College of San Mateo
Course Outline

☐ New Course
☒ Update/No change
☐ Course Revision (Minor)
☐ Course Revision (Major)

Date: Nov. 16, 2006
Removed HBA Fall 2010

Department: ELEC **Number:** 424

Course Title: Hydraulic, Pneumatic, and Vacuum power systems **Units:** 4.0

Hours/Week: **Lecture:** 3 **Lab:** 3 **By Arrangement:** 0

Length of Course
- ☒ Semester-long
- ☐ Short course (Number of weeks___)
- ☐ Open entry/Open exit

Grading
- ☒ Letter
- ☐ Credit/No Credit
- ☐ Grade Option (letter or Credit/No Credit)

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

Completion of ELEC 422 or equivalent with a final grade of C or better

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

None

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

None

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation.)

Theory, construction, installation and operation of hydraulic, pneumatic and vacuum power system in an automated controls environment. Various types of devices are investigated inculding those which produce linear and rotary power, check valves, flow valves, and electricla activators. The various fundamental laws of physical science which govern fluid flow are also reviewed with respect to operation and troubleshooting. (CSU)

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation.)

Same as above

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

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

1. state the basic laws of physical science which govern the operation of fluid flow and fluid power systems;
2. describe the operation of hydraulic, pneumatic, and vacuum actuators which produce linear motion;

3. describe the operation of hydraulic, pneumatic and vacuum actuators which produce rotary motion;
4. describe the operation of control valves, check valves, and solenoid control valves;
5. compute output power given the input variables;
6. state the safety rules which must be observed when working with fluid power systems;
7. identify the basic interconnect fittings used in all three types of fluid power;
8. detail the common mode troubleshooting techniques used in fluid power systems

7. Course Objectives (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section).*

Same as above

8. Course Content (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

I Hydraulic Power Systems (objectives 1-8)
- A Principals and Laws
- B Pumps
- C Pressure Controls
- D Flow Control
- E Directional Control
- F Cylinders for linear motion
- G Hydraulic motors for rotary motion
- H Fluids
- I Auxiliary hydraulic devices
- J Transmission lines and fittings
- K Basic circuits
- L Electro hydraulics
- M System troubleshooting

II Pneumatic Power systems (objectives 2-8)
- A Principles of compressed air power
- B The basic pneumatic circuit including electrical activation
- C Air regulation, drying and filtering
- D Production of linear motion with compressed air
- E Production of rotary motion with compressed air
- F Pneumatic control valves
- G Safety and pneumatic systems
- H Pneumatic system symbology, design and documentation
- I Pneumatic system maintenance
- J Pneumatic system troubleshooting

III Vacuum power systems (objectives 2-8)
- A Principles of vacuum power
- B The basic vacuum circuit including electrical activation
- C Vacuum pump basic operation
- D Vacuum regulation and filtering
- E Production of linear motion with vacuum
- F Production of rotary motion with vacuum

G Vacuum control valves
H Safety and vacuum systems
I Vacuum system symbology, design, and documentation
J Vacuum system maintenance
K Vacuum system troubleshooting

9. Representative Instructional Methods (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.)

1. Lectures
2. analytical problem sets
3. essay question sheets
4. topic reading assignments
5. assigned computer activities
6. computer simulation
7. hands-on lab activities
8. system case studies

10. Representative Methods of Evaluation (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

1. Graded problem sets
2. graded homework problems
3. graded computer based and hands-on lab activities
4. Quizzes
5. midterm
6. Final

11. Representative Text Materials (With few exceptions, texts need to be current. Include publication dates.)

Fluid Power Technology. By Jackson. ATE Press, copyright 2004.
CSM Lab Manual (Fluid Society of America Guide). Copyright 2004.

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