EICC COURSE DEVELOPMENT MODEL (CDM)

CATALOG COURSE NUMBER: MFG-205
COURSE TITLE: Mill Programming
Originating College: ☐CCC ☐MCC ☑SCC Effective Term/Year: Fall 2014
Initiating Faculty Member: Kenneth Darmody Initiating Department Coordinator: Ben Kettering

Reason for submission: Check all that apply
☐New Course If yes, type of course:
☐**A&S**
To be considered for General Education? ☐ Yes ☐ No Category:
To be part of an A & S Concentration? ☐ Yes ☐ No Concentration:
☐**CTE** Program Title: ☐Required ☑Elective
☑General Education or Program Review ☐Reactivation of an inactive course ☐Making course inactive
☐Changing course; please explain:
☐Other; please explain:

Contact Hours/Distribution of Contact Hours

Lecture Hours		**Lab Hours**		**Clinical Hours**		**Coop Hours**	
Hours per Week:	1.00	Hours per Week:	2.00	Hours per Week:	0	Hours per Week:	0
Number of Weeks:	16.50	Number of Weeks:	16.50	Number of Weeks:	16.50	Number of Weeks:	16.50
***Note: If offering a course for the full fall or spring semester, the number of weeks is 16.5*							
Total Lecture Hrs:	19.80	Total Lab Hrs:	39.60	Total Clinical Hrs:	0	Total Coop Hrs:	0

Semester Hours Credit: 2.00 if variable credit, give range:
Allow repeat* for credit: ☐Yes ☑No
If yes, total course repeats allowed: If yes, total credits:
*Note that repeat for credit means a student can pass the course and then repeat it for additional credit. An internship course is an example of a course that could be set up as repeatable for additional credit

Course or courses this CDM replaces, if any:

CATALOG COURSE DESCRIPTION: This course will introduce students to Computer Numeric Control (CNC) programming concepts in manufacturing settings. Topics include circular interpolation, manual program units, drilling, tapping, boring canned cycles, conversational programming units for milling operations, as well as verifying new programs and understanding advanced programming techniques. Various projects will strengthen the student's proper use, programming and troubleshooting of the equipment in the manufacturing setting.

RECOMMENDED ENTRY LEVEL SKILLS/KNOWLEDGE:

PRE-REQUISITE COURSES

CCN#	COURSE TITLE
MFG 105	Machine Shop Measuring
MFG 221	CNC Milling Operator

CO-REQUISITE COURSES

CCN#	COURSE TITLE

PUBLISHED MATERIAL(S) USED FOR CDM DEVELOPMENT: Amatrol. CNC Operator Program: HAAS Based Interface. Amatrol, 2009. Web.

In general it is expected that source material will be dated within 5 years of this CDM date. If all materials/ textbooks cited above are older than this, please explain:

GENERAL COURSE GOALS

Upon successful completion of this course the student should be able to:

Explain what CNC is and where standards are set.
Explain the advantages of CNC.
Use programming techniques to move the work offset during program execution.
Apply subprograms and subroutines to organize program functions and automate repetitive tasks.
Use programming techniques to write programs for canned cycles, sub-programming, documentation, coordinate position sheet and set up sheet.
Program, set up and run the following programs: clean face program, circle program, drill and tap program, all practice program and do all bore program.

TOPICAL OUTLINE

1. CNC Programming Introduction
2. Programming Safety
3. Machine Reference Points
4. Program Structure
5. G-Code Definitions
6. M-Code Definitions
7. Programming Compensations
8. Subroutines and Subprograms
9. Advanced Editor
10. Visual Quick Code
11. Common Tasks

COURSE OBJECTIVES

Upon successful completion of the course, a student should be able to:

1. CNC Programming Introduction
   a. Identify why numerical control (NC) and CNC machines were developed.
   b. Describe the functions of current CNC technology.
   c. Identify the advantages and disadvantages of CNC machines.
2. Programming Safety
   a. Describe general dangers related to the equipment.
   b. Identify why the programming safety block is used in a program.
   c. Identify the correct program plane.
3. Machine Reference Points
   a. Identify machine home zero.
   b. Identify the location of machine home zero.
   c. Identify programmed part zero.
   d. Distinguish between absolute and incremental positioning.
   e. Describe work offset and why it is established.
   f. Describe how to find work offset.
   g. Describe how to determine tool work offsets.
4. Program Structure
   a. Identify program structures, including characters, words, and blocks.
   b. Define G-codes, including those which are modal or non-modal codes.
   c. Identify M-codes.
   d. Define machine controls.
   e. Identify alternate programming methods.
   f. Identify the five main sections of a part program.
5. G-Code Definitions

a. Distinguish between modal and non-modal commands.
b. Describe what G-codes are.
c. Identify G-code demands and functions in a program.

6. M-Code Definitions
   a. Describe what M-codes are.
   b. Identify M-code commands and functions in a program.
7. Programming Compensations
   a. Describe tool length compensation.
   b. Identify how tool length compensation is established.
   c. Identify how tool length compensation is used.
   d. Identify how to compensate for tool length in the part program.
   e. Identify G-codes used in programming tool length compensation.
   f. Define cutter compensation.
8. Subroutines and Subprograms
   a. Describe how to create a subroutine.
   b. Describe how to create a subprogram.
9. Advanced Editor
   a. Identify how to compensate for tool wear in the part program.
   b. Describe proper procedure to edit program entries.
10. Visual Quick Code
    a. Identify how to access Visual Quick Code.
    b. Identify the Visual Quick Code categories.
    c. Describe how to use Visual Quick Code.
11. Common Tasks
    a. Load mill programs.
    b. Run mill programs.

RECOMMENDED METHODS OF INSTRUCTION: *Check all appropriate methods of instruction to facilitate student learning of course objectives.*

☐ Case Studies	☐ Class Discussions
☑ Computer lab work	☐ Computer-assisted tools
☐ Computer-assisted writing	☐ Conducting experiments
☑ Demonstration or modeling	☐ Electronic interaction
☐ Field observation	☐ Field trips
☐ Guest speaker	☑ Guided practice
☐ In-class writing or editing workshops	☐ Journals
☑ Lecture	☐ Library instruction and resources
☑ Model building	☐ Peer review
☐ Readings	☐ Role play
☐ Service learning	☐ Simulation
☑ Student and instructor conferences	☐ Student collaborative learning
☐ Student presentation	☑ Student projects
☐ Tests or quizzes	☐ Worksheets/surveys
☐ Writing assignments/exercises (graded or not)	
☐ Other (please list specifics):	

RECOMMENDED EVALUATION METHODS: *Check all appropriate methods of evaluation to assess student achievement of course objectives.*

☐ Class workshops	☐ Classroom discussions/participation
☐ Collaborative work	☑ Demonstration of skill(s)
☑ Individual conferences	☐ Journals
☑ Laboratory reports	☐ Oral presentations

❑Portfolios	❑Pretest/Posttest
❑Quizzes	❑Reading responses
☑Student presentations	☑Student projects
❑Tests	❑Writing Assignments

❑Other (please list specifics):

ATTENDANCE: Policies on attendance will be formulated by the instructor and communicated to the students on the course syllabus.

ACADEMIC DISHONESTY: Policies on academic dishonesty can be found in the EICC student code of conduct published in the student handbook.

CDM CREATION/REVIEW/REVISION INFORMATION	
Originally Written by:	Date:
Department Chair, Comments, & Date:	
Does similar curriculum exist at other EICC Colleges? ❑CCC ❑MCC ❑SCC ❑No	
If yes, Counterparts Consulted, College, Comments & Date:	
CDM Review or Revision Date:	
Faculty member(s) & College:	
Does similar curriculum exist at other EICC Colleges? ❑CCC ❑MCC ❑SCC ❑No	
Changes made to course which will require further review steps:	
❑ Making course inactive ❑ Credit hours ❑ Contact hours ❑ Course Description	
❑ 25% or more of course objectives ❑ Other minor revisions or no revisions	
Dean Review, Comments & Date:	
If changes made require further review and approval:	
College Curriculum Committee Sign-off & Date:	
IC Review Subcommittee Sign-off & Date:	
Instructional Council Approval:	