MTT147
Hydraulics & Pneumatics I

2 Credit Hours

Prepared by:
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MTT147 Hydraulics & Pneumatics I

I. CATALOGUE DESCRIPTION
   A. Pre-requisite: None
   B. Credit hour award: 2
   C. Description: Hydraulics and Pneumatics I is a study of basic components of hydraulic and pneumatic systems. Included is an examination of how components are combined to build up various circuits for control and power transmission. (S)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

<table>
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<tr>
<th>Description</th>
<th>Written exams</th>
<th>Homework assignments</th>
<th>Observation of lab performance</th>
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<tr>
<td>Describe the basic components of hydraulic and pneumatic systems including actuators, check valves, flow control valves, directional control valves, pressure control valves, pumps, reservoirs, and filters</td>
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<td>Recognize and draw schematic circuit diagrams using basic ANSI hydraulic and pneumatic symbols</td>
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<td>Perform simple calculations on components concerning pressures, flow rates, speed, and force</td>
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<td>Compare and contrast the differences between the characteristics of hydraulic and pneumatic systems</td>
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<td>Describe the characteristics of hydraulic and pneumatic transmission of force and energy</td>
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<td>Describe the terms associated with work, power, energy, and the law of conservation of energy as they relate to the applications of hydraulic and pneumatic devices</td>
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III. OUTLINE OF TOPICS
   A. Pneumatic Power Systems
      1. Introduction to pneumatics
      2. Pneumatic power
      3. Circuit connections
      4. Basic cylinder circuits
B. Basic Pneumatic Circuits
1. Single-acting cylinder circuits
2. Basic motor circuits
3. Pneumatic schematics

C. Principles of Pneumatic Pressure and Flow
1. Pressure vs. cylinder force
2. Pneumatic leverage
3. Pressure and volume
4. Air flow and resistance

D. Pneumatic Speed Control Circuits
1. Air flow control and measurement
2. Flow control valves
3. Speed control

E. Hydraulic Power Systems
1. Introduction to hydraulics
2. Power unit operation
3. Circuit connections
4. Basic cylinder circuits

F. Basic Hydraulic Circuits
1. Pumps
2. Needle valves
3. Basic motor circuits
4. Hydraulic schematics

G. Principles of Hydraulic Pressure and Flow
1. Pressure vs. cylinder force
2. Hydraulic leverage
3. Fluid friction
4. Absolute vs. gauge pressure

H. Hydraulic Speed Control
1. Relief valves
2. Check valves
3. Flow control valves
4. Meter-in and meter-out circuits
5. Flow control circuit design
6. Flow rate vs. cylinder speed
I.  Pressure Control Circuits
   1.  Sequence valves and applications
   2.  Pressure reducing valves
   3.  Accumulators

IV.  METHOD(S) OF INSTRUCTION

   A.  Lecture
   B.  Textbook Reading
   C.  Demonstrations
   D.  Hands on Activities

V.  REQUIRED TEXTBOOK(S)

   Amatrol Basic Hydraulics Student Laps (85-BH), Amatrol Basic Pneumatics Student Laps (85-BP), (current edition)

VI. REQUIRED MATERIALS

   A.  Paper
   B.  Pens
   C.  Pencils
   D.  Safety Glasses

VII.  SUPPLEMENTAL REFERENCES

   None

VIII.  METHOD OF EVALUATION

   A.  Homework  40%
   B.  Hands on Exercises  20%
   C.  Exams  30%
   D.  Attendance  10%
A = 90-100%
B = 80-90%
C = 70-80%
D = 60-70%
F = Below 60%

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library; phone 636-797-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College Website http://www.jeffco.edu).

XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.