PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

FLUID MECHANICS & POWER APPLICATIONS W/LAB
MET 2022

Class Hours: 4.0 Credit Hours: 3.0
Laboratory Hours: 0.0 Revised: Fall 2012

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.

Entry Level Standards:
Students entering this course must have a working knowledge of advanced algebra and trigonometry.

Prerequisites:
NONE

Textbook(s) and Other Course Materials:

Textbook:


I. Week/Unit/Topic Basis:

<table>
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<th>Week</th>
<th>Topic</th>
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| 1    | Basic Fluid Properties  
Lab: Introduction to Hydraulics |
| 2    | Fluid Pressure and Measurement  
Lab: Hyd. Actuators & Control Devices |
| 3    | Fluid Flow  
Lab: Directional Control Valves |
| 4-5  | Fluid Energy and system losses |
| 6    | Lab: Pressure Control Valves |
| 7-8  | Viscosity, Laminar, and Turbulent Flow  
Lab: Hydraulic Pumps |
| 9-10 | Friction Losses and Minor Losses |
II. 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

III. Engineering Technology Concentration Competencies*

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

• At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

IV. Course Goals*:

The course will

1. Guide students to demonstrate an understanding of basic fluid concepts. (A,B,C,E,F)

2. Enhance effective understanding of incompressible fluids and hydraulic concepts.
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)

*Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

V. Expected Student Learning Outcomes*:

Students will be able to:

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

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

VI. 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.
Unit Exams  (50 Points)
There will be 4-5 unit exams administered during the course.

Final Exam  (15 Points)
The final exam will be a comprehensive examination of the topics covered in 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 and exercises, quizzes, and regular attendance.

B. Laboratory Expectations:

Laboratory  (30 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 of the total.

C. Field Work:

n/a

D. Other Evaluation Methods:

n/a

E. 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

VII. Policies:

A. 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.

B. 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.

C. Accommodations for disabilities:

Students who 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 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, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at http://www.pstcc.edu/sswd/.

D. 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.