EASTERN ARIZONA COLLEGE
Advanced Manufacturing Production Processes

Course Design

2015-2016

Course Information

Division	Industrial Technology Education
Course Number	AMT 240
Title	Advanced Manufacturing Production Processes
Credits	3
Developed by	Brian Coppola
Lecture/Lab Ratio	1 Lecture/4 Lab

Transfer Status

ASU	NAU	UA
Pending Evaluation	Pending Evaluation	Non-transferable

Activity Course	No
CIP Code	48.0503
Assessment Mode	Portfolio
Semester Taught	Spring
GE Category	None
Separate Lab	No
Awareness Course	No
Intensive Writing Course	No

Prerequisites

AMT 220 or instructor approval

Educational Value

Advanced manufacturing technology majors will utilize advanced machine shop skills to produce multiple parts and follow developed project process plan and quality inspection methods.

Description

This course focuses on using manual machines, 3D scanners, 3D printers, laser cutters, CNC (Computer Numerical Control) routers, plasma cutters, and CNC lathes and mills to produce multiple projects. Core to this course will be the study of industry products to improve their function and usability. Students will be required to develop and follow a manufacturing process plan from CAD (computer aided design) drawing. Students will also be required to upload a project's machine code and manufacture parts within drawing/print callouts and specifications.

Supplies

Safety glasses

Competencies and Performance Standards

1. Demonstrate the use of all tools and machines in a safe and effective manner.

Learning objectives

What you will learn as you master the competency:

a. Identify the causes of accidents in a machine shop environment.

b. List the safety equipment required in shop operation.

c. List the safety rules for each machine tool and hand tool.

d. Identify the conditions in a shop that could be considered hazardous.

Performance Standards

Competence will be demonstrated:

- in classroom activities and discussions
- in written assignments and tests

Criteria - Performance will be satisfactory when:

- learner practices recognized safety procedures and uses the prescribed safety equipment at all times
- learner demonstrates an ability and willingness to follow designated procedures

2. Demonstrate proper set-up and properly operate various manual machines, advanced manufacturing equipment to produce multiple parts in accordance to project process plan while meeting drawing/print callouts (CNC machining center, 3D scanner, 3D printer, laser, plasma cutter, CNC router).

Learning objectives

What you will learn as you master the competency:

a. Demonstrate how to properly mount parts with fixtures and accessories on various machines.

b. Operate all machines properly and safely.

c. Operate multiple CNC controlled machines.

d. Demonstrate set-up of 3D printers to produce a part based off 3D scanner.

e. Operate a 3D scanner to produce usable parts.

f. Operate laser or plasma cutter or CNC router to produce usable parts.

Performance Standards

Competence will demonstrated:

- in shop production activities
- oral discussions

Performance will be satisfactory when:

- learner produces accurately fabricated parts on multiple advance manufacturing equipment noted above

3. Develop a project process plan from an approved (instructor validated) CAD/CAM drawing detailing the step by step process for manufacturing multiple parts.

Learning objectives

What you will learn as you master the competency:

a. Use CAD/CAM solid modeling software to draw print from a given part.

b. Identify and understand the purpose for critical print dimensions, callouts, and datum's.

c. Develop a list of fixtures, holding methods, and part clamping techniques.

d. Write a project process plan/traveler and revise as needed to ensure the part is made properly.

e. List cautions a machine operator needs to be aware of during the part manufacturing process (oil, tool type, inspection process, etc.).

Performance Standards

Competence will be demonstrated:

- in classroom activities and discussions
- in written assignments and tests

Criteria - Performance will be satisfactory when:

- learner identifies the elements of a cutting operation
- learner successfully completes first run projects
- learner demonstrates how to set up a machining process by using an industry print

4. Analyze and redesign a small usable part or product using a CAD system.

Learning objectives

What you will learn as you master the competency:

a. Use 3D scan and CAD solid modeling software to redesign and draw print from student ideas.

b. Identify and understand the purpose for critical print dimensions, callouts, and datum's.

c. Develop a list of fixtures, holding methods, and part clamping techniques.

d. Write a project plan/traveler and revise as needed to ensure the part is made properly.

e. List cautions a machine operator needs to be aware of during the part manufacturing process (oil, tool type, inspection process, etc.).

Performance Standards

Competence will be demonstrated:

- in classroom activities and discussions
- in written assignments and tests

Criteria – Performance will be satisfactory when:

- learner demonstrates an ability to make the required calculations and record the corresponding answers to shop problems

5. Use an industry recognized quality control statistical process to validate parts produced during production runs meet drawing/print callouts for form and function.

Learning objectives

What you will learn as you master the competency:

a. Demonstrate the correct use of an optical comparator, precision height gage, Rockwell hardness tester, and an optical flat.

b. Demonstrate the correct use of inside micrometers, internal relief gages, sign bars, and a double protractor.

c. Use correctly blade micrometers, OD & ID depth micrometers, pitch gages, finish

comparators, indicators, and thread gages.

d. Using a variety of precision measuring methods, validate the parts needed to meet each precision call-out shown on the project's print.

e. Utilize a statistical table based on part dimensions and tolerances to inspect part(s).

Competence will be demonstrated:

- in classroom activities and discussions
- in written assignments and tests

Criteria - Performance will be satisfactory when:

- learner records actual part dimensions in assigned projects

Types of Instruction

Demonstrations, Classroom Presentation, Fab Lab Dialog & Collaboration

Grading Information

Grading Rationale

30% of final grade is chapter tests & quizzes (all quizzes = one test score)

60% of final grade is based on project and process plans and lab activity documented on activity timecard

10% of final grade is final exam

Grading Scale

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
F	Below 60 %

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