ITT Technical Institute

AM360
Computer Numerical Control

Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 50 (30 Theory Hours, 20 Lab Hours)

Prerequisite(s) and/or Corequisite(s):
College algebra and trigonometry

Course Description:
This course presents a study of CNC with an emphasis on step-by-step development of CNC programs. Operational codes, parts programs for computer-controlled machine tools, and tooling requirements are discussed. Laboratory will provide the opportunity to program CNC systems to produce machined parts.

Outside Work:

For purposes of defining an academic credit hour for Title IV funding purposes, ITT Technical Institute considers a quarter credit hour to be the equivalent of: (a) at least 10 clock hours of classroom activities and at least 20 clock hours of outside preparation; (b) at least 20 clock hours of laboratory activities; or (c) at least 30 clock hours of externship, practicum or clinical activities. ITT Technical Institute utilizes a "time-based option" for establishing out-of-class activities which would equate to two hours of out-of-class activities for every one hour of classroom time. The procedure for determining credit hours for Title IV funding purposes is to divide the total number of classroom, laboratory, externship, practicum and clinical hours by the conversion ratios specified above. A clock hour is 50 minutes.

A credit hour is an artificial measurement of the amount of learning that can occur in a program course based on a specified amount of time spent on class activities and student preparation during the program course. In conformity with commonly accepted practice in higher education, ITT Technical Institute has institutionally established and determined that credit hours awarded for coursework in this program course (including out-of-class assignments and learning activities described in the "Course Outline" section of this syllabus) are in accordance with the time-based option for awarding academic credit described in the immediately preceding paragraph.

STUDENT SYLLABUS

Instructor: _____

Office hours: _____

Class hours: _____

Major Instructional Areas

1. Introduction to N/C
2. N/C, DNC and CNC systems
3. Applied tooling mechanics
4. Manual CNC part programming
5. CNC turning centers and programming
6. Advanced programming features
7. Causes and prevention of CNC downtime
8. Future of CNC (in CIM, FMS, rapid prototyping, etc.)

Course Objectives

1. Compare and contrast features and applications of NC, DNC, and CNC.
2. Identify axes (plus directions) for NC programming of mills or lathes.
3. Identify the main components of an NC or CNC system and the purpose of each.

4. Evaluate a CNC part program for safety and efficiency.
5. Select correct tooling for a given CNC job, and plan and, if required, perform the setup.
6. Perform video simulated runs, “dry” runs, and actual material removal runs of specified CNC programs.
7. Write simple CNC part programs for specified material removal jobs. Criteria of safety and efficiency will apply.
8. Debug a part program which contains an error and correct the error.
9. Discuss causes of CNC downtime and ways of preventing it.
10. Identify and discuss procedures specifically required for multi-axis programming.
11. Identify and discuss characteristic features of CIM and FMS.

TEACHING STRATEGIES

Curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools in the classrooms.

Student Textbook and Materials

Valentino, James V., and Joseph Goldenberg. *Introduction to Computer Numerical Control*, 4th ed. Prentice-Hall, 2008.

Course Outline

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage
1	Introduction to CNC and Machine Tool Controls	Ch 1, Ch 2	Lab, Homework Exercises
2	Tooling for Hole and Milling Operations CNC Machining Centers	Ch 3, Ch 4	Lab, Homework Exercises
3	Print Reading and Tolerance	Ch 5	Lab, Homework Exercises
4	CNC Shop Activities	Ch 9	Lab, Homework Exercises
5	Word Address Programming	Ch 10	Lab, Homework Exercises
6	Programming Hole Operations and Linear Profiles	Ch 12, Ch 13	Lab, Homework Exercises

7	Programming Circular Profiles and Programming with Cutter Diameter Compensation	Ch 14, Ch 15	Lab, Homework Exercises
8	Introduction to the CNC Lathe	Ch 17	Lab, Homework Exercises
9	CNC Lathe Programming Techniques	Ch 19	Lab, Homework Exercises
10	CNC Lathe Programming Techniques	Ch 20	Lab, Homework Exercises
11	Review		
	Final Exam	The final examination will be based on the content covered in Units 1 to 10.	

Evaluation Criteria and Grade Weights

Quizzes	10%
Homework	30%
Lab exercises	25%
Participation	10%
Final exam	25%

Final grades will be calculated from the percentages earned in class as follows:

A	90 - 100%	4.0
B+	85 - 89%	3.5
B	80 - 84%	3.0
C+	75 - 79%	2.5
C	70 - 74%	2.0

D+	65 - 69%	1.5
D	60 - 64%	1.0
F	<60%	0.0

