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  Revised: Spring 05

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:
MATH 1730

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

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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    | 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 Pneumatic System Analysis and Maint.
Lab: Pneumatic Logic Circuits

15 Final Exam

II. Course Objectives*:

A. Demonstrate an understanding of basic fluid concepts. (A-G)
B. Demonstrate an understanding of incompressible fluids and hydraulic concepts. (A-G)
C. Demonstrate an understanding of compressible fluids and pneumatics. (A-G)
D. Identify, describe, and explain the function of commonly used hydraulic and pneumatic components. (A-C, G)

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

III. 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, and principles of fluid mechanics, hydraulics and pneumatics. Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

2. Work in teams to complete laboratory experiments related to the theories, concepts and principles covered in the lecture section 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 including Microsoft Word, Word Perfect, and Microsoft Excel. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

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, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

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. 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.

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 fluid 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

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

V. 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 5-7 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.

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:

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.

E. Grading Scale:

Final grade for this course will be based on the following alphabetic/numerical 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 (Pellissippi State Catalog). Individual instructors may have requirements that are more stringent.

B. Academic Dishonesty:


C. Accommodations for disabilities:

If you need accommodation 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. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.

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.

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