

**PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS**

**CNC MACHINING & AUTOMATION
MET 2750**

Lecture/Lab Hours: 4

Credit Hours: 3

Date Revised: Spring 2017

Catalog Course Description

CNC Milling is a state-of-the-art machining course in 3-axis programming and applications. Computer-assisted methods of part programming (SolidWorks & FeatureCAM) will be taught with particular emphasis placed on laboratory projects to enhance "hands-on" operational experience. The course will include such topics as basic codes, absolute/incremental programming, tool database, post-processing, and program transfer.

Prerequisites

ENGT 1010 and MET 1022 or consent of program coordinator

Co-requisites

None

Textbooks and Other Supplies

Textbook: Haas VF Series Operations Manual

References: Haas Lathe-Series Training Manual

FeatureCAM User Guide: Current Version, Delcam.

FeatureCAM Post Processing Guide: Current Version, Delcam.

SolidWorks Essentials: Current Version, SolidWorks Corporation.

Week/Unit/Topic Basis

Week	Topic
1-2	Machine Set-Up Manual Operation
3-9	SolidWorks/FeatureCAM Programming
10	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 understanding of the basic principles of CNC milling. (A,B)
2. Expand skills to set-up, maintain, and functionally operate machine. (B-E)
3. Develop knowledge and skills to create, program, and machine parts using computer-assisted methods. (B-E)
4. Expand skills to inspect a part and analyze results. (A-E)
5. Enhance skills to communicate technical information. (B-E)

Expected Student Learning Outcomes

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

The student will

- a. Define, explain, and associate the terminology used in CNC milling. (1)
- b. Apply and associate the principles of CNC milling. (1)
- c. Differentiate absolute and incremental programming. (1)
- d. Identify all safety hazards associated with CNC milling operations. (2)
- e. Identify, mount, and load correct tooling. (2)
- f. Set tool length offsets and part program zero. (2)
- g. Evaluate machining process during cutting operation and adjust settings to achieve maximum results. (2)
- h. Create parts, define tool paths, input part program information, and verify cutting operation. (3)
- i. Create tool data base. (3)
- j. Post-process and generate a machine readable program. (3)
- k. Set-up and initiate a transfer of program. (3)
- l. Edit an existing program. (3)
- m. Measure part features using standard gauging or CMM techniques. (4)
- n. Accept/reject/rework parts based on standard or geometric tolerancing. (4)
- o. Relate inspection results to machining process. (3,4)
- p. Locate and extract needed information from operational and programming manuals. (5)
- q. 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

SolidWorks/FeatureCAM Programming Project	90 points
Part A: Fixture	
Part B: Blank	
Part C: Part	

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

Participation	10 points
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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/>) 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