Course Outline

General Information

COURSE ID (CB01A AND CB01B)

DMT 56

COURSE TITLE (CB02)

3D Printing for AM Support Technicians and Operators

COURSE CREDIT STATUS

Credit - Degree Applicable

EFFECTIVE TERM

Fall 2022

COURSE DESCRIPTION

The objective of this course is to present a comprehensive overview of the creation and operation of an Additive Manufacturing facility. Topics include specifying, installing, and operating different printer technologies, managing production 3D print queues, selecting material/technology for a print job, optimizing build configurations for each technology, employee safety, customer management, and other technical and business considerations.

FACULTY REQUIREMENTS

COURSE FAMILY

Not Applicable

Course Justification

Foothill Equivalency

DOES THE COURSE HAVE A FOOTHILL EQUIVALENT?

FOOTHILL COURSE ID

Formerly Statement

Course Development Options

BASIC SKILL STATUS (CB08)

Course is not a basic skills course.

GRADE OPTIONS

- Letter Grade
- Pass/No Pass

REPEAT LIMIT

0

Transferability & Gen. Ed. Options

Information below is subject to change. For the official listing of courses, their approval dates, and transfer credit limitations, check the De Anza catalog (by academic year), ASSIST.ORG (https://assist.org/) and C-ID.NET (https://c-id.net/).

TRANSFERABILITY

Transferable to CSU only

Units and Hours

Summary

MINIMUM CREDIT UNITS	5.0
MAXIMUM CREDIT UNITS	5.0

Weekly Student Hours

Type	In Class	Out of Class
Lecture Hours	5.0	10.0
Laboratory Hours	0.0	0.0

Course Student Hours

COURSE DURATION (WEEKS)

12.0

HOURS PER UNIT DIVISOR

36.0

Course In-Class (Contact) Hours

LECTURE

60.0

LABORATORY

0.0

TOTAL

60.0

Course Out-of-Class Hours

LECTURE

120.0

LABORATORY

0.0

NA

0.0

TOTAL

120.0

Prerequisite(s)

DMT 54 and DMT 60A (may be taken concurrently) or DMT 65A (may be taken concurrently) or equivalent

Corequisite(s)

Advisory(ies)

Limitation(s) on Enrollment

Entrance Skill(s)

General Course Statement(s)

Methods of Instruction

Lecture and visual aids
Discussion of assigned reading Discussion and problem solving performed in class Quiz and examination review performed in class Homework and extended projects

Assignments

A. Research and compiled report on selected material additive manufacturing (AM) topics.
B. In class exercises to recognize various materials strength and design processes.
C. Manipulate provided CAD models for exportation to STL & 3MF files of parts & build prep.
D. Understand internal machine maintenance and support

Methods of Evaluation

A. Accuracy and Completeness of assigned reading, research projects and CAD models
B. Mid-term exam covering assigned video lectures, textbook reading and basic Additive Manufacturing / 3D Printing. Exam will be evaluated on Additive Manufacturing / 3D Printing processes and applications grading rubric.
C. Final Examination evaluating student's comprehensive understanding of 3D Printing techniques and design from CAD modeling by means of accuracy and completeness of STL files as it applies to the post processing in 3D Printer software.

Essential Student Materials/Essential College Facilities

Essential Student Materials:

- None.

Essential College Facilities:

- DMT 3D Printing/CAD laboratory

Examples of Primary Texts and References

Author	Title	Publisher	Date/Edition	ISBN
Ben Redwood, Filemon SchÃ¶ffer & Brian Garret "The 3D Printing Handbook: Technologies, design and applications" 3D Hubs. (2017)				

Examples of Supporting Texts and References

Author	Title	Publisher
Additive Manufacturing Technologies, 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing By Ian Gibson, David Rosen and Brent Stucker. (2015)		
3D Printing 2E Understanding Additive Manufacturing 2nd Ed. Author: Gebhardt, A., Kessler, J., Thurn, L. (2019)		

Learning Outcomes and Objectives

Course Objectives

- Define what AM technologies best meet the needs of the users
- Identify physical plant requirements driven by each technology
- Describe the key elements of planning AM builds
- Prepare files and properly configure AM machines for printing
- Demonstrate requirements for post processing based on individual technologies
- Identify machine maintenance processes to maximize part quality and system reliability
- Recognize steps to manage vendors to assure high machine reliability and availability of materials
- Explain best practices to staff and train AM roles

CSLOs

- Demonstrate the skills required for each of the different roles (manager, operator, technician) within an Additive Manufacturing facility.

Outline

A. Define what AM technologies best meet the needs of the users
    1. Evaluate customer requirements for material properties, surface finish, colors, delivery time
    2. Determine which AM technologies can meet these needs
B. Identify physical plant requirements driven by each technology
    1. Installation requirements such as power, HVAC, and post-processing.
    2. Identify local authority requirements for fire safety, ventilation, seismic readiness, and similar.
    3. Design and implement employee safety plan for safe operation of machines and material handling
    4. Facility construction
C. Describe the key elements of planning AM builds
    1. Prioritization based on customer requests
    2. Job tracking and customer interaction
    3. Manufacturing Execution System (MES) use
D. Prepare files and properly configure AM machines for printing
    1. File preparation
    2. Production optimization such as advanced stacking and nesting of parts
    3. Slicing in machine-specific software
E. Demonstrate requirements for post-processing based on individual technologies
    1. Best practices for support removal and part cleaning
    2. Safe handling processes
    3. Equipment for semi-automated support removal
F. Identify machine maintenance processes to maximize part quality and system reliability
    1. Daily
    2. Preventative maintenance

3. Unscheduled outages

G. Recognize steps to manage vendors to assure high machine reliability and availability of materials
   1. Service contracts
   2. Training
   3. Material purchasing

H. Explain best practices to staff and train AM roles
   1. Roles and responsibilities
   2. Prerequisites and on-the-job training