

## FLORIDA COMMUNITY COLLEGE AT JACKSONVILLE

## COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: PMT 2250

COURSE TITLE: CNC Programming I

PREREQUISITE(S): None

COREQUISITE(S): None

CREDIT HOURS: 3

CONTACT HOURS/WEEK: 4

CONTACT HOUR BREAKDOWN:

Lecture/Discussion: 1

Laboratory: 3

Other \_\_\_\_\_:

FACULTY WORKLOAD POINTS: 3.01

STANDARDIZED CLASS SIZE ALLOCATION: 24

## CATALOG COURSE DESCRIPTION:

This course introduces multiple axis CNC Mill machining and develops the theory of programming in the classroom with applications of the program accomplished on industry-type machines. Studies consist of terminology of coordinates, cutter paths, angle cutting, and linear and circular interpolation.

SUGGESTED TEXT(S): Machine Tool Practices, ISBN: 0-13-033447-2 by Kibbe and Neely

IMPLEMENTATION DATE: Fall Term, 2009 (20101)

REVIEW OR MODIFICATION DATE:

COURSE TOPICS		CONTACT HOURS <u>PER TOPIC</u>
I.	Safety checklist	3
II.	Coordinate system and Positioning	10
III.	Programming Fundamentals ( <i>G</i> and <i>M</i> codes)	12
IV.	Milling Fundamentals	15
V.	Using various Programming Languages ( <i>EMCO</i> , <i>STAR</i> and etc...)	10
VI.	CNC Machine programming simulator training.	10

PROGRAM TITLE: Engineering Technology

COURSE TITLE: CNC Programming I

CIP NUMBER: 1615.061300 AS

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

12.0 DEMONSTRATE PROFICIENCY IN THE PRINCIPLES, CONCEPTS AND APPLICATIONS IN METAL FABRICATION METHODS - The student will be able to:

12.01 Understand professionalism in the manufacturing environment.

12.02 Understand, use and work with precision numbers.

12.03 Interpret mechanical drawings.

12.04 Demonstrate the use of geometric dimensioning and tolerancing.

12.05 Understand materials, and machining processes.

12.06 Demonstrate safe use of hand and power tools.

12.07 Identify the use and process in part layout.

12.08 Demonstrate a working knowledge of metal forming equipment.

12.09 Demonstrate the use of precision steel rulers.

12.10 Demonstrate the use of oxy - fuel cutting.

12.11 Demonstrate acceptable methods in tungsten inert gas welding.

12.12 Demonstrate acceptable methods in gas metal arc welding.

12.17 Demonstrate acceptable methods to use a dial indicator.

12.18 Explain the use of a height gauge to measure stock.

12.19 Identify aircraft sheet metal tools.

12.20 Demonstrate acceptable methods hand cutting and forming sheet metal.

12.21 Demonstrate the use of layout sheet metal tools.

12.22 Demonstrate acceptable methods using micro-counter sinks.

12.23 Demonstrate acceptable methods of Riveting solid rivets.

12.24 Identify and demonstrate operation of the pneumatic rivet gun.

12.25 Demonstrate the use of a rivet gauge set.

12.26 Demonstrate acceptable methods using a back rivet set.

12.27 Demonstrate acceptable methods using bucking bars.

12.28 Demonstrate the use of rivet squeezers and dimpling.

12.29 Demonstrate acceptable methods in using a blind riveting.

12.30 Identify the axes on a CNC mill.

LIST PERFORMANCE STANDARD ADDRESSED: (Continued)

NUMBER(S):            TITLES(S):

- 12.31 Demonstrate hand jog features on a CNC mill & CNC lathe.
- 12.32 Demonstrate acceptable methods to use an ironworker.
- 12.33 Demonstrate acceptable methods using a break & shear.
- 12.34 Demonstrate the use of dial calipers.

14.0 DEMONSTRATE PROFICIENCY IN THE SET-UP AND OPERATION OF MANUAL AND CNC MACHINING CENTERS - The student will be able to:

- 14.01 Set up and maintain a manual lathe and mill.
- 14.02 Demonstrate acceptable processes using a manual lathe and mill.
- 14.03 Demonstrate acceptable control of machining processes.
- 14.04 Identify and define the physics of machine cutting metals.
- 14.05 Demonstrate the characteristics of machining cutting tools.
- 14.06 Define and identify parameters of cutting tool life.
- 14.07 Demonstrate efficient parameters in production processes.
- 14.08 Demonstrate the process to drill and layout holes to a specific size.
- 14.09 Identify baseline machining layout.
- 14.10 Identify manual machining procedures used in CNC programming.
- 14.11 Identify grinding machining practices and processes.
- 14.12 Identify thread types and tooling used in machining.
- 14.13 Identify metal alloys and their properties in machining.
- 14.14 Demonstrate job planning procedures in machining.
- 14.15 Demonstrate procedures to calculate cutting tool speeds and feeds.
- 14.16 Demonstrate methods for accessing machine RPM.
- 14.17 Identify coordinate and primary machining axes.
- 14.18 Define and describe Absolute and incremental coordinates.
- 14.19 Identify the five CNC drive components.
- 14.20 Demonstrate rapid travel and interpolation.
- 14.21 Identify coordinate and primary machining axes.
- 14.22 Identify and define industrial machining and turning centers.
- 14.23 Identify processes for program creation and data management.
- 14.24 Demonstrate acceptable procedures in starting CNC machines.
- 14.25 Demonstrate the CNC machine controls for set up and operation.
- 14.26 Demonstrate acceptable procedures to set up a CNC Machining center.

LIST PERFORMANCE STANDARD ADDRESSED: (Continued)

NUMBER(S):            TITLES(S):

- 14.27 Demonstrate acceptable procedures to run programs using a CNC machining center.
- 14.28 Demonstrate acceptable procedures to generate a CNC program.
- 14.29 Demonstrate acceptable procedures in CNC job planning.
- 14.30 Identify cutting tools collets and holding fixtures.
- 14.31 Identify CNC tooling and applications.
- 14.32 Define CNC programming code words and conventions.
- 14.33 Define and demonstrate CNC program fixed cycles.



**Florida Community College  
At Jacksonville**

**Course Learning Outcomes &  
Assessment  
For All College Credit Courses**

NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

<b>Section 1</b>	
<b>COURSE PREFIX AND NUMBER:</b> <u>PMT 2250</u>	<b>SEMESTER CREDIT HOURS:</b> <u>3</u>
<b>COURSE TITLE:</b> <u>CNC Programming I</u>	

**Section 2**  
**TYPE OF COURSE: (Click on the box to check all that apply)**

AA Elective                       AS Required Professional Course     College Prep  
 AS Professional Elective             AAS Required Professional Course     Technical Certificate  
 Other \_\_\_\_\_  
 General Education: (For General Education courses, you must also complete Section 3 and Section 7)

**Section 3 (If applicable)**  
**INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:**

Communications             Social & Behavioral Sciences             Mathematics  
 Natural Sciences             Humanities

**Section 4**  
**INTELLECTUAL COMPETENCIES:**

Reading     Speaking     Critical Analysis             Quantitative Skills     Scientific Method of Inquiry  
 Writing     Listening     Information Literacy             Ethical Judgment             Working Collaboratively

<b>Section 5</b> <b>LEARNING OUTCOMES</b>		<b>METHOD OF ASSESSMENT</b>
1	Safety checklist	Hands-on test, quizzes, or written test
2	Coordinate system and Positioning	Hands-on test, quizzes, or written test
3	Programming Fundamentals (G and M codes)	Hands-on test, quizzes, or written test
4	Milling Fundamentals	Hands-on exercises, written quizzes or tests.
5	Using various Programming Languages (EMCO, STAR and etc...)	Hands-on test, quizzes, or written test
6	CNC Machine programming simulator training.	Hands-on tests, written quizzes, and tests

**Section 6** Name of Person Completing This Form: Darrell J. High                      Date: 05/07/07