



## 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, 2a-i, 2a-ii, 2a-iii, 2b-i, 2b-ii, 2b-iii, 2c-ii, 2d-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-iii, 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, 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, 2d-i, 2d-ii, 2d-iii, 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, 2d-i, 2d-ii, 2d-iii, 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 %
Weekly assignments:	50 %
Exams:	40 %

Assignments are due as assigned and 10 points for each day the work is late.

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

## Secretary of Labor's Commission on Achieving Necessary Skills (SCANS)

### 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.