Bergen Community College
Division of Math, Science and Technology
Department of Industrial & Design Technology

Course Syllabus
MFG-227 CNC Programming I

Semester and year:
Course Number:
Meeting Times and Locations:

Instructor:
Office Location:
Phone:
Office Hours:
Email Address:

COURSE DESCRIPTION:

MFG-227 CNC Programming provides the fundamentals of programming Computer Numerical
Control Equipment with a heavy concentration on CNC turning and machining centers. Included
in this course will be language and graphics based programming, automated features and
capabilities, advanced CNC applications and integration. Students will receive hands on
programming experience using industry preferred software and controllers.
2 lecture, 4 lab, 4 credits
Prerequisites: MFG-229 Materials Processing and Fabrication
Co-requisites: DFT-210 Computer Aided Drafting I or MFG-119 Pro-Engineer® Design I

STUDENT LEARNING OBJECTIVES:

As a result of meeting the requirements in this course, students will be able to:	Student performance on these objectives will be measured by:
1. Write and store a CNC program on a computer and use DNC to upload and download programs.	Graded Exercises.
2. Write and store on a computer a program, which is first verified by CNC simulation software, which will drive a collection of tooling through multiple tool paths, needed to produce the part.	Graded Exercises and Exams.
3. Demonstrate the ability to setup and produce a 1st article to specification, on a CNC turning or machining center.	Graded hands-on lab Projects.
4. Demonstrate the ability to setup the tooling and work piece; qualify the work piece to the control; prepare tools or load tools into the tool magazine as required.	Graded hands-on lab Projects and Exams.

COURSE CONTENT:

CHAPTER	TOPIC
1-3	Background and History of CNC Machining, Controls & Data Communication
4.	Cartesian Coordinate System and Rotary Axis
6.	Programming Using Cartesian Coordinates
7.	Programming Modes
8,9	G & M Code Programming Format
15.	CNC Positioning Systems
17-18	Work Settings and Offsets
19.	Tool Settings and Offsets
20.	Linear Interpolation
22.	Circular Interpolation
29.	Helical Interpolation
30.	Cutter Radius and Diameter Compensation
32.	Programming and Set-up for Milling Centers
35-36	Programming and Set-up for Turning Centers
39.	Subprograms
50-52	Troubleshooting Set-ups

TEXTBOOK: CNC Programming Handbook, Peter Smid, Third Edition, Industrial Press, Inc. 2007. ISBN: 978-0-8311-3347-4

EVALUATION:
A. Projects . . . . 35 %
B. Exams . . . . 35 %
C. Final Examination. . . . . 20 %
D. Class Participation 10%
        TOTAL 100%

Assignments will have specific due dates. Assignments submitted after that date will be lowered one full letter grade per class meeting that they are late.

ATTENDANCE POLICY:

If a student is absent from the lecture portion of the class, it will be recorded as an absence for the entire class period. If a student is absent from the laboratory portion of the class, it will be recorded as an absence from that portion of the class only.

A letter grade will be deducted from the class participation portion of your final grade for each absence beyond three absences from either portion of a class period.

SPECIAL NOTES: **A final grade cannot be assigned for the course until all projects and examinations for the course have been completed.**

Make-up examinations will be administered in accordance with the instructor's and division's policy.

FACULTY ABSENCE PROCEDURE: Please note well.

A daily listing will appear in the glass case located in the main hall A bldg. which will indicate all classes which are cancelled. Students can consult this case before going to class. If students find a class cancelled which has not been listed, they should report this to the divisional dean's office (A325) or to the evening/Saturday office (L113).

CALENDAR:

Class Meeting	Date	Topic	Chapter
1.	_____	Background and History of CNC Machining, Controls, and Data Communication	1,2,3
2.	_____	Cartesian coordinate system and rotary axis (A,B,C)	4
3.	_____	Programming Modes	7

4.	_____	CNC Positioning Systems
		  a. Point to Point
		  b. Continuous-Path Positioning (Contouring)
			15,17,32

5.	_____	**EXAM** Programming Format including G-code and M-code	8,9
6.	_____	Linear, Circular and Helical Interpolation	20,22,29
7.	_____	Tool Settings and Offsets	19
8.	_____	Work Settings and Offsets	17,18
9.	_____	Cutter Radius and Diameter Compensation	30
10.	_____	**EXAM** Programming Using Cartesian Coordinates	4
11.	_____	Subroutines or Macros	39
12.	_____	Part loading and programming options	51
13.	_____	Programming and Set-up for Milling Centers	2,32
14.	_____	Programming and Set-up for Turning Centers	35,36
15	_____	**FINAL EXAM** Troubleshooting Set-ups	50-52

All machining courses will include instruction on safe operation of equipment, handling and storage of materials.