AIT-1010: CONSTRUCTION MEASUREMENTS AND CALCULATIONS

Cuyahoga Community College

Viewing: AIT-1010 : Construction Measurements and Calculations

Board of Trustees:
2013-11-29

Academic Term:
Fall 2024

Subject Code
AIT - Applied Industrial Technology

Course Number:
1010

Title:
Construction Measurements and Calculations

Catalog Description:
Covers fundamental measuring and calculation skills essential to the skilled craftsperson working in the construction industry. Provides a basic level of knowledge and understanding of practical measurements used to establish building, wall and equipment locations as well as material sizes and quantities. Field application and measurement conversions are stressed. Basic mathematical concepts are explained and applied in job situations.

Credit Hour(s):
4

Lecture Hour(s):
4

Requisites

Prerequisite and Corequisite
Eligibility for ENG-0985 Introduction to College Literacies, and MATH-0915 Basic Arithmetic and Pre-Algebra or qualified Math placement, and concurrent enrollment in the following courses: AIT-1020 Comprehension and Communication for Construction, AIT-1030 Basic Construction Language, AIT-1040 Spatial and Mechanical Reasoning, AIT-1050 Construction Industry Orientation, AIT-1060 Construction tools, and AIT-1120 Building Construction Trades Lab.

Outcomes

Course Outcome(s):
A. Use various hand tools to lay out buildings, building sections, partitions and/or divisions within a structure.

Objective(s):
1. Develop hand tool skills required to read and transfer measurements from construction drawings to materials and construction projects.
2. Apply basic mathematical concepts to convert measurements written in decimals to feet, inches and fractional parts of an inch.

Course Outcome(s):
B. Apply math skills to lay out and measure standard construction dimensions for cutting and fabricating materials.

Objective(s):
1. Establish centerline to centerline measurements for foundations, columns, anchor bolts and structural components using standard measuring tools.
2. Calculate floor to floor heights by adding and subtracting standard building materials including floor joist widths, sub and finish floor thicknesses and various building allowances.
3. Generate a cut list for various construction materials used by the respective trades.

4. Prepare material lists for mechanical and architectural trades by calculating lengths and quantities of components using basic math concepts of addition, subtraction, multiplication and division of whole numbers and fractions.

Course Outcome(s):

C. Calculate lengths of building materials including pipe, ductwork, steel, masonry and wood or wood substitute products.

Objective(s):

1. Differentiate between the standard divisions of a foot, inch and fractional parts of an inch to establish accurate measurements for construction layout and material requirements.
2. Determine steel requirements for structural columns and beams and decking.
3. Establish wall heights and columns made of brick, block, mortar and concrete.
4. Layout, cut and fabricate framed wood or wood substitute components for floors and floor openings, walls and wall openings, stairs and roofs, and fixtures.
5. Establish respective lengths of pipe and tubing used for liquid and gas supply lines, waste discharge and venting.
6. Compute ductwork requirements for heating and air conditioning pipe runs including plenums and vents.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Practical application

Course Content Outline:

1. Hand tools and building layout
    a. Reading the tape measure
        i. Feet
        ii. Inches
        iii. Fractional parts on inch
    b. Engineer measure
        i. Feet and tenths
        ii. Tenths and hundreds
    c. Unit conversions
        i. Calculations
        ii. Charts
    d. Math concepts
        i. Decimals to feet, inches and fractional parts of an inch
        ii. Inches and fractional parts to decimal parts of a foot
2. Cutting and fabrication
    a. Layout
        i. Buildings
        ii. Foundations
        iii. Wall locations
        iv. Miscellaneous
    b. Structural members
        i. Anchor bolts
        ii. Column locations
        iii. Beam and bracing
    c. Floor requirements
        i. Finish floor to finish floor
        ii. Floor members
            1. Joists
            2. Subfloor thicknesses
            3. Finish materials
        iii. Cut lists
        iv. Mechanical and architectural trades
            1. Piping and equipment
            2. Finishes

3. Building material lengths
    a. Mechanical supply lines
        i. Liquid and gas supply
        ii. Pipe lengths
        iii. Tubing
    b. Heating, ventilating and air conditioning
        i. Supply runs
        ii. Returns
        iii. Suspensions
    c. Structural steel
        i. Columns
        ii. Beams
        iii. Decking
    d. Masonry and concrete
        i. Footings
        ii. Columns
        iii. Walls
    e. Framed components
        i. Floors
            1. Structural
            2. Finishes
            3. Openings
        ii. Walls
            1. Heights
            2. Lengths
            3. Openings
            4. Finishes
        iii. Stairs, roofs and fixtures

Resources

Bright, Webster and Judy. *Math for Carpentry and Construction.* 3rd. Upper Saddle River, N.J.Prentice Hall, 2011.

Bass, Laurie. *Geometry: Tools for a changing World.* 3rd. Upper Saddle River, N.J.Prentice Hall, 1998.

Resources Other

1. www.constructionclasses.com/estcert/102_math.htm
2. www.construction-resource.com/forum/forumdisplay.php?f=
3. www.construction-resource.com/forum/forumdisplay.php
4. chemistry.about.com/od/mathsciencefundamentals

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