MET-1041: FOUNDATIONS OF MANUFACTURING

Cuyahoga Community College

Viewing: MET-1041 : Foundations of Manufacturing
Board of Trustees:
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Academic Term:
Fall 2024

Subject Code
MET - Mech Eng/Manuf Ind Eng Tech

Course Number:
1041

Title:
Foundations of Manufacturing

Catalog Description:
Introduction to print reading and part visualization from drawings, including analyzing and interpreting multi-view drawings and three-dimensional models, location of key features and dimensioning specifications. Also covers beginning concepts in geometric dimensioning and tolerancing. Instruction in using precision measurement tools including, but not limited to scales, calipers, micrometers, dial indicators, coordinate measurement machines. Students will incorporate the use of computer interfaces in metrology and basic statistical process control and topics in lean manufacturing.

Credit Hour(s):
3

Lecture Hour(s):
2
Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
None.

Outcomes
Course Outcome(s):
Use basic measurement and precision tools and techniques.

Objective(s):
 1. Describe and justify the importance of Dimensional Measurement.
 2. Describe and convert SI and US system units of measurement.
 3. Identify and use both metric and inch rules.

Course Outcome(s):
Analyze measurements and perform technical calculations.

Objective(s):
 1. Express physical quantities with the appropriate number of significant digits, units and dimensions.
 2. Perform operations on whole numbers, fractions and mixed numbers.

Course Outcome(s):

Examine visualization and graphics as a major component in engineering technology, graphics, and visualization techniques.

Objective(s):
1. Interpret basic schematic or diagram, including a parts list.
2. Position manufacturing equipment according to facility drawings.
3. Identify different types of engineering drawings.

Course Outcome(s):

Describe the fundamentals of lean Manufacturing.

Objective(s):
1. Describe the history of lean manufacturing.
2. Describe the benefits of lean manufacturing.
3. Summarize the benefits of lean manufacturing.

Course Outcome(s):

Examine maintenance schemas: predictive, time-based, preventative, and corrective.

Objective(s):
1. Describe predictive, time-based, and preventative maintenance schemas.
2. Describe predictive time-based and corrective maintenance schemas.

Course Outcome(s):

Articulate the basic principles and purpose of Quality Control and Quality Systems and examine the basic concepts of Statistical Process Control (SPC).

Objective(s):
1. Describe the characteristics of data sets.
2. Describe types of variation and control charts.
3. Identify seven tools used for solving product quality.
4. Interpret a variety of charts and diagrams used in SPC.
5. Predict process trends using statistical methods given a set of process data.

Course Outcome(s):

Examine the basic concepts of Geometric Dimensioning and Tolerancing.

Objective(s):
1. Explain Geometric Dimensioning and Tolerancing (GD&T) terms.
2. Describe the purpose of geometric dimensioning and tolerancing (GD&T).
3. Specify tolerance and calculate dimensional limits given an industrial print.

Course Outcome(s):

Demonstrate problem-solving, critical thinking and communication skills while completing an individual course retrospective project assignment and a collaborative retrospective project assignment.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Use basic measurement and precision tools and techniques.

1. Analyze measurements and perform technical calculations.
2. Articulate basic principles and purpose of Quality Control and Quality Systems.
3. Read and follow standard operating procedures/checklists in paper or digital format.
4. Document work using industry records, standard operating procedures (SOPs) and travelers.

Methods of Evaluation:
1. Tests
2. Quizzes
3. Laboratory Assignments/Reports
4. Homework
5. Projects

Course Content Outline:
1. Introduction to Manufacturing - Basic Measurement and Applied Math
    a. Introduction to Manufacturing
    b. Introduction to Manufacturing Applied Math
    c. Basic Measurements
        i. Fractional, Decimal, and Metric Rulers
        ii. Standard and Metric Micrometers
        iii. Standard and Metric Calipers
2. Visualization and Graphics
    a. Introduction to Manufacturing Print Reading
    b. Bill of Materials
    c. Industrial Electrical Symbols
    d. Industrial Print Dimensions
    e. Basic Hydraulic Symbols
    f. Vacuum Symbols
3. Lean Manufacturing Fundamentals
    a. Introduction to Lean Manufacturing
    b. Standard Operating Procedures (SOPs)
    c. 5s
4. Maintenance Schemas
    a. Introduction to Manufacturing Maintenance Schemas
    b. Hand Tools
5. Quality Control and Quality Systems
    a. Historical Review
    b. Basic Definitions
    c. Prevalent Quality Philosophies
6. Statistical Process Control
    a. Introduction to Statistical Process Control (SPC)
    b. Variation
    c. X-bar and R-chart
7. Geometric Dimension and Tolerancing
    a. Basic Concepts - Symbols & Terms
    b. Importance to the Manufacturing Process

Resources

Kalpakjian, Serope and Steven R. Shmid. *Manufacturing Engineering and Technology*. 8th ed. Pearson, 2020.

Madsen, David A. and David P. Madsen. *Geometric Dimensioning and Tolerancing: Principle and Practices* . 9th ed. G-W Books, 2022.

Templeton, John and Mark W. Huth. *Math for Machinists*. 2nd ed. G-W Books, 2022.

Resources Other

OACC Semiconductor Collaboration Network Course - Introduction to Manufacturing
https://ohiolink.oercommons.org/courseware/lesson/2708/overview (https://ohiolink.oercommons.org/courseware/lesson/2708/overview/)

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