MT 3.801 Effective Troubleshooting and Learning  
(3 class hrs/wk, 3 cr) F  
Learn an effective troubleshooting method that will enable you to successfully troubleshoot technical problems in mechanical, electrical, control, and fluid power systems. This method features a disciplined approach that promotes learning from troubleshooting. Included are strategies for improving your school and workplace learning and customer service for technical troubleshooters.

MT 3.803 Industrial Safety  
(2 class hrs/wk, 2 cr) F  
Learn how to protect yourself and your fellow workers from workplace accidents. Topics analyzed include, but are not limited to, electrical safety, personal protective equipment, confined space entry, hazardous materials, MSDS and blood borne pathogens. Emphasis is on personal responsibility for your own and others' safety. You will create a personalized safety manual.

MT 3.805 Computerized Maintenance Management  
(3 class hrs/wk, 3 cr) Sp  
Learn to manage the computerized maintenance management systems (CMMS) used in most modern plants and facilities. Using CMMS as a troubleshooting tool and as a method for improving plant efficiency is stressed. Boiler operation and maintenance serves as the case study for this course.

MT 3.809 Successful Learning in the Workplace  
(2 class hrs/wk, 2 cr) F  
Students will learn how to improve their learning from everyday workplace activities and employer sponsored training. They will complete a learning plan to guide them through their mechatronics training. Included is the social and human relations aspect of workplace training.

MT 3.812 Mechanical Systems  
(4 class hrs/wk, 3 cr) F  
Apply mechanical principles to machine operations like machine drives and structural designs. Covers the basic calculations needed to understand machine operation and practical metallurgy. Understanding mechanical forces in relation to machine operation is stressed.

MT 3.815 Mechatronics Skills Lab  
(3-12 hrs/wk, 1-6 cr) As needed  
Individual lab practice to improve mechatronics skills. May also be used for special projects. To be offered every term subject to instructor approval. Prerequisite: Instructor's approval required.

MT 3.817 Drive Systems  
(3 class hrs/wk, 2 cr) F  
Learn to troubleshoot and maintain drive systems. Fundamentals of vibration analysis and shaft alignment are covered in the lab. Emphasis is placed on effective maintenance of belt, chain and gear drives.

MT 3.819 Bearings and Lubrication Systems  
(4 class hrs/wk, 3 cr) W  
Learn to troubleshoot and maintain bearings and lubrication systems. Fundamentals of vibration and oil analysis, handling and mounting bearings, and operating lubrication systems are included in this training.

MT 3.821 Electrical Systems Troubleshooting  
(4 class hrs/wk, 3 cr) F  
Learn to use electrical troubleshooting theory in troubleshooting common electrical problems: low voltage, high voltage, unwanted resistance, open circuits, high resistance shorts to ground, and current and voltage unbalance.

MT 3.822 Troubleshooting Motors and Controls  
(4 class hrs/wk, 3 cr) W  
Learn to troubleshoot and maintain motor control systems, single and three-phase motors and stepper and servo motors. Analyzing motor control schematics and using advanced digital multimeters are stressed. Understanding motor controls is critical to understanding the operation of PLC and all automated control systems. Prerequisite: MT 3.821 Electrical Systems Troubleshooting or instructor's approval.

MT 3.823 Industrial Sensors and Actuators  
(4 class hrs/wk, 3 cr) F  
Students will learn to select, install, troubleshoot and maintain the sensors (inputs) and actuators (outputs) that monitor and power automated production and climate control systems. Application-based selection of sensors and actuators and comprehension of associated documentation will be emphasized. Prerequisite: MT 3.822

MT 3.824 Programmable Logic Controllers  
(4 class hrs/wk, 3 cr) Sp  
Hands-on introduction to programmable logic controllers (PLCs) with emphasis given to effective selection, installation, and troubleshooting of PLC systems. PLC ladder logic programming will be introduced. Field troubleshooting of input and output devices will be covered. Prerequisite: MT 3.822 Troubleshooting Motors and Motor Controls.

MT 3.825 Process Control and Instrumentation  
(4 class hrs/wk, 3 cr) Sp  
Learn the fundamentals of process control which involves the control and operation of automated manufacturing processes. Troubleshooting, maintenance and repair of industrial systems require the technicians to interpret information supplied by the computers controlling the manufacturing processes. Prerequisite: MT 3.824 Programmable Logic Controllers.

MT 3.826 Advanced PLC Troubleshooting  
(4 class hrs/wk, 3 cr) F  
Develop skills in programming PLCs. Students will learn to convert common industrial control circuits to PLC ladder logic as well as create programs from narrative description. Special emphasis will be placed on interfacing the PLC with a selection of electro-pneumatic control devices. A systemic approach to testing and troubleshooting PLC programs will also be covered. Prerequisite: MT 3.824 Programmable Logic Controllers or instructor's approval.

MT 3.827 Automated Material Handling  
(5 class hrs/wk, 3 cr) W  
Learn the fundamental operation of automated materials handling by working from a pick-and-place robot to a more complicated automated manufacturing process. Concepts include positioning and speed control, programming, and speed and pauses, which will be practiced in a lab setting. Prerequisite: MT 3.824 Programmable Logic Controllers.

MT 3.830 Industrial Pneumatics Systems  
(4 class hrs/wk, 3 cr) W  
Learn to analyze fundamental pneumatic schematics, how to troubleshoot common pneumatic problems, and how to maintain and repair pneumatic systems used in a variety of production applications. Understanding pneumatic circuits is critical to working with all types of industrial control systems.

MT 3.833 Principles of Technology  
(5 class hrs/wk, 4 cr) W  
Blends the scientific technical theories associated with mechanical, fluidal, electrical, and thermal energy systems with real world lab work. The goal of this course is to improve the troubleshooting of systems operations.
MT 3.834 Principles of Technology II
(5 class hrs/wk, 4 cr) Sp
This course continues the process of blending the scientific technical theories associated with mechanical, fluidal, electrical, and thermal energy systems with real world lab work. The goal of this course is to improve the troubleshooting of systems operations.

MT 3.836 Industrial Hydraulics Systems
(4 class hrs/wk, 3 cr) Sp
Learn to analyze fundamental hydraulic schematics, how to troubleshoot common hydraulic problems, and how to maintain and repair hydraulic systems used in a variety of production applications and power equipment. You will construct and troubleshoot common hydraulic circuits.

MT 3.844 Industrial Boiler Operation
(2 class hrs/wk, 2 cr) Sp
Learn the operating and safety procedures to successfully operate both low and high-pressure steam and hot water boilers in industrial plants and commercial buildings. This is an e-learning class using podcasts.

MT 3.846 Pumps and Valves
(3 class hrs/wk, 2 cr) W
Learn to troubleshoot, maintain and repair industrial pumps and valves. Pump and valve selection is stressed as is print reading and correct installation. Emphasizes internet research and practical labs that include pump and valve rebuilding, installation of packing and seals for pumps and valves, and selecting pumps for specific applications.

MT 3.847 HVAC System Controls
(2 class hrs/wk, 2 cr) W
This is an internet, hybrid course that will introduce the student to HVAC ducting systems and digital (DDC) controls. Students will learn about using the DDC system as an aid in troubleshooting and promoting energy efficiency, and indoor air quality. Prerequisite: MT 3.855, MT 3.854

MT 3.848 EPA Technician Certification
(2 class hrs/wk, 2 cr)
Anyone handling and refrigerants or working on refrigeration systems must have EPA certification or face large fines and legal proceedings. Students will sit for an EPA certification from the ESCO HVAC Excellence program. The student will study from a test prep booklet, optional texts, and a podcast of the class lectures then arrange the test date with the instructor sometime during the term. Completing 410A certification is an additional option for this class. Prerequisite: MT 3.844, MT 3.845 or proven knowledge of refrigeration system operation.

MT 3.849 Heating Systems
(3 class hrs/wk, 2 cr)
Skills learned include the operation and servicing of oil and gas heating systems. All relevant safety and energy efficiency concerns are covered.

MT 3.850 Electrical Schematics Analysis
(2 class hrs/wk, 2 cr)
Skills learned include the analysis of electrical schematics: building plans, ladder diagrams, PLC diagrams, and electrical system manuals. This course is a hybrid course combining internet, podcasts, text and work book activities, and intensive hands-on seminars.

MT 3.851 Refrigerant 410A Safety Certification
(1 class hr/wk, 1 cr)
Refrigerant 410A is an important replacement for Refrigerant HCFC 22, but it has significantly different operating characteristics. This course will inform you about these differences and prepare you to sit for a 410A safety certification from the ESCO HVAC Excellence program. The student will study from a test prep book and an MP3 download of the class lectures. The student then arranges the test date with the instructor. Please contact the instructor to learn about podcast options. Prerequisite: Knowledge of refrigeration system operation.

MT 3.852 Refrigeration Brazing
(2 class hrs/wk, 1 cr)
Skills learned include: cutting and brazing safety, bend, cut, flare, and swag refrigerant tubing, and HVAC silver soldering. Earn Oregon State Refrigeration Brazing Certification. Introduction to refrigeration systems as related to troubleshooting. This training requires 10–20 hours of hands-on practice or passing a challenge test.

MT 3.853 Ammonia Plant Operator
(2 class hrs/wk, 2 cr)
This course prepares you to begin work as an ammonia plant operator. It focuses on the skills and knowledge to operate such plants safely. No ammonia plant experience is required but previous knowledge of general refrigeration system operation is required. Contact instructor for options for taking this training. Prerequisite: MT 3.855, MT 3.854 or proven knowledge of refrigeration system operation.

MT 3.854 Refrigeration Servicing
(2 class hrs/wk, 2 cr)
Skills learned include: take pressures, identify refrigerants, recover and recycle refrigerant, evacuate and charge refrigeration systems. All applicable safety precautions and EPA governed environmental regulations. This is a hybrid course that includes podcast and on-line activities combined with focused seminar activities that feature intensive, hands-on practice of these essential skills.

MT 3.855 Refrigeration Troubleshooting
(2 class hrs/wk, 2 cr)
Skills learned include: troubleshoot and repair refrigeration systems; evaluate system operation; check superheat and subcooling; test compressors, evaporators, condensers, and expansion devices; troubleshoot hot and cold calls; and cleaning a contaminated system. This is a hybrid course that includes podcast and on-line activities combined with focused seminar activities that feature intensive, hands-on practice of these essential skills.

MT 3.897 Capstone Project 1
(3 class hrs/wk, 2 cr) F
Begin the creation of operating and maintenance routines for a working, fully automated production system. Troubleshoot systems faults and devise a plan for optimizing system operation. Requires substantial research activity and lab time. Prerequisite: Completion of all program objectives and instructor’s approval.

MT 3.898 Capstone Project 2
(3 class hrs/wk, 2 cr) W
Begin the creation of operating and maintenance routines for a working, fully automated production system. Troubleshoot systems faults and devise a plan for optimizing system operation. Requires substantial research activity and lab time. Prerequisite: Completion of all program objectives and instructor’s approval.

MT 3.899 Capstone Project and Assessment
(3 class hrs/wk, 2 cr) Sp
Complete the creation of operating and maintenance routines for a working, fully automated production system. Troubleshoot systems faults and devise a plan for optimizing system operation. Requires substantial research activity and lab time. Prerequisite: Completion of all program objectives and instructor’s approval.

Courses marked with the following symbols may be used to fulfill general education requirements for the Associate of General Studies degree: ❖ Humanities/Art ❦ Math/Science ☐ Social Sciences.