

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

**GEOMETRICS & COORDINATE MEASURING
MET 2310**

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

Revised: Fall 06

Catalog Course Description:

Geometrics & Coordinate Measuring is a course in state-of-the-art methods of metrology with emphasis on Geometric Dimensioning and Tolerancing (GD&T) and Computer-Assisted Coordinate Measuring (CMM).

Entry Level Standards:

Students entering this course should have fundamental knowledge of geometry, trigonometry, basic manufacturing, and drawing practices to include blueprint reading and the use of AutoCAD.

Prerequisites:

ENGT 1000 and MET 1020 and CID 1100

Textbook(s) and Other Course Materials:

Textbook: *Geometric Dimensioning and Tolerancing*: Neumann & Associates, Latest Edition.

References: *ASME Y14.5M-1994 Dimensioning and Tolerancing: American Society of Mechanical Engineers*. (Reaffirmed 1999) or Latest Edition.

Geometric Dimensioning and Tolerancing: Madsen, Goodheart-Willcox Company, 1988.

MCAT-C1 CMM Operation Manual: Mitutoyo Corp., 2004.

I. Week/Unit/Topic Basis:

Week	Topic
1	Introduction Theory & Rules
2-3	Symbols Feature Control Frames Material Conditions
4-5	Datums - Basics Position - Basics Standard Gaging Methods Standard Gaging Lab Exercise
6	Standard Gaging Lab Exercise

	Coordinate Measuring - Basics
7	Form Tolerances Coordinate Measuring - Basics Coordinate Measuring Practice
8	Orientation Tolerances Coordinate Measuring Practice
9	Profile Tolerances Coordinate Measuring - Programming Coordinate Measuring Practice
10	Coaxiality Coordinate Measuring - Programming Coordinate Measuring Practice
11-12	Datums & Position - Advanced Coordinate Measuring/GD&T Characteristics Coordinate Measuring Practice
13	Fixed & Floating Fasteners Coordinate Measuring Practice
14	Coordinate Measuring – Programming
15	Final Exam Period

II. MET Program Objectives & Outcomes:

Objectives:

- I. Apply basic engineering theories and concepts.
- II. Apply basic engineering theories and concepts.
- III. Identify and solve work related problems with minimum assistance.
- IV. Operate equipment and instruments with a high degree of skill.
- V. Communicate effectively, including verbal, writing, and graphical skills.
- VI. Apply the principles of good work ethics.
- VII. Obtain gainful employment in the MET discipline or matriculate to a 4-year program in engineering technology.

Outcomes:

- A. apply the knowledge of mathematics, science, and engineering technology. (I, II, IV, VI)
- B. use the techniques and modern engineering tools needed for engineering technology practices. (I – IV, VI)
- C. identify, formulate, and solve engineering technology-based problems. (I, II, VI)

- D. design and conduct experiments, as well as analyze and interpret collected data. (I– IV, VI)
- E. create or fabricate a system, subsystem, component, or process to meet specified needs. (I – IV, VI)
- F. read and extract information from manuals, journals, and other discipline related literature. (I –IV, VI)
- G. communicate effectively, including verbal, writing, and graphical skills. (IV, V, VI)
- H. function and contribute positively in team situations. (II, IV- VI)
- I. comprehend social, professional, and ethical responsibilities, including development of a respect for diversity and other contemporary issues.(II, V, VI)
- J. realize the impact of engineering technology solutions in a global and societal context. (V, VI)
- K. realize the importance of a commitment to quality, timeliness, and continuous improvement. (V, VI)
- L. recognize the importance of life-long learning.(I – VI)

III. Course Objectives*:

- A. Demonstrate their understanding of GD&T principles. (A-C)
- B. Measure and analyze a part using standard gauging techniques. (A-C)
- C. Measure and analyze a part using CMM techniques. (A-C)
- D. Communicate technical information. (F, G)

*Letters after course objectives reference MET Program Outcomes (as required by ABET).

IV. Instructional Processes*:

Students will:

1. Actively listen to class lectures and participate in class discussions that develop and reinforce an understanding of the theories, concepts, principles, and applications of Geometric Dimensioning & Tolerancing (GD&T). *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
2. Work individually or in teams to complete projects and assignments related to the theories, concepts, principles, and applications covered in the lecture or demonstration portions of the course. *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
3. Collect, analyze, and tabulate data in an orderly format to prepare a college level technical report using computer software packages such as AutoCAD, Microsoft Word, Word Perfect, Excel, and MCAT-C1 CMM Software. *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*

*Strategies and outcomes listed after instructional processes reference TBR's goals for strengthening general education knowledge and skills, connecting course work to experiences beyond the classroom, and

encouraging students to take active and responsible roles in the educational process.

V. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Define, explain, and associate the terminology used in GD&T. A
2. Identify and associate the various GD&T symbols. A
3. Dimension and tolerance parts in accordance with ASME Y14.5M specifications. A
4. Setup and collect data using standard gauging techniques. B
5. Tabulate results and "accept or reject" part. B, C, & D
6. Operate and set-up CMM. C
7. Align part, create geometric elements, and collect data using computer-assisted techniques. C
8. Edit CMM program. C
9. Locate and extract needed information from ASME standard and operational/programming manuals. D
10. Document technical information in a neat and orderly format. D
11. Complete assignments based on written and oral instructions. D

*Letters after performance expectations reference the course objectives listed above.

IV. Evaluation:

A. Testing Procedures:

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

Quizzes (35 Points)

Approximately 7-10 quizzes will be administered during the course. They will include discussion questions, short answer questions, true/false questions, and problem solving.

B. Laboratory Expectations:

Project 1: Standard Gauging & Analysis (20 Points)
Project 2: CMM Gauging & Analysis
GD&T Application Exercise (10 Points)
Report (15 Points)
Operational Evaluation (10 Points)

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

C. Field Work:

N/A

D. Other Evaluation Methods:

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.

E. Grading Scale:

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

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

VII. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog).

B. Academic Dishonesty:

Refer to the Pellissippi State Catalog & Handbook.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.

D. Other Policies:

Make-Up Quizzes: As a general rule, no make-up quizzes will be administered during the course.

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 will result in automatic failure of the course.

Your instructor is available during posted office hours or by appointment.