. Lecture/Lab: 0.4 credits (10.5 contact hours).

Components: LEC: Lecture

IET 1206 (0.7 credit hours)**Hand and Power Tools**

Introduces safe and effective use of hand and power tools. Emphasizes the application of the most common tools used by multi-skilled industrial maintenance technicians. Lecture/Lab: 0.7 credits (16.5 contact hours).

Components: LEC: Lecture

IET 1207 (0.9 credit hours)**Measuring and Layout Tools**

Introduces measuring and layout tools commonly found in industrial environments. Emphasizes the safe application of the most common tools used by multi-skilled industrial maintenance technicians. Lecture 0.9 credits (21 contact hours)

Components: LEC: Lecture