Course Syllabus

PTRT 1321 – Hydraulics and Pneumatics

Catalog Description: Presents hydraulics and pneumatics applicable to drilling, completion, and production. Includes calculating and evaluating the characteristics of the flowing and static fluids in various tubular and annular systems.
Lecture Hrs = 2, Lab Hrs = 2

Prerequisites: PTRT 1301 Introduction to the Petroleum Industry

Semester Credit Hours: 3
Lecture Hours per Week: 2
Contact Hours per Semester: 64
State Approval Code: 1509030000
Course Subject/Catalog Number: PTRT 1321
Course Title: Hydraulics and Pneumatics

Course Rationale: Provides the student required information concerning hydraulic and pneumatic systems used in the oil and gas industry.

Instructional Goals and Purposes: The purpose of this course is to provide the student with the basic skills to maintain and service hydraulic systems used in the oil and gas industry.

Learning Objectives: Upon completion of this course, the student will be able to accomplish the following competencies.

1. Define pneumatics and give an application.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-ii, 2d-i)

2. Explain six pneumatic safety rules.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-ii, 2d-i, 2e-ii)

3. List types of pneumatic circuit connections.
   SCANS (1a-i, 1a-ii, 1a-iii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 1c-vi, 2a-i, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-ii, 2d-i, 2e-i, 2e-ii)

4. Describe basic cylinder circuits and give applications.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-ii, 2d-i, 2e-i, 2e-ii, 2e-iii)

5. Discuss the principles of pneumatic pressure and flow.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii, 2e-iii)
6. Define hydraulics and give an application.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii, 2e-iii)

7. Describe the operation of a hydraulic power unit.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii)

8. Discuss function of a hydraulic schematic.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii)

9. Describe basic hydraulic cylinder circuits and their application.
   SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii)

10. Discuss the principles of hydraulic pressure and flow.
    SCANS (1a-i, 1a-ii, 1a-iv, 1a-v, 1b-i, 1b-ii, 1b-iii, 1b-iv, 1b-v, 1b-vi, 1c-i, 1c-iv, 1c-v, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-i, 2c-ii, 2c-iv, 2d-i, 2d-ii, 2e-i, 2e-ii)

**Methods of Instruction/Course Format/Delivery:** Class will meet weekly for lecture and labs. Additional lab work and research projects will be assigned.

**Course Grade:**

Note: The instructor may implement a different grading policy.

Attendance and Participation: 10 %
Lab: 30 %
Exams: 30 %
Quizzes: 30 %

Exams: Any test missed by the student will be counted as a 0 unless prior arrangements have been made with the instructor.

**Texts, Materials, and Supplies:**

Course material requirements will be presented on the first day of class.

Supplies: Scientific calculator
1. BASIC SKILL COMPETENCIES

A. Basic Skills
i. **Reading:** Locate, understand and interpret written information in prose and in documents such as manuals, graphs and schedules.

ii. **Writing:** Communicate thoughts, ideas, information and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.

iii. **Arithmetic & Mathematical Operations:** Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.

iv. **Listening:** Receive, attend to, interpret, and respond to verbal messages and other cues.

v. **Speaking:** Organize ideas and communicate orally.

B. Thinking Skills
i. **Creative Thinking:** Generate new ideas.

ii. **Decision Making:** Specify goals and constraints generate alternatives, consider risks and evaluate and choose the best alternative.

iii. **Problem Solving:** Recognize problems and devise and implement plan of action.

iv. **Visualize ("Seeing Things in the Mind's Eye"):** Organize and process symbols, pictures, graphs, objects, and other information.

v. **Reasoning:** Discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.

C. Personal Qualities
i. **Responsibility:** Exert a high level of effort and persevere toward goal attainment.

ii. **Self-Esteem:** Believe in one's own self-worth and maintain a positive view of oneself.

iii. **Sociability:** Demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.

iv. **Self-Management:** Assess oneself, set personal goals, monitor progress, and exhibit self-control.

v. **Integrity & Honesty:** Choose ethical courses of action.
2. WORKPLACE COMPETENCIES

A. Resources:
i. Time: Select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
ii. Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
iii. Material & Facilities: Acquire, store, allocate, and use materials or space efficiently.
iv. Human Resources: Assess skills and distribute work accordingly, evaluate performance and provide feedback.

B. Interpersonal Skills:
i. Participate as Member of a Team: Contribute to group effort.
ii. Teach Others New Skills.
iii. Serve Clients/Customers: Work to satisfy customers’ expectations.
iv. Exercise Leadership: Communicate ideas to justify position, persuade & convince others, responsibly challenge existing procedures & policies.
v. Negotiate: Work toward agreements involving exchange of resources, resolve divergent interests.
vi. Work with Diversity: Work well with men and women from diverse backgrounds.

C. Information:
i. Acquire and Evaluate Information.
ii. Organize and Maintain Information.
iii. Interpret and Communicate Information.
iv. Use computers to process information.

D. Systems:
i. Understand Systems: Know how social, organizational and technological systems work and operate effectively with them.
ii. Monitor & Correct Performance: Distinguish trends, predict impacts on system operations, and diagnose deviations in systems' performance.
iii. Improve or Design Systems: Suggest modifications to existing systems and develop new or alternative systems to improve performance.

E. Technology
i. Select Technology: Choose procedures, tools or equipment including computers and related technologies.
ii. Apply Technologies to Task: Understand overall intent and proper procedures for setup and operation of equipment.
iii. Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies.