Discipline: Manufacturing Technology
Originator: Paul Van Hulle

RIVERSIDE COMMUNITY COLLEGE DISTRICT
INTEGRATED COURSE OUTLINE OF RECORD

MANUFACTURING TECHNOLOGY 60

MAN-60 : Hydraulic and Pneumatic Systems

College: NOR

Lecture Hours: 40.000
Lab Hours: 72.000
Units: 3.00
Pass/No Pass
Letter Grade

Course Description

Prerequisite: None
Advisory: ENE-60 or MAT-52
Course Credit Recommendation: Degree Credit

Basics of hydraulic and pneumatic systems including physical properties of liquids under pressure. Pumps, motors, accumulators, valves and drive cylinders are studied. The design and assembly of both high and low pressure fluid control systems from standard components is experienced. Applications of fluids in robotic and industrial equipment systems are presented. 40 hours lecture and 72 hours laboratory. (Letter Grade, or Pass/No Pass option.)

Short Description for Class Schedule

Overview of basic pressurized fluid systems in engineering, manufacturing, robotic and industrial equipment systems are presented.

Entrance Skills:

Before entering the course, students should be able to demonstrate the following skills:

1. **Solve arithmetic problems dealing with addition, subtraction, multiplication and division.**
   - **ENE-60 -** Solve arithmetic problems dealing with addition, subtraction, multiplication and division that are typical to the industrial setting.
2. **Solve formulas by using unknowns and apply this knowledge to solve problems encountered in technological areas and engineering fields.**
   - **ENE-60 -** Solve formulas by using unknowns and apply this knowledge to solve problems encountered in technological areas and various fields of engineering.
3. **Solve problems by use of a scientific calculator.**
   - **ENE-60 -** Solve problems by use of a scientific calculator.

Student Learning Outcomes:

Upon successful completion of the course, students should be able to demonstrate the following skills:

1. **Demonstrate basic safety procedures when designing and assembling high pressure hydraulic and pneumatic systems.**

2. **Use troubleshooting procedures to diagnose and repair hydraulic and pneumatic systems used in automated processes and robotic assemblies.**
3. **Set-up and operate fluid powered valves, cylinders, controls filters, and actuators.**
4. **Calculate functions and load requirements then design, select components and test complex fluid powered systems in a robotic or industrial environment.**
5. **Recognize fluid power schematic symbols.**
6. **Explain basic operation, construction and applications of typical industrial hydraulic components.**
7. **Construct typical components using a print, and test run the system.**

Course Content:

1. Fluid power systems
    a. Safe use of fluid power systems
    b. How a fluid power system works
2. Fundamental laws of fluid mechanics
    a. Pascal's law
    b. Pressure
    c. Force
    d. Transmittal of confined liquids
    e. Area
3. Components of a hydraulic system
    a. Reservoir to hold the fluid
    b. Pump to force the fluid through the system
    c. Valves to control fluid pressure and flow
    d. Actuator to convert the energy of the compressed fluid into mechanical force
4. Applications of fluid power
    a. manufacturing
    b. transportation
    c. construction
    d. agriculture
    e. lumbering
    f. material handling
    g. mining
    h. printing
    i. space exploration
5. Pneumatic vs hydraulic fluid systems
    a. Manufacturing
    b. Transportation
    c. Construction
    d. Agriculture
    e. Lumbering
    f. Material handling
    g. Mining
    h. Printing
    i. Space exploration
6. Fluid Systems
    a. Pneumatic
    b. Hydraulic
7. Industrial drawings and schematics
8. Fabrication and troubleshooting fluid power systems

Methods of Instruction:

Methods of instruction used to achieve student learning outcomes may include, but are not limited to, the following activities:

- Present class lectures/discussions/demonstrations in order to show the students how to design a fluid power circuit to control machinery and robotics.
- Show videos in order to give the students a better understanding of how fluid power mechanisms are used in industry.
- Create and assign pair and small group activities such as designing and connecting a fluid power system to drive different fluid power based machines.
- Develop and assign class exercises such as worksheets that help the students understand various fluid power symbols used in industry.
- Conduct individual conferences in order to help the students understand how fluid power applies to what the students are doing within their job.
- Assign lab projects that help the students' show they can use fluid power concepts to safety construct fluid power mechanisms.
- Industry tours that help the students understand how many different industries are using fluid power to drive automated systems.

Methods of Evaluation:

Students will be evaluated for progress in and/or mastery of student learning outcomes using methods of evaluation which may include, but are not limited to, the following activities:

- Lab projects designed to show the student is adept at using fluid power to create automated systems. Drawings and pictures of these lab projects can then be used by the student to show future or current employers what they created during class.
- Quizzes/examinations designed to test the students' understanding of the operation of fluid power systems.
- Written assignments designed to give the students experience in researching some aspect of uses of fluid power within industry.
- Class and individual projects designed to let the students experience creating fluid power systems as a group.
- The portfolio is a collection of printouts showing fluid power systems designed during the class.
- Final examination designed to test the students on their understanding of fluid power systems and symbols.

Sample Assignments:

Outside-of-Class Reading Assignments

- Students may be required to read articles and periodicals on hydraulics. For example:
  - Go to the following online article:
    - http://www.amazines.com/article_detail.cfm/653797?articleid=653797
  - Read the article and write an outline of the main points.

Outside-of-Class Writing Assignments

- Research and write a one page report on how fluid power is used in the industry.

Other Outside-of-Class Assignments

- Field trips may be required to view professional hydraulic systems with a subsequent one page report of their trip's findings.

Course Materials:

All materials used in this course will be periodically reviewed to ensure that they are appropriate for college level instruction. Possible texts include the following:

- Amatrol. *Amatrol Learning Systems Manual and Curriculum Guides.* Amatrol, Inc., 2004.
- Eaton Hydraulics Training Services (Vickers) . *Industrial Hydraulics Manual 5th Ed. 2nd Printing.* April 1, 2008 Eaton Hydraulics Training Services; 5th edition, 2008.
- Esposito, Anthony. *Fluid Power with Applications.* Prentice Hall, 2003.
- Johnson, James. *Introduction to Fluid Power.* Thomson-Delmar Learning, 2001.

Codes/Dates:

CB05 MOV Transfer Status: Non-Transferable (C)
CB05 NOR Transfer Status: Non-Transferable (C)
CB05 RIV Transfer Status: Non-Transferable (C)
Board of Trustees Approval Date: 01/26/2010
COR Rev Date: 01/26/2010

Generated on: 2/1/2018 10:22:47 AM