

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**MACHINE ELEMENTS  
MET 2030**

**Class Hours: 2.0**

**Credit Hours: 3.0**

**Laboratory Hours: 3.0**

**Revised: Fall 06**

**Catalog Course Description:**

A study in the selection and application of basic elements common to most machine designs. Topics include shafts, bearings, power transmission, and lubrication.

**Entry Level Standards:**

Students entering this course must have a working knowledge of statics, strength of materials, dynamics, and basic machine shop practices.

**Prerequisites:**

MET 1020

**Textbook(s) and Other Course Materials:**

Textbook: *Machine Design*: Latest Edition, Esposito, Delmar Publishers, Inc., 1991.

References: *Machines and Mechanisms: Applied Kinematic Analysis*: 2nd Edition, Myszka, Prentice-Hall, 2002.

*Machine Elements in Mechanical Design*: 4th Edition, Mott, Prentice-Hall, 2004.

*Applied Mechanics for Engineering Technology*: 4th Edition, Walker, Prentice-Hall, 1991.

**I. Week/Unit/Topic Basis:**

<b>Week</b>	<b>Topic</b>
1-2	Introduction to Mechanisms W/Related Topics
3-4	Bearings
5-7	Shaft Design & Associated Elements
8-9	Gearing & Cams
10-11	Belt & Chain Drives w/Associated Elements
12	Fasteners & Power Screws

13-14	Design Project
15	Final Presentation & Exam

## **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 an acquired knowledge of journal and rolling contact bearings. (A-G)
- B. Demonstrate an understanding of shafts and associated elements. (A-G)
- C. Demonstrate an acquired knowledge of power transmission. (A-G)
- D. Demonstrate an understanding of cams. (A-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 machine elements. *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
2. Work individually or in teams to complete projects, lab experiments, and assignments related to the theories, concepts, principles, and applications covered in the lecture or demonstration portion of the course. *Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
3. Analyze, tabulate, and present collected data in an orderly format to prepare a college level technical report using computer software packages such as AutoCAD, Microsoft Word, Word Perfect, Excel, FeatureCAM Manufacturing Software, Coordinate Measuring software, MD Solids, Working Model 2D. *Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
4. Use research and oral presentation skills to present findings to a subject matter expert, peer group or an evaluation team from industry. *Communication Outcome, Natural Sciences 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. Explain and apply the hydrodynamic theory of lubrication. A
2. Solve for life expectancy of a bearing. A
3. Select an appropriate bearing based on system analysis. A
4. Calculate critical speeds. B
5. Select shaft material, size, and shape from standard tables. B
6. Select appropriate fasteners. B

7. Analyze system and select appropriate belt and chain drives from standard catalogs. C
8. Identify basic gear geometry and types of gears. C
9. Calculate gear forces and stresses. C
10. Select appropriate gearing system which provides maximum operational efficiency. C
11. Identify and explain the function of various types of cams and followers. D
12. Design a simple cam. D

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

## **VI. Evaluation:**

### A. Testing Procedures:

Total evaluation will be based on the following point distribution.

Unit Exams (50 Points)

There will be 4-6 exams administered during the course.

### B. Laboratory Expectations:

Laboratory (40 Points)

Laboratory will include problem-solving sessions and a special design project. Guidelines and requirements for special 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 and exercises, response to verbal questions, quizzes, 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). Individual departments/ programs/ disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

### 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 Exams: As a general rule, no make-up quizzes or exams 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.