

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

FLUID MECHANICS & POWER APPLICATIONS
MET 2020

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

**Date Revised: Spring
01**

Catalog Course Description:

A study of fluids with hydraulic and pneumatic applications. Topics include pressure, fluid flow, fluid energy system losses, pumps, control valves, system analysis and maintenance.

Entry Level Standards:

Students entering this course must have a working knowledge of advanced algebra and trigonometry.

Prerequisite:

MATH 1731

Textbook(s) and Other Reference Materials Basic to the Course:

Textbook:

Applied Fluid Mechanics: Mott, Merrill Publishing Company, 5th Edition, 2000.

Industrial Hydraulic Technology: Bulletin 0221-B1, Parker Hannifin Corporation, 21st Printing, 1997. [Lab Text]

References:

Fundamentals of Fluid Mechanics: Evett & Lu, McGraw-Hill, 1987.

Power Handbook: McGraw-Hill, 1983.

Fluid Power, Theory and Application: Sullivan, Reston Publishing Company, 2nd Edition, 1982.

I. Week/Unit/Topic Basis:

Week	Topic
1	Basic Fluid Properties Lab: Introduction to Hydraulics
2	Fluid Pressure and Measurement Lab: Introduction to Hydraulic Actuators & Control Devices
3	Introduction to Pneumatics Lab: Check & Flow Control Valves
4-5	Fluid Flow Lab: Directional Control Valves
6	Fluid Energy and system losses Lab: Pressure Control Valves

7-8	Viscosity, Laminar, and Turbulent Flow Lab: Hydraulic Pumps
9-10	Friction Losses and Minor Losses Lab: Hydraulic Motors
11-12	Hydraulic Systems Analysis and Maint. Lab: Hydraulic System Components
13	Compressible Fluids Lab: Introduction to Pneumatics
14-15	Pneumatic System Anal. and Maint. Lab: Pneumatic Logic Circuits
16	Final Exam

II. Course Objectives*:

- A. Demonstrate an understanding of basic fluid concepts. I, II, IV
- B. Demonstrate an understanding of incompressible fluids and hydraulic concepts. I, II, IV
- C. Demonstrate an understanding of compressible fluids and pneumatics. I, II, IV

*Roman numerals after course objectives reference goals of the MET program.

III. Instructional Processes*:

Students will:

1. Actively listen to class lectures and participate in class activities that develop and reinforce an understanding of the theories, concepts, principles, and applications of fluid mechanics, hydraulics and pneumatics. *Communication Outcome, Problem Solving & Decision Making Outcome, Information Literacy Outcome, Active Learning Strategy*
2. Work individually and in teams to complete lab projects and assignments related to the theories, concepts, and principles covered in the lecture section of the course. *Communication Outcome, Personal Development Outcome, Problem Solving & Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*
3. Collect, analyze, and tabulate data in an orderly format to prepare a college level technical report using computer software packages including Microsoft Word, Word Perfect, and Microsoft Excel. *Communication Outcome, Problem Solving & Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy, Transitional Strategy*
4. Use research, computer, and oral presentation skills to research a topic and present findings to a subject matter expert, a peer group or an evaluation team from industry. *Communication Outcome, Personal Development Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*
5. View instructional video tapes on topics related to course subject matter, complete workbook assignments and apply concepts by replicating circuits on test stand to increase

problem solving skills along with identification and recognition of components. *Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*

*Strategies and outcomes listed after instructional processes reference Pellissippi State's goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

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

1. Solve problems using both the English and SI system. A
2. Identify and apply the basic properties of mass, specific weight, specific gravity, and density. A
3. Differentiate force and pressure. A
4. Differentiate absolute, gage, and atmospheric pressure. A
5. Associate the concepts of pressure and elevation. A
6. Associate and apply the concepts of energy and losses to various types of fluid flow. A
7. Classify and analyze various types of piping systems. A
8. Identify the symbols and explain the function of various hydraulic and pneumatic system components. B
9. Classify and analyze various types of piping systems. A
10. Troubleshoot and maintain basic hydraulic and pneumatic systems. B
11. Calculate flow rates and pressures for compressible fluids. C
12. Identify the basic differences between a hydraulic and pneumatic system. C
13. Identify the basic differences between a hydraulic and pneumatic system. C

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

V. Evaluation:

A. Testing Procedures: 75 points

Unit Exams:

There will be 5-7 unit exams administered during the course. (65 points)

The final exam will be a comprehensive examination of the topics covered in the course. (10 points)

B. Laboratory Expectations: 20 points

Experiments and demonstrations will be performed in the laboratory on many of the topics covered in class. Guidelines and requirements for each project will be provided by the instructor. Laboratory reports will count towards 15 points and a presentation will count towards 5 points.

C. Field Work:

N/A

D. Participation: 5 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, pop quizzes, and regular attendance.

E. Grading Scale:

A 92-100
B+ 88-91
B 83-87
C+ 79-82
C 74-78
D 65-73
F Below 65

VI. 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.

B. Academic Dishonesty:

Cheating on a quiz or assigned project will not be tolerated. First offense will result in immediate dismissal and automatic failure of the course. Assistance from other students is encouraged during the learning stages of the course, but each student is responsible for completing their own course assignments.

C. 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.

Counseling: Counseling is available during posted office hours or by appointment.