

MET-1040: FOUNDATIONS OF MANUFACTURING

Cuyahoga Community College

Viewing: MET-1040 : Foundations of Manufacturing

Board of Trustees:

May 2019

Academic Term:

Fall 2019

Subject Code

MET - Mech Eng/Manuf Ind Eng Tech

Course Number:

1040

Title:

Foundations of Manufacturing

Catalog Description:

Students will review learning styles, studying techniques, exam techniques, stress management, and time management as applied to manufacturing skills. Application of applied quantitative procedures to typical manufacturing, warehouse, construction, logistics, and allied industries situations. Covers concepts of numbers, exponential and logarithmic functions, algebraic word problems, right triangle trigonometry and basic trigonometric identities, foundational geometry, vectors and vector algebra, matrices, and solving systems of linear equations as applied to warehouse, logistics, manufacturing, and construction.

Credit Hour(s):

2

Lecture Hour(s):

1

Lab Hour(s):

3

Requisites

Prerequisite and Corequisite

None.

Outcomes

Course Outcome(s):

Apply quantitative analysis in manufacturing/industrial/construction and allied area decision making.

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.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Use trigonometry to calculate the X,Y,Z position of a part on a CNC Machine
2. Explain their importance when calculating properties of electricity.
3. Configure a set of linear equations to describe the operations of a warehouse and solve for the values.
4. Solve vector problems to describe the motion of a crane on a construction site.
5. Use exponential and logarithmic functions to describe when preventative maintenance may be needed for a machine.

Course Outcome(s):

Identify and explain attributes of successful employees in an industrial environment.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Describe the importance of punctuality, stress management, and independent learning when at a place of employment.
 2. Explain each step when creating a SMART goal.
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Methods of Evaluation:

1. Course Project
2. Midterm Exam and Final Exam
3. Laboratory Assignments/Reports
4. Quizzes and Homework Assignments

Course Content Outline:

1. Numbers
 - a. Familiarity with different types of numbers such as integers, real numbers, rational, and irrational numbers.
 - b. Understanding of ratios and fractions
 - c. Multiplications and division of numbers
 - d. Concept of positive and negative numbers
 - e. Four basic operations (+, -, x, and /) as applied to rations and fractions
 - f. Proportionality
 - g. Understanding of the concept of decimals
 - h. Understand the concept of percentage
 - i. Prime factorization of a integer
 - j. Concept of the absolute value of a number
2. Exponents
 - a. Familiarity with the concept of exponents (base and power)
 - b. Understanding of exponents having fractions as their basis
 - c. Understanding of exponents having fractions as their powers
 - d. How to handle negative base and negative power in exponents
 - e. Four basic operations (+, -, x, and /) as applied to exponents
 - f. Understanding of radicals and their connection to exponents
 - g. Zero Exponent Rule
 - h. Letters of alphabet representing numbers (Algebra)
 - i. Numbers may be represented by alphabetic characters
 - j. Four basic operations (+, -, x, and /) as applied to alphabetic characters
 - k. Concept of FOIL (First, Outer, Inner, Last)
 - l. Algebraic equations
 - m. Algebraic identities
 - n. Factorization of an algebraic expression
 - o. Algebraic inequalities
3. Solving Systems of algebraic equations
 - a. Understanding of polynomial
 - b. Four basic operations (+, -, x, and /) as applied to polynomials
 - c. Linear one variable equations (solution method)
 - d. Quadratic one variable equations (solution method)
4. Trigonometry
 - a. Definition of Sine, Cosine, Tangent, and Cotangent in a right angle triangle
 - b. Concept of "Unit Circle" for the definition of Sine, Cosine, Tangent, and Cotangent
 - c. Trigonometric identities
 - d. Trigonometric equations
 - e. Four basic operations (+, -, x, and /) as applied to trigonometric expression
 - f. Trigonometric polynomials
 - g. The concept of FUNCTIONS & their GRAPHS
 - h. Definition of a function, DEPENDENT and INDEPENDENT Variables
5. Concept of Number Line

- a. Two dimensional plot of a FUNCTION
 - b. DOMAIN and RANGE of a FUNCTION
 - c. Maximum and Minimum of a FUNCTION
 - d. GRAPH of a LINEAR FUNCTION (Concept of SLOPE)
 - e. GRAPH of a QUADRATIC FUNCTION (Max, Min, and Vertex)
6. Vector and Scalar Quantities
- a. Definition of a SCALAR quantity
 - b. Definition of a VECTOR quantity
 - c. Four basic operations (+, -, x, and /) as applied to VECTORS
 - d. Concept of Logarithm
 - e. Definition of Logarithm
 - f. Relationship between Logarithm and Exponents
 - g. Four basic operations (+, -, x, and /) as applied to Logarithms
7. Word Problems
- a. Application of one variable linear equations
 - b. Application of two variables linear system of equations
 - c. Four basic operations (+, -, x, and /) as applied to Logarithms
8. Employment Skills
- a. Time and Stress Management
 - b. Setting SMART Goals
 - c. Studying and importance of lifelong learning

Resources Other

Math in Motion (handouts from YTA program)

Wright State University Model for Engineering Math Education (<https://engineering-computer-science.wright.edu/research/engineering-mathematics/the-wright-state-model-for-engineering-mathematics-education>)

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