

ATMT-1200: MACHINE TOOL THEORY

Cuyahoga Community College

Viewing: ATMT-1200 : Machine Tool Theory

Board of Trustees:

September 2025

Academic Term:

Fall 2025

Subject Code

ATMT - Appd Ind Tech-ManufacturingTec

Course Number:

1200

Title:

Machine Tool Theory

Catalog Description:

Presents foundation for study of manufacturing methods, processes, related equipment, and tools of industry, requiring student to understand shop safety practices, job planning, feeds and speeds, layout tools and procedures, hand tools and bench work, metal cutting saws, drilling machines, lathe, milling machines, jig bore and jig grinder, surface grinder, E.D.M, and abrasives.

Credit Hour(s):

4

Lecture Hour(s):

4

Requisites

Prerequisite and Corequisite

Departmental approval: Admissions to Manufacturing Technology apprenticeship program.

Outcomes

Course Outcome(s):

N/A

Objective(s):

1. Complete the processes required for manufacturing a precision part.
2. Demonstrate standard shop safety practices.
3. Set-up and operate standard manufacturing machines.
4. Complete accurate lay-outs.
5. Use correctly and explain applications of hand tools.
6. Discuss correct feeds and speeds.
7. Use basic measuring tools.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Classroom participation

Course Content Outline:

1. Safety practices in the machine shop
 - a. Personal grooming
 - b. Housekeeping
 - c. Safe work practices
 - d. Fire prevention
 - e. OSHA regulations
2. Basic measurement
 - a. Inch system
 - b. Metric system
 - c. Fractional
 - d. Steel rule
 - e. Transferring
 - f. Measuring inside diameters
 - g. Measuring outside diameters
3. Squares and surface plates
 - a. Precision squares
 - b. Beveled edge squares
 - c. Toolmakers surface plate
 - d. Straightedges
 - e. Micrometer square
 - f. Adjustable square
 - g. Cylindrical square
 - h. Care of equipment
4. Micrometers - precision measuring tools
 - a. Reading
 - b. Adjust the accuracy
 - c. Combination inch-metric
 - d. Screw thread micrometers
 - e. Height gauges
 - f. Verniers
 - g. Depth gauges
 - h. Gage blocks
 - i. Fixed gauges
 - j. Plug gauges
 - k. Ring gauges
 - l. Coordinate measuring systems
 - m. Snap gauges
5. Layout procedures
 - a. Layout tables
 - b. Solutions
 - c. Scribbers
 - d. Care of equipment
 - e. Dividers and trammels
 - f. Squares
 - g. Combination sets
 - h. Semi-precision layout
 - i. Precision layout
6. Hand type cutting tools
 - a. Bench vise
 - b. Saws
 - c. Files
 - d. Scrapers
 - e. Burr tools
 - f. Taps
 - g. Dies
 - h. Reamers

- i. Broaching
- j. Lapping
- 7. Cutting tools
 - a. Carbide
 - b. High speed
 - c. Cermet
 - d. Diamond
 - e. Ceramic
 - f. Nitride
 - g. Fluids
 - h. Tool life, tool coatings
- 8. Drill presses
 - a. Twist drills
 - b. Reaming
 - c. Speeds and feeds
 - d. Types
 - e. Accessories, safety
- 9. Engine lathe
 - a. Machining between centers
 - b. Knurling
 - c. Taper turning
 - d. Thread cutting
 - e. Chucks, safety, backlash
- 10. Milling machines
 - a. Cutters
 - b. Depth of cut
 - c. Helical milling
 - d. Indexing
 - e. Setups
 - f. Operations, backlash
 - g. Safety
- 11. Jig bore and jig grinder
 - a. Methods of location
 - b. Set-up principals
 - c. Backlash
 - d. Procedures
 - e. Edge finders
 - f. Rectangular coordinates
 - g. Prefiguring coordinates
 - h. Grinding wheel selection
 - i. Tapered holes
 - j. Wheel dressing
 - k. Speeds
 - l. Safety
- 12. Grinding
 - a. Abrasives
 - b. Surface
 - c. Cylindrical
 - d. Id-od
 - e. Diamond wheels
 - f. Bonds
 - g. Inspection of wheels
 - h. Handling and storage of wheels
 - i. Characteristics
 - j. Grades
 - k. Selection of a wheel, wheel dressing
 - l. Safety
- 13. EDM (conventional & wire)

- a. Principals
 - b. Electrodes
 - c. Overburn
 - d. Materials
 - e. Roughing
 - f. Finishing
 - g. Vacuum flow
 - h. Dielectric fluids
 - i. Servos
 - j. Amperage
 - k. Tool wear
14. CNC
- a. Terms and definitions
 - b. The controlling medium
 - c. Part programming
 - d. Organizing for maximum performance
 - e. Future trends

The Course Schedule is subject to change due to pedagogical needs, instructor discretion, parts of term, and unexpected events.

Resources for the Instructor

Hardman, William. *Basic Machine Shop Theory*. Washington: NTMA Textbook Series, 1982.

Krar, Steve and Check Albert. *Technology of Machine Tools*. Westerville: Glencoe/McGraw-Hill, 1997.

Taylor, David. *Blueprint Reading for Machinists*. 5th ed. Albany, New York: Delmar, 1992.

Taylor, David. *Machine Trades Blueprint Reading*. Albany, New York: Delmar, 1985.

Walker, John. *Machining Fundamentals*. South Holland: Goodheart-Wilcox, 1993.

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