

**PELLISSIPPI STATE COMMUNITY COLLEGE  
MASTER SYLLABUS**

**ADVANCED CNC MACHINING  
MET 2742**

**Lecture/Lab Hours: 4**

**Credit Hours: 4**

**Date Revised: Spring 2017**

**Catalog Course Description**

A state-of-the-art machining course that expands the computer-assisted programming skills presented in CNC Milling and CNC Turning. The course includes 3D surface and solid modeling, four-axis programming, bar feeder applications, and modification of post-processors.

**Prerequisites**

MET 2700

**Co-requisites**

MET 2720

**Textbooks and Other Supplies**

**Textbook:** Instructor Developed Materials.

**References:** Haas VF-Series Operators Manual: Current Edition, Haas Automation, Inc.  
Haas SL Series Operations Manual: Current Edition, Haas Automation, Inc.  
FeatureCAM User Guide: Current Version, Delcam.  
FeatureCAM Post Processing Guide: Current Version, Delcam.  
SolidWorks Essentials: Current Version, SolidWorks Corporation.  
The Team Learning Assistant Workbook: Carr, Herman, Keldsen, Miller, & Wakefield; McGraw-Hill, 2005

**Week/Unit/Topic Basis**

<b>Week</b>	<b>Topic</b>
1-7	3-D Surface & Solid Modeling 4-Axis Programming
8	Post-Processor Modification

9-14	Bar Feeder Applications Design, Programming, Machining, and Inspection Of Special Projects
15	Final Project

### **Engineering Technology General Outcomes (Educational objectives)**

- I. Apply basic engineering theories and concepts creatively to analyze and solve technical problems.
- II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
- III. Communicate effectively using developed writing, speaking, and graphics skills.
- IV. Assimilate and practice the concepts and principles of working in a team environment.
- V. Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology.

### **Engineering Technology Concentration Competencies**

NOTE: At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

Students will

- A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities.
- B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge.
- C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results.
- D. Function effectively as a member of a technical team.
- E. Identify, analyze and solve specifically defined engineering technology-based problems.
- F. Employ written, oral and visual communication in a technical environment.

### **Course Goals**

NOTE: Capital letters after course goals reference goals of the Engineering Technology Program.

The course will

1. Enhance knowledge and skills to create, program, and machine various 3-D surfaces and 4-axis features by computer-assisted methods. (A,B,C,E,F)
2. Expand skills to set-up, maintain, and functionally operate a bar feeder and 4-axis controller. (A,B,C,E,F)

3. Develop knowledge to modify and verify functional operation of a post-processor. (A-F)
4. Expand skills to inspect a variety of parts and analyze results. (A,B,C,E,F)
5. Enhance skills to communicate technical information. (C,E,F)

### **Expected Student Learning Outcomes**

NOTE: Numbers after Expected Student Learning Outcomes reference the course goals listed above.

The student will

- a. Create, input milling properties, and simulate cutting operation of 3-D surface and solid modeling features by computer-assisted methods. (1)
- b. Create, input milling properties, and simulate cutting operation of 4-axis features by computer-assisted methods. (1)
- c. Transfer a program file utilizing the "DNC Link" process. (1)
- d. Evaluate machining process during cutting operation and adjust initial variable settings to achieve maximum results. (1, 2)
- e. Calibrate and set-up bar feeder and CNC turning center for various stock sizes. (2)
- f. Calculate and input bar feeder variables in controller. (2)
- g. Align 4-axis chuck and tailstock. (2)
- h. Develop a post-processor for specific outputs. (3)
- i. Test post-processor for functional operation and controller compatibility. (3)
- j. Measure part features using standard gauging or CMM techniques. (4)
- k. Accept/reject/rework parts based on standard or geometric tolerancing. (4)
- l. Relate inspection results to machining variables. (1, 4)
- m. Locate and extract needed information from operational and programming manuals. (5)
- n. Document technical information in a neat, orderly format. (5)
- o. Complete assignments based on oral and written instructions. (5)

### **Evaluation**

Evaluation of both classroom and laboratory work is required in this course. Total evaluation will be based on the following point distribution.

#### **Testing Procedures**

##### **Programming Projects**

<b>Project 1: Surface Programming</b>	<b>20 points</b>
<b>Project 2: Solids Programming</b>	<b>20 points</b>
<b>Project 3: 4-Axis Programming</b>	<b>20 points</b>
<b>Project 4: Team Project</b>	<b>30 points</b>

Guidelines and requirements for each project will be provided by the instructor

**Participation****10 points**

Based on instructor observation during the course, each student will be evaluated on participation activities. Evaluation parameters to include active participation in class discussions, being prepared, efficient use of lab time, striving to achieve more than minimum requirements, and regular attendance

**Laboratory Experiences**

N/A

**Field Work**

N/A

**Other Evaluation Methods**

N/A

**Grading Scale**

Final grade for this course will be based on the following alphabetical/numerical scale.

A	93-100
B+	88-92
B	83-87
C+	79-82
C	74-78
D	65-73
F	Below 65

**Policies****Attendance Policy**

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

**Academic Dishonesty**

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

### **Accommodations for Disabilities**

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Disability Services (DS) in order to receive accommodations in this course. [Disability Services](http://www.pstcc.edu/sswd/) (<http://www.pstcc.edu/sswd/>) may be contacted via [Disability Services email](#) or by visiting Alexander 130.

### **Other Policies**

#### **Safety and Equipment Abuse**

Repeated safety violations will result in a reduction of final grade, at the instructor's discretion. Flagrant violations which result in equipment damage or personal injury could result in automatic failure of the course