

MPT COURSE STUDENT LEARNING OUTCOMES

MPT 101 - Basics of Operations and Maintenance

Students will be able to apply proper industry standard safety practices for themselves and others when interacting with electrical and pneumatic equipment as well as potentially hazardous materials.

Students will be able to analyze how the position of industry standard sensors impacts the production process and hypothesize how to improve that process through optimizing their placement.

Students will be able to utilize industry standard various precision measurement equipment to calculate whether components are sized to specifications.

Students will be able to install and troubleshoot electric motors and accompanying industry standard mechanical drive components in a standing production system and identify through measurement and calculation if these components are within the specified tolerance or if further adjustment is required.

MPT 102 - Introduction to Programming for Mechatronics

Students will be able to identify and operate basic mechatronic equipment and articulate its function.

Students will be able to perform rudimentary non-programming related exercises with the PLC.

Students will be able to analyze and interpret PLC programming challenges related to mechatronic equipment, design a program, and implement it to analyze its functionality.

Students will be able to analyze variables such as sensor placement and air pressure to design and implement changes to optimize the function and output of the production system.

Students will be able to analyze and interpret a CNC programming challenge to design and test a program to evaluate its function.

MPT 104 - Introduction to IIoT, Networking and Data Analytics

Students will be able to establish an ethernet network with both managed and unmanaged switches.

Students will be able to work in teams to create an industry standard database to acquire, track, query, and display data using multiple modes of communication.

Students will be able to operate industry standard barcode and RFID tracking and program related functions for Programmable Logic Controllers (PLCs).

Students will be able to operate an industry standard Manufacturing Execution System to place web-based manufacturing orders.

MPT 110 - Automated Production Concepts I

CSLOs are under review.

MPT 111 - Fundamentals of Manufacturing and Automation I

CSLOs are under review

MPT 112 - Fundamentals of Manufacturing and Automation II

Students will be able to demonstrate effective communication by analyzing how roles within a manufacturing personnel structure interact to support collaboration and productivity.

Students will be able to identify industry standard manufacturing materials, metrics, and processes and perform related calculations.

Students will be able to identify industry standard elements in mechanical and fluid power transmission systems and perform a variety of related calculations.

Students will be able to describe and analyze elements of electrical control circuits.

Students will be able to describe the industry standard function and qualities of programmable components of automation and manufacturing facilities.

MPT 114 - Fundamentals of Manufacturing and Automation III

Students will be able to identify elements of PLC project development, operation, and troubleshooting.

Students will be able to describe the operation and programming of advanced asset tracking applications.

Students will be able to describe the operation and configuration of smart sensors.

Students will be able to describe concepts regarding databases as well as data acquisition and analysis.

Students will be able to describe how inventory is stored, retrieved, and distributed in an automated environment.

MPT 135 - Material Handling

CSLOs are under review.

MPT 140 - Quality Control

Students will be able to identify and explain major causes of process variation, implementation of TQM, and give examples of how they have affected individual employees.

Students will be able to identify the major principles of LEAN Manufacturing and how it relates to Quality Management.

Students will be able to identify and apply LEAN “tools” for the elimination of waste within the manufacturing process.

Students will be able to perform accurate shop measurements utilizing common measuring instruments.

Students will be able to identify Six Sigma components associated with statistical modeling of manufacturing processes.

Students will be able to utilize sources of data to identify areas of improvement to an organization’s processes taken to eliminate causes of waste.

Students will be able to utilize Industrial and Organizational psychology to understand group behavior, motivational systems, and leadership theory in the workplace.

MPT 160 - Mechanical Drive Systems I

CSLOs are under review.

MPT 198 - Special Topics in Manufacturing and Production Technologies

Students will be able to demonstrate specific knowledge, abilities and skills in Manufacturing and Production Technologies topics.

Students will be able to synthesize existing knowledge, abilities and skills with new practical experience in manufacturing and production technologies.

MPT 305 - Introduction to System Dynamics

Students will be able to formulate mathematical models for mechanical, electrical, fluid, and thermal systems.

Students will be able to perform computer simulation of various dynamic system responses.

Students will be able to apply feedback loops to real world control systems.

MPT 311 - Laser Scanning Methods / Techniques

Students will be able to compare and contrast acousto-optic, electro-optic, polygonal, resonant, and MEMS scanners.

Students will be able to incorporate proper safety rules in the design of laser scanning systems.

Students will be able to analyze a variety of laser scanners and their uses.

Students will be able to articulate the various reasons laser scanning is more efficient for product quality.

MPT 312 - Industry 4.0 / Cyber Physical Manufacturing

Students will be able to compare and contrast the significant differences between the third and fourth industrial revolution.

Students will be able to identify and outline the various systems used in manufacturing and their role in Industry 4.0 environment.

Students will be able to analyze the challenges brought about by Industry 4.0.

MPT 325 - Digital Inspection / Quality Control

Students will be able to generate complex functions required for image processing, image analysis and object identification.

Students will be able to compare automated quality control applications for part inspections and counting used in manufacturing.

Students will be able to examine various artificial vision systems used in multiple automated guided vehicle (AGV) applications.

Students will be able to analyze 3D and 2D images to accurately identify finished product quality issues in manufacturing.

MPT 340 - Computer Simulations and Analysis

Students will be able to troubleshoot manufacturing operational issue through simulations.

Students will be able to develop a virtual production process utilizing the CIROS software application.

Students will be able to analyze a production process using value stream mapping.

Students will be able to construct mathematical models to analyze, and identify potential bottlenecks in manufacturing, material handling, supply chain, warehousing, and logistics environments.

MPT 343 - Design and Manufacturing Process II

Students will be able to compare and contrast the differences between various process industries.

Students will be able to analyze process data to identify operational efficiencies within various industries.

Students will be able to incorporate effective design methodology to insure maximum production throughput.

MPT 351 - 3D Vision Technology

Students will be able to appraise the limitations of three-dimensional vision systems.

Students will be able to utilize three-dimensional vision technology to address real world manufacturing applications.

Students will be able to distinguish product quality (pass/fail) through the utilization of pattern recognition.

MPT 363 - Manufacturing Execution Systems

Students will be able to develop and apply RFID tags using both external read/write devices and the HMI (human-machine interface).

Students will be able to define how a logical sequence of RFID data and a transition table are used to structure a production sequence.

Students will be able to create a work plan and assign it to a product.

MPT 411 - Advanced Machine Vision Integration

Students will be able to define the components of a machine vision system.

Students will be able to identify and select appropriate machine vision components to be utilized within a predefined manufacturing system.

Students will be able to integrate machine vision into an existing manufacturing system.

MPT 412 - Advanced Digital Inspection

Students will be able to analyze and apply image processing algorithms used in industrial applications.

Students will be able to analyze and apply color imaging, edge detection, and pattern matching techniques to detect faulty components.

Students will be able to apply camera calibration techniques to ensure proper product identification.

MPT 415 - Simulation of Manufacturing Systems

Students will be able to evaluate the manufacturability of new product designs.

Students will be able to analyze the layout and flow of materials within production areas, lines, and workstations.

Students will be able to determine production and material handling resource requirements.