

**PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS**

**FLUID MECHANICS & POWER APPLICATIONS W/LAB
MET 2022**

Lecture/Lab Hours: 4

Credit Hours: 3

Date Revised: Spring 2017

Catalog Course Description

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

Prerequisites

None

Co-requisites

None

Textbooks and Other Supplies

Applied Fluid Mechanics: Latest Edition. Mott, Merrill Publishing Company.

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

Week/Unit/Topic Basis

Week	Topic
1	Basic Fluid Properties Lab: Introduction to Hydraulics
2-3	Fluid Pressure and Measurement Lab: Hydraulic Actuators and Control Devices
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 Maintenance Lab: Hydraulic System Components
13	Compressible Fluids Introduction to Pneumatics
14	Pneumatic System Analysis and Maintenance Lab: Pneumatic Logic Circuits
15	Final Exam

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. Guide students to understanding the basic concepts of fluids. (A,B,C,E,F)
2. Enhance effective understanding of incompressible fluids and hydraulic concepts. (A,B,C,E,F)
3. Expand student understanding of compressible fluids and pneumatics. (A,B,C,E,F)
4. Guide students to identify, describe, and explain the function of commonly used hydraulic and pneumatic components. (A,B,C,E,F)
5. Engage and develop the student's skills, knowledge, and abilities regarding the correct identification, reading, and interpretation of Pneumatic & Hydraulic Schematics and Diagrams. (A,B,C,E,F)

Expected Student Learning Outcomes

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

The student will

- a. Solve problems using both the English and SI system. (1)
- b. Identify and apply the basic properties of mass, specific weight, specific gravity, and density. (1, 2)
- c. Differentiate force and pressure. (1, 2)
- d. Differentiate absolute, gage, and atmospheric pressure. (1, 2)
- e. Associate the concepts of pressure and elevation. (1, 2)
- f. Associate and apply the concepts of energy and losses to various types of fluid flow. (1, 2, 3)
- g. Classify and analyze various types of fluid systems. (1, 2, 3)
- h. Identify the symbols and explain the function of various hydraulic and pneumatic system components. (1, 2, 3, 4)
- i. Classify and analyze various types of piping systems. (1, 2, 3, 4)
- j. Troubleshoot and maintain basic hydraulic and pneumatic systems. (1-5)
- k. Calculate flow rates and pressures for compressible fluids. (1-5)
- l. Identify the basic differences between a hydraulic and pneumatic system. (1-5)
- m. Document technical information in a neat and orderly format. (1-5)
- n. Complete assignments based on oral and written instructions. (1-5)

Evaluation

Total evaluation will be based on the following point distribution.

Testing Procedures

Unit Exams**45 points**

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

Homework**10 Points**

Homework will be assigned throughout the semester. Late homework will not be accepted

Final Exam**15 Points**

There will be a comprehensive final exam administered at the end of the course.

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, response to verbal questions, and regular attendance.

Laboratory Experiences 25 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.

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