Syllabus
Engineering Technology
University of North Texas
Course Title: CNC Programming and Operation
Course Prefix and Course Number: MFET 4220
Semester: Fall, 2018

The Engineering Technology Department, in cooperation with the Office of Disability Accommodation, complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request to the instructor prior to the fourth day.

SAFETY CATEGORY: 3
DATE PREPARED: 8/1/18
PREPARED BY: Hector R. Siller

COURSE NUMBER, TITLE, CREDIT HOURS:

MFET 4220, CNC Programming and Operation. 3 hours (2;3)

DESCRIPTION:

Local programming and operation of CNC (Computer Numerical Control) machining and turning centers, including programming of fixed cycles; program troubleshooting, editing and optimizing; setting work coordinate system selections; and setting tool geometry offsets.

PREREQUISITES:

MFET 4210 or consent of instructor

REQUIRED TEXTBOOKS:


COURSE OBJECTIVES: At the conclusion of this course, the student will (be able to):

1. Enhance established knowledge base of computer-controlled machine tools.
2. Enhance programming and troubleshooting skills in CNC Milling Center and CNC Turning Center part programs.
3. Explore programming, interfacing and troubleshooting skills regarding machine-tending robotics.

APPROPRIATE PROGRAM OUTCOMES:

Technology Accreditation Commission of ABET, Inc.: An engineering technology program must demonstrate that graduates have:

a. an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
f. an ability to identify, analyze and solve technical problems,
i. an ability to understand professional, ethical and social responsibilities.

STUDENT LEARNING OUTCOMES: (TAC of ABET Program Outcomes Addressed)
Upon completion of this course, students should be able to
1. Understand the characteristics of Computerized Numerical Controllers and their Human Machine Interfaces (HMI). (i)
2. Demonstrate competence in writing and reading word address machine tool language, including G and M codes. (b)
3. Explain various machine tool functions in turning and machining centers. (b)
4. Compose manually and verify a CNC milling center part program. (a)
5. Compose manually and verify a CNC turning center part program. (a)
6. Demonstrate practical competence with CAM software in preparing CNC milling and turning center programs. (a)
7. Design and execute process plans for the manufacturing of mechanical parts in CNC machining and turning centers. (a,f)

INSTRUCTIONAL OBJECTIVES

1. The lab activity, a group project, as well as the CAD/CAM individual projects are to be completed, adhering to the drawing in the working syllabus, and submitted at the designated date.
2. Quizzes shall consist of free response items from the previous week or previous weeks lecture (as announced by the professor).
3. The two examinations will be forced response items and non-cumulative with reference to semester's content. The items will solicit detailed technical information as well as more broadly-based generalizations regarding processing capabilities, advantages and disadvantages.
4. The oral presentation assignment shall be prepared, adhering to the instruction in the working syllabus, and presented to the class.

LEARNING STRATEGIES:

Lecture/Demonstration/Hands-On Laboratory Activity

COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, Organization of Course, Course Policies, Process Planning of CNC Machining Operations</td>
<td>HW 1 &amp; Lab 1</td>
</tr>
<tr>
<td>2</td>
<td>Programming of CNC Machining Centers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Programming of CNC Machining Centers</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Loading/Editing Programs, Trialing Programs, Optimizing Programs</td>
<td>HW 2 &amp; Lab 2</td>
</tr>
<tr>
<td>5</td>
<td>Setting Tool Geometry and Work Coordinate Offsets Programming of CNC Machining Centers</td>
<td>HW 3 &amp; Lab 3</td>
</tr>
<tr>
<td>6</td>
<td>Programming of CNC Machining Centers</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Prep for Midterm Exam</td>
<td>Project Part. Report 1</td>
</tr>
<tr>
<td>8</td>
<td>Midterm Exam</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Review Midterm Results, Programming of CNC</td>
<td>HW 4 &amp; Lab 4</td>
</tr>
</tbody>
</table>
Turning Centers
10 Process Planning of CNC Turning Operations
11 Programming of CNC Turning CentersHW 5 & Lab 5
12 Setting Tool Geometry and Work Coordinate Offsets
13 Loading/Editing Programs, Trialing Programs, HW 6 & Lab 6
Optimizing Programs
14 Fixed Cycles for Turning Centers Project Part. Report 2
15 Prep for Final Exam
16 Final exams and Group Project Exhibition Project Final Report

GRADING ELEMENTS AND WEIGHTS:

<table>
<thead>
<tr>
<th>Element</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Group Project</td>
<td>30%</td>
</tr>
<tr>
<td>Homework, Lab Practices and Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>20%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>20%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

GRADING POLICIES:

Quizzes and examinations are graded based on class performance.

The laboratory activity will be a group effort. Formal evaluations will consist of homework, quizzes and two examinations.

The instructor reserves the right to alter the syllabus.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% to 100%</td>
</tr>
<tr>
<td>B</td>
<td>80% to 89.99%</td>
</tr>
<tr>
<td>C</td>
<td>70% to 79.99%</td>
</tr>
<tr>
<td>D</td>
<td>60% to 69.99%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
</tr>
</tbody>
</table>

NOTICE OF SAFETY REGULATIONS:

1. All students are required to purchase their own eye protection, which is to be worn at all times while in the laboratory.

2. Suitable footwear, has non-slip soles and hard uppers (preferably with safety toe), which completely enclose the foot. Sandals and tennis shoes are strictly prohibited.
3. Long, loose hairstyles must be constrained to prevent engagement in moving machinery, tools work, etc.

4. Neckties, necklaces, etc. must be removed or tucked into the shirt to prevent engagement in moving machinery, tools work, etc.

5. Compressed air may be used to clean parts and small tools, but never during cleanup periods, or to clean machinery, clothing or any part of one's body.

6. Consult with the instructor prior to attempting to lift or move heavy objects.

7. One student only may manipulate a CNC controller at a given time.

8. Metal chips may be removed with a brush; never use fingers.

9. Non-essential, distracting conversation with students operating machinery is prohibited.

10. Only official assignments may be undertaken during laboratory periods.

11. Any liquid spills are to be wiped up immediately.

12. Running and any horseplay are expressly forbidden.

13. Only officially enrolled students may enter and work in the laboratory.

14. No food or beverages are permitted in the laboratory.

15. Gloves may not be worn.

16. Audio/visual devices, including cell phones, will not be used in the laboratory.

17. Students with hidden medical conditions or handicaps, which may impact on their safe functioning in the laboratory, are requested to consult with the instructor.

18. Any accident, regardless of severity, will be reported promptly to the instructor.