Syllabus
Engineering Technology
University of North Texas
Course Title: CAD/CAM System Operations
Course Prefix and Course Number: MFET 4210
Semester: Fall, 2019

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: 1

ENGINEERING TECHNOLOGY
COLLEGE OF ENGINEERING
UNT RESEARCH PARK
940/565-2022
DATE PREPARED: 8/17/19  
PREPARED BY: Ali S. NOURI  
Email: nouri@unt.edu  
Phone: 940 891 6779  
Office: F115S  
Office Hours: Monday, Wednesday 11:00 am – 12:30 pm  
Tuesdays, Thursday: 1:00 pm – 3:00 pm

COURSE NUMBER, TITLE, CREDIT HOURS:

MFET 4210, CAD/CAM System Operations. 3 hours (2;3)

DESCRIPTION:

CAD/CAM programming, compilation of generic tape files for N/C and CNC machine tools, local N/C and CNC part programming and operational techniques, G codes and M codes.

PREREQUISITES:

MFET 3110

REQUIRED TEXTBOOKS:


(editions as early as 26 are acceptable)

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

1. Acquire functional skills in the manual preparation of N/C programs for milling and drilling machines.
2. Acquire functional skills in the use of graphics based CAM software for the preparation of CNC programs for milling, drilling, and turning machines.
3. Understand G and M code terminology and syntax.
4. Expand the knowledge base established in MFET 3110 with an emphasis on manufacturing engineering technology considerations.

APPROPRIATE STUDENT OUTCOMES:

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

1. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,  
2. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology problems that require the application of principles and applied procedures or methodologies
2. An ability to apply creativity in the design of systems, components or processes for broadly defined engineering technology problems appropriate to program educational objectives,
3. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
4. An ability to conduct standard test and measurements; to conduct, analyze, and interpret experiments; and apply experimental result to improve processes.

STUDENT LEARNING OUTCOMES: (ETAC Student Outcomes Addressed)
Upon completion of this course, students will be able to do the following activities, given the appropriate parameters:
1. List and describe the components of an operational N/C controller. (b, d, j)(Abet1)
2. Determine tools to be used and sequence of operations. (a, ) (Abet1)
3. Compare and contrast the miscellaneous functions M98 and M99. (b) (Abet1)
4. Compare and contrast G90 and G91. (b) (Abet1)
5. Discriminate between modal and non-modal commands. (a) (Abet1)
6. Define “word” and “address”. (a) (Abet1)
7. Discriminate between absolute and incremental positioning. (a) (Abet1)

LEARNING STRATEGIES:
Lecture, Demonstration and Hands-On Laboratory Activity.

COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture/Laboratory</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Course, Drill ,Tap,Die</td>
<td>Ch3</td>
</tr>
<tr>
<td>2</td>
<td>Work Holding devisces Basic Blueprint reading for CNC</td>
<td>Ch. 1 , 2 &amp;5, MasterCAM # 1,2</td>
</tr>
<tr>
<td>3</td>
<td>Evulotion of the NC/CNC Word Address Programing</td>
<td>Ch. 6 MasterCAM # 3</td>
</tr>
<tr>
<td>4</td>
<td>CNC Programming - Machining Center /MasterCAM Programing CNC Exercise 1</td>
<td>Ch.7;8 MasterCAM # 4</td>
</tr>
<tr>
<td>5</td>
<td>CNC Programming - Machining Center /MasterCAM Programing CNC EXERCISE2, CNC EXERCISE 3</td>
<td>MasterCAM #5,6</td>
</tr>
<tr>
<td>6</td>
<td>N/C Part Programing Basics/MasterCAM Programing Circular Interpolation R,J,J</td>
<td>Ch. 8 Ch11 MasterCAM # 7,8</td>
</tr>
<tr>
<td>7</td>
<td>MasterCAM Programming, Prep for Midterm</td>
<td>MasterCAM #9</td>
</tr>
</tbody>
</table>
Canned Cycle/ Loop Subprogram

8 MasterCAM Programming, Midterm

9 Review Midterm Results, CNC Programming - Machining Center
CNC TURNING

10 CNC Programming - Machining Center
Origin, Turning Exercise 1,

11 CNC Programming - Machining Center
Lathe Exercise 2

12 CNC Programming - Turning Center
Circular interpolation R,I,K

13 CNC Programming - Turning Center
Lath Exercise 3

14 CNC Programming - Turning Center

15 CNC Programming - Turning Center, Prep for Final

Ch 9
Ch. 10;
MasterCAM # 10,11
Ch. 14;
MasterCAM # 12,13
Ch. 15;
MasterCAM # 14,
Ch. 16;
MasterCAM # 15

MasterCAM Lathe # 1
MasterCAM Lathe #2

MasterCAM Assignments

All MasterCAM exercises will be submitted in a 3-ring binder to the TA at the end of the laboratory period on the day the exercise is due. No late assignments will be accepted. The binder will have the student's name, the name of the course and its number, and the semester and year on a label permanently affixed to the exterior front cover. Each exercise will be separated from the others using a labeled 1/3 or 1/5 cut divider with the name and number of the exercise. Following the divider will be a hard copy of the drawing (.MCX) and CNC code (.NC) files, Feed and speed calculation.

Note: Exercise 1 & 2 will have a drawing file only. Complete electronic copies of .MCX and .NC files will be attached to the 3-ring binder and will not be available to the student until AFTER graded exercises are distributed back to the class.
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GRADING ELEMENTS AND WEIGHTS:

Laboratory Activity 30%  
Homeworks 10%  
Quizzes(5) 10%  
Midterm Examination 25%  
Final Examination 25%  

Total 100%

GRADING POLICIES:

Timetable for submission of assignments is provided on pages 3 and 4 of this syllabus; no late assignments are accepted. Quiz and examination performance interpretations are based on maximum scores accrued by students, not maximum points possible. Letter grades are determined using the following scale:

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

DISABILITIES ACCOMMODATION:
The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodations of their disabilities. If you believe that you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940 565-4343 during the first week of class.

CLASS POLICIES:

1. All rules relating to academic dishonesty will be enforced in accordance with University policies. Cheating on quizzes, examinations and laboratory assignments, and plagiarism on various papers and reports are types of disciplinary misconduct for which penalties are assessed under the UNT Code of Student Conduct and Discipline. Major responsibility for implementing the University's policy on scholastic dishonesty rests with the faculty. Be advised that the instructor of this course supports and fully implements this policy. The following actions will be taken when evidence of such misconduct is observed. The student will be presented with the evidence of misconduct and given an opportunity to explain same. Based on the outcome of this private conference, the matter
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will be either dropped or the student will be given a grade of "F" in the course and be referred to the Dean of Students for further counseling and/or disciplinary action.

2. During the course, handouts will be provided to enhance the presentation of certain concepts. These materials are provided strictly for instructional purposes and may otherwise be restricted. There is no authorization for further reproduction of distribution of handout materials beyond that intended to teach the course.

3. This syllabus is subject to change at any time during the semester with changes to be announced in class.

4. Students should schedule at least one hour per lecture hour for study outside class. Students should schedule at least one hour per laboratory hour for outside work to prepare for the laboratory, use of open laboratory hours, and to complete the required laboratory documentation.

5. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.

6. Requests for review of graded work must be submitted during the lecture in which such work is returned to the students. The request should be accompanied by a written justification of the request including any supporting data.

7. There is no limit to the use of calculators for lecture, labs, pop quizzes, formal tests, or final examination.

8. Challenges to the course grade must be presented within 60 days of receipt of grade notices mailed by the university. This will insure that instructor's records are still available to allow a review of the assigned grade. You should first discuss your complaint with the instructor. If you wish to carry it further, contact the Program Coordinator by calling (940) 565-2022. To further pursue your complaint, contact the Department Chair at (940) 565-2022, but ONLY after first discussing your concern with the previous two individuals.

9. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
LAB ASSIGNMENT:

INSTRUCTION TO MASTER-CAM EXERCISES

MasterCAM Assignments

All MasterCAM exercises will be submitted on the CANVES at the end of the laboratory period on the day the exercise is due. No late assignments will be accepted. You will submit the drawing (.MCX) with and CNC code (Post process) files, Feed and speed calculation.

Note: Exercise 1 & 2 will have a drawing file only.

MasterCAM (Student Version)

A student version of MasterCAM is available for you to download directly. The link is: https://www.inhousesolutions.com/mastercam-demo-software-download/

INSTRUCTION TO MASTER-CAM EXERCISES

1. MAS-CAM Mill # 1 D
   a. Construct an orthographic projection working drawing and dimension the drawing
   b. Convert view to an isometric and solid

2. MAS-CAM Mill # 2 B
   a. Construct an orthographic projection working drawing and dimension the drawing
   b. Convert view to an isometric and solid

3. MAS-CAM Mill # 3 B
   a. Construct an orthographic projection working drawing and dimension the drawing
   b. Convert view to an isometric and solid
   c. Material 1526 Hardness 335 BH, Tool Material Coated Carbide

4. MAS-CAM Mill # 4 B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools coated carbide, Work piece material is 4621, Hardness 265 BH
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)
5. MAS-CAM Mill # 5B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools HSS, Work piece is Carbon Steel 4419 , Hardness 185BH
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

6. MAS-CAM Mill # 6A
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools Coated Carbide, Work piece is Carbon steel 4620 , Hardness 300 BH
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

7. MAS-CAM Mill # 7B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools HSS, Work piece is Carbon Steel Carbon Steel 1015 , HB 145
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

8. MAS-CAM Mill # 8C
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools HSS, Work piece is Carbon Steel Carbon Steel 1064 , HB 224
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

9. MAS-CAM Mill # 9B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools HSS, Work piece is Alloy Steel 8615 , HB 284
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)
10. MAS-CAM Mill # 10C
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools uncoated carbide, Work piece is Carbon Steel Carbon Steel 1022, HB 120
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

11. MAS-CAM Mill # 11B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools Coated Carbide, Work piece is Alloy steel 4037, Hardness 220
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

12. MAS-CAM Mill # 12B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools HSS, Work piece is Leaded steel 41L47, HB 225
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

13. MAS-CAM Mill # 13B
   a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   b. Parameters: All tools Coated Carbide, Work piece is Alloy steel 4042, Hardness 180 BH
   c. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)

14. MAS-CAM Mill # 14C
   1. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid
   2. Parameters: All tools HSS, Work piece is Free Machining 5IL 32, Hardness 222 BH
   3. Output files (Hard copy): Screen print of toolpath
      Feed & speed calculation
      Post processed program (G codes and M codes)
15. MAS-CAM Mill # 15 B

a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid

b. Parameters: All tools Uncoated Carbide, Work piece Carbon Steel 1526 HB 350

c. Output files (Hard copy): Screen print of toolpath
   Feed & speed calculation
   Post processed program (G codes and M codes)

16. MAS-CAM Lathe # 1

a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid

b. Parameters: All tools HSS, Work piece is Alloy Steel 4140 HB 195

c. Output files (Hard copy): Screen print of toolpath
   Feed & speed calculation
   Post processed program (G codes and M codes)

17. MAS-CAM Lathe # 2

a. Construct an orthographic projection working drawing and dimension the drawing, Convert view to an isometric and solid

b. Parameters: All tools HSS, Work piece is Alloy Steel 4150 HB 295

d. Output files (Hard copy): Screen print of toolpath
   Feed & speed calculation
   Post processed program (G codes and M codes)

Good Luck