MET-2290: DIGITAL FABRICATION II

Cuyahoga Community College

Viewing: MET-2290 : Digital Fabrication II

Board of Trustees:
May 2026

Academic Term:
Fall 2026

Subject Code
MET - Mech Eng/Manuf Ind Eng Tech

Course Number:
2290

Title:
Digital Fabrication II

Catalog Description:
This course provides knowledge and skill requisite for utilizing modern sophisticated digital equipment to fabricate engineering parts.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
MET-1290 Digital Fabrication I; and MATH-0955 Beginning Algebra, or qualified Math placement.

Outcomes

Course Outcome(s):
Apply Science, Technology, Engineering, and Mathematics (STEM) concepts to conceptualize, design, fabricate, assemble, cost analyze and test parts using advanced tools and digital software.

Essential Learning Outcome Mapping:
Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):
1. Perform cost analysis using a spreadsheet.
2. Use experimental methods for testing parts and process data collection.
3. Design and fabricate parts.

Course Outcome(s):
Utilize computer/digital software to create solutions for fabrication of parts.

Essential Learning Outcome Mapping:
Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Use computer/digital software to import, slice, and process a STL file into g-code for additive manufacturing machines.
2. Create toolpaths for parts that can be CNC manufactured according to design specifications.
3. Create 2-D designs for vinyl and laser cutting, and laser engraving.

Course Outcome(s):

Explore the advantages, disadvantages, use, and safety considerations for contemporary tools, equipment, and machines in the fabrication and manufacturing labs.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Select and apply tools, equipment, and machines appropriately based on design considerations.
2. Use proper personal safety equipment based on tool, equipment and machine operation.

Course Outcome(s):

Apply verbal communication, technical writing, and graphical representation to appropriately convey information about a product or design to a specified audience.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Write technical reports.
2. Present oral reports.
3. Collect data for graphical representation.

Methods of Evaluation:

1. Technical Documents
2. Oral presentations
3. Visual presentations
4. Projects
5. Quizzes
6. Midterm Examination
7. Final Examination

Course Content Outline:

1. Design Thinking
    a. Stages of the Design Thinking Process
    b. Uses and Advantages
2. Prototyping
    a. Iterative Prototyping
    b. Parallel Prototyping
        i. Competitive Prototyping
    c. Rapid Prototyping (3D printing)
3. Individual vs Mass Production
    a. Differences
        i. Cost
        ii. Processes

4. Measurement
    a. Measuring tools
    b. Measurement in US standard and Metric
    c. Nominal vs Actual Dimensions
5. Build Plan Reading
    a. Materials List
    b. Cut List
    c. Assembly Steps
6. Safety
    a. Personal Protective Equipment
    b. Inhalation Hazards
    c. Thermal Hazards
    d. Mechanical Hazards
    e. Electrical Hazards
7. Hand Tools
    a. Screwdrivers
    b. Hammers
    c. Pliers
    d. Wrenches
    e. Utility Knife
    f. Wood Clamps
    g. Chisels
    h. Level
    i. Kreg Pocket Hole Jig
8. Power Tools
    a. Sliding Miter Saw
    b. Table Saw
    c. Jig Saw
    d. Reciprocating Saw
    e. Drill/Driver
    f. Sanders
    g. Router
    h. Planer
9. Automated Tools
    a. Laser Cutter/Engraver
    b. Desktop/Industrial 3D Printers
    c. CNC Router
    d. Vinyl Cutter/Plotter

Religious Accommodation

Before reviewing the course schedule, students should carefully review the following religious accommodation policy and other required instructional policies:

Religious Accommodation:

Students seeking an accommodation for absences permitted under Ohio's Testing Your Faith Act must provide the instructor with written notice of the specific dates for which the student requires an accommodation and must do so not later than fourteen (14) days after the first day of instruction. Please submit requests for accommodations at this link: https://portal2.tri-c.edu/ReligiousAccommodation/ Religious Accommodation Form. Students with questions about their religious accommodations under Ohio's Testing Your Faith Act may contact the College's Office of General Counsel and Legal Services by phone at 216.987.4856 or via email at legal@tri-c.edu.

Other Required Instructional Policies:

https://www.tri-c.edu/student-resources/curriculum/documents/syllabus-part-b.pdf

Weekly Schedule

	Topics
Week 1	Safety orientation Design thinking overview and stages
Week 2	Prototyping Strategies: Iterative, parallel, and competitive prototyping Rapid prototyping and the role of 3D printing
Week 3	Measurement fundamentals Precision measurement devices Tolerances
Week 4	Reading and interpreting build plans Understanding digital file formats
Week 5	Safety and risk mitigation: PPE, Mechanical, Electrical, Inhalation Hazards Emergency Procedures
Week 6	Hand tools: operation, safety, and techniques
Week 7	Power tools for wood and plastic fabrication: operation, safety, and techniques
Week 8	Digital workflows: capabilities and limitations Vinyl cutting and 2D digital fabrication
Week 9	Additive manufacturing workflow
Week 10	Toolpath creation CNC router fundamentals
Week 11	2D digital design Laser cutting and engraving
Week 12	Start final project: integrating workflows for prototype Begin technical report Begin design review presentation
Week 13	Continue guided work on final project Functional testing of fabricated parts and data collection
Week 14	Continue guided work on final project Conduct functional testing of fabricated parts Conduct cost analysis using spreadsheets
Week 15	Continue technical report Continue design review presentation
Week 16	Final project design review presentation Completed prototype demonstration Technical report due

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

Required/Recommended Readings

Readings may be selected from the following resources:

Ann Saterbak, Matthew Wettergreen. *Introduction to Engineering Design.*

Bjarki Hallgrimsson. *Prototyping and Modelmaking for Product Design.*

Sherif D. El Wakil. *Processes and Design for Manufacturing.*

Resources for the Instructor

Ann Saterbak , Matthew Wettergreen. (2021) *Introduction to Engineering Design*, Springer.

Bjarki Hallgrimsson. (2020) *Prototyping and Modelmaking for Product Design: Second Edition*, Laurence King Publishing.

Sherif D. El Wakil. *Processes and Design for Manufacturing*. CRC Press, 2026.

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