Computer Numerical Control

Turning

Course Outline and Syllabus

Course Title: Computer Numerical Control Turning

Instructor: TBD

Course Description: An introduction of machining principles and concepts related to computer numerical control (CNC) Turning applications. Includes the use of the Cartesian coordinate system, programming codes and command, and tooling requirements for CNC/CAM machines.

Prerequisite: CNC Fundamentals

Course Length: 40 hrs.

Text: *Computer Numerical Control Turning by PEN Associates, LLC*

Methodology: Any and/or all of the following activities may be utilized by the instructor during the term to achieve the learning objectives for the course.

A. Lecture
B. Discussions
C. Audio/Visual Instruction
D. Individual and Group Projects/Presentations
E. Laboratory Exercises
F. Quizzes and Examinations

Course Objective:

Upon completion of this course, the participant will be able to:

- Define the coordinate system of turning machine tools,
- Understand the axis motion of CNC Machine tools,
- Understand general machining operations,
- Identify associated tooling for specific CNC operations,
- Perform effective and accurate CNC offset input,
- Understand the importance of Feeds and Speeds.
- Develop CNC programs for turning centers

Course Outline:

I. Turning

A. CNC Turning Centers
B. Operations performed on a CNC Lathe Type Machine
1. Turning

2. Facing
3. Drilling
4. Threading
5. Cutting Off

II. Work Holding Devices

A. Collets
B. Three Jaw Chucks
C. Four Jaw Chucks

III. Lubricants and Coolants

A. Oils
B. Soluble
C. Semi-synthetic
D. Synthetic

IV. Feeds and Speeds

A. Tool wear
B. Equations

V. Cutting Tools and Applications

A. Tool Geometry
B. Metal Cutting
C. High Speed
D. Carbide
E. Coating Materials

VI. The Coordinate System for Turning

A. Absolute
B. Incremental

VII. Overview of CNC Setup and Operation

A. TLO
B. Considerations

VIII. Programming Turning Centers

A. Planning and Programming
B. Program Functions
C. Program Start

. D. Tool Change
E. Program End
F. Running a Program for the First Time
G. Constant Cutting Speed (CSS)
H. Turning Canned Cycles
I. Threading on Turning Centers
J. Hole Cycles
K. Offsets

Student Learning Objectives: (Competences)

1. Describe CNC Turning machining and uses, and applications of CNC program.

- Describe the capabilities and limitations of computer numerical control (CNC)/computer assisted manufacturing (CAM) equipment.
- Describe the general Turning machining operations performed on CNC Turning machine tools.
- Describe the type of cutting tools used on CNC Turning machine tools.
- Describe the materials used to manufacture Turning cutting tools.
- Understand and utilize to calculate machining factors such as speeds, feeds, and depth of cuts.
- Describe the importance of coolants and lubricants in the mill machining operation.
- Describe the different types of coolant solutions used in machining.
- Understand basic G, M codes
- Describe the Cartesian coordinate system as used in a CNC machine program.
- Calculate the coordinates position of geometric points of transition on and X and Z system.
- Describe the differences in absolute and incremental dimensioning as related to an ISO programming of a CNC machine.
- Review a mechanical drawing and determine the appropriate datum structure.
- Perform calculations to determine coordinates.

- Understand the elements of a CNC machine tool controller.
- Describe procedures for CNC machine start-up.
- Explain safety requirements.

Grades: Grades for this course will follow the following criteria.

Tests-	40%
Lab Activities-	40%
Final-	20%

Attendance Policy Statement

All students are expected to attend each class. Students are solely responsible for keeping up with their attendance.

If circumstances require an absence, then students should note that it may initiate starting the course from where the absence occurred when the course is presented again. Each case will be treated to ensure that the student receive the full benefit of the training.

If Machine Tools are Used

Safety Test: Each student enrolled in the CNC Fundamental Course must successfully pass a safety test. This test is based on knowledge and skills needed to safely perform duties and responsibilities within the chosen field of study. A score of 100% must be obtained before students will be allowed to perform and lab activities.

Classroom Safety/Security: All students are expected to be familiar with emergency evacuation procedures, emergency medical procedures, and potential classroom hazards. Your instructor should review these procedures at the beginning of the semester, either orally or in writing. Please ask for clarification if your instructor fails to adequately review these procedures.

Student Responsibilities:

Students are expected to be responsible for their actions as they relate to in-class activities.

As a student, you are expected to:

- Arrive to the class/laboratory on time and enter with respect for others

- Remain attentive in class
- Prepare for each class. This means preparation of assignments as well as preparation for participation.
- Attend all classes (legitimate excuses are understood). (Letting the instructor know of the absence prior to class is good business on the part of the student.)
- Refrain from non-topic, side conversation.
- Be prompt on meeting scheduled times (class time, due date of reports, etc.)
- Work with others as assigned to complete an assignment carrying out his or her portion of the assignment to its fullest.
- Be respectful to the instructor and the other students.

Essential Functions:

1. Wear safety glasses at all times when in machine tool lab.
2. Wear proper protective equipment when performing lab activities.
3. Use small hand tools.
4. Use machinery in shop.
5. Use measuring instruments.
6. Read and understand technical literature.
7. Read and understand blueprints.
8. Reason and perform problem solving activities.
9. Work with others and communicate orally and in writing.
10. Exhibit behavior and social skills that is acceptable to the college.

The above list of essentials functions is not intended as a complete list.