



Course Syllabus

DEMR 1316 - Basic Hydraulics

Catalog Description: This course teaches the fundamentals of hydraulics including components and related systems.

Lecture hours = 2, Lab hours = 3

Prerequisites: None

Semester Credit Hours: 3

Lecture Hours per Week: 2

Lab Hours per Week: 3

Extended hours:

Contact Hours per Semester: 80

State Approval Code: 47.0605

Class section meeting time:

Instructional Goals and Purposes: The purpose of this course is to identify various components used in hydraulic systems; evaluate hydraulic components by inspection and testing; and explain the theory, circuits, and application of hydraulics.

Learning Outcomes:

1. **Introduction to Hydraulics**
2. **Fundamentals**
3. **Basic Circuits**
4. **Functional Circuits**
5. **Troubleshooting**

Specific Course Objectives (includes SCANS):

After studying all materials and resources presented in the course, the student will be able to:

1. **Introduction to Hydraulics.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify hydraulic components.
 - b. Safely operate the Hydraulics Trainer.
 - c. Demonstrate your ability by constructing simple hydraulics circuits.
2. **Fundamentals.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. State the laws governing hydraulics.

- b. Perform simple calculations involving force, pressure, area, velocity, and rate of flow.
3. **Basic Circuits.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Operate and test simple, practical hydraulic circuits.
 - b. Describe the operation of a directional control valve.
 4. **Functional Circuits.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Construct and operate functional hydraulic circuits using accumulators.
 - b. Construct and operate functional hydraulic circuits using hydraulic motors.
 - c. Construct and operate functional hydraulic circuits using pressure reducing valves and remotely controlled relief valves.
 5. **Troubleshooting.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Test the main components of a hydraulic system based on the manufacturer specifications and on the first principles of hydraulics.
 - b. Explain how temperature affects the operating characteristics of a hydraulic system.
 6. **Required Readings with Quiz assessment from Textbook.**

Course Content:

A general description of lecture/discussion topics included in this course is listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will be required to do the following:

1. Attend scheduled classes regularly and be on time for every class period. Students can be dropped from a class due to excessive absences. More than **two** (2) unexcused absences are considered to be excessive.
2. Study the assigned materials, complete and submit homework assignments on time, complete quizzes and exams to assess understanding and comprehension of the material presented.
3. Complete scheduled lab assignments. Personal Protective Equipment (PPE) is required to be worn in lab.

Methods of Instruction/Course Format/Delivery:

Students will have access to this course in Canvas and will meet regularly for class each week. Classes will consist of lecture, lab, and online exercises as appropriate. Quizzes and exams may be administered by the Instructor or by an approved testing facility.

Students in traditional, hybrid and Internet classes will have access to courses via Canvas. Students in the traditional class will meet regularly for lecture. Students in the Internet class will be required to take quizzes and exams at an approved testing facility or, they may also be administered by the instructor. Students in hybrid classes will have both in class and online assignments. Hybrid classes are required to read assigned material, take quizzes and exams as assigned by the instructor, and complete assigned homework prior to meeting for the face to face lecture or lab.

The following will be used to calculate the student's final grade:

Attendance and Participation

Students are expected to attend face to face classes and be on time. Students are required to participate in class discussions and work with other students during class lab exercises.

Attendance is based on the student missing no more than 10% of class periods in the semester without a valid excuse (10% equals two class periods). Any student thirty minutes late will be counted absent. Students that leave before being dismissed will be counted absent.

Lab Exercises

Students will complete lab assignments designed to teach them how to apply the knowledge gained from the textbook to actual hydraulic circuits.

Quizzes

Upon completion of each major assignment, students will take online quizzes over the material covered. Quizzes will generally contain true/false, multiple choice, matching or fill In-the-blank questions.

Midterm and Final Exams

There will be two major exams consisting of a Midterm Exam and a Final Exam. The Final Exam will be cumulative.

Grading Notes

Missed quizzes or exams due to legitimate reasons should be taken prior to the reporting of mid-term or final grades as applicable. It is the responsibility of the student to reschedule the makeup with the instructor, who reserves the right to change the test format of any makeup quiz or exam. ***No makeup work will be allowed for an unexcused absence.***

Scholastic Dishonesty includes, but is not limited to, the willful attempt to misrepresent one's work, cheat, plagiarize, or impede other students' scholastic progress. It is a serious offence and will be dealt with as such by the Instructor and Panola College. The penalty for ***Scholastic Dishonesty*** is an F in the course.

Grading Scale: A=90-100, B=80-89, C=70-79, D=60-69, F=59 and below

Major Assignments / Assessments:

The following items will be assigned and assessed during the semester and used to calculate the student's final grade.

Assignments: Textbook

Chapter 1: **Introduction to Fluid Power:** *The Fluid Power Field*

Chapter 2: **Fluid Power Systems:** *The Basic System*

Chapter 3: **Basic Physical Systems:** Applications to Fluid Power Systems

Chapter 4: **Fluid Power Standards and Symbols:** *Language of the Industry*

Chapter 7: **Source of Hydraulic Power:** *Power Units and Pumps*

Chapter 8: **Fluid Storage and Distribution:** *Reservoirs, Conductors, and Connectors*

Chapter 9: **Actuators:** *Workhorses of the System*

Chapter 10: **Controlling The System:** *Pressure, Direction, and Flow*

Chapter 11: **Accumulators:** *Pressure, Flow, and Shock Control Assistance*

Chapter 12: **Conditioning System Fluid:** *Filtration and Temperature Control*

Lab Exercises: (Lab-Volt Hydraulics Trainers)

Introduction to Hydraulics: *Exercise 1-1 and Exercise 1-2*

Fundamentals: *Exercise 2-1, Exercise 2-2, Exercise 2-3, and Exercise 2-4*

Basic Circuits: *Exercise 3-1, Exercise 3-2, Exercise 3-3, and Exercise 3-4*

Functional Circuits: *Exercise 4-1, Exercise 4-2, Exercise 4-3, and Exercise 4-4*

Troubleshooting: *Exercise 5-1, Exercise 5-2, Exercise 5-3, and Exercise 5-4*

Assessment (Textbook)

Chapter 1 Quiz

Chapter 2 Quiz

Chapter 3 Quiz

Chapter 4 Quiz

Chapter 7 Quiz

Chapter 8 Quiz

Chapter 9 Quiz

Chapter 10 Quiz

Chapter 11 Quiz

Chapter 12 Quiz

Assessment (Labs)

Exercise 1-1

Exercise 2-4

Exercise 4-1

Exercise 1-2

Exercise 3-1

Exercise 4-2

Exercise 2-1

Exercise 3-2

Exercise 4-3

Exercise 2-2

Exercise 3-3

Exercise 4-4

Exercise 2-3

Exercise 3-4

Exercise 5-1

Exercise 5-2

Exercise 5-3

Exercise 5-4

Course Grade:

The grading scale for this course is as follows:

- Attendance – 10%
- Lab Exercises – 20%
- Quizzes – 30%
- Exams – 40%

Texts, Materials, and Supplies:

- *Fluid Power Hydraulics and Pneumatics*
- ISBN 9781605259314
Author: James R. Daines
Publisher: The Goodheart-Willcox Company, Inc.
Tinley Park, IL, www.g-w.com
- Calculator (**Your phone is not a calculator**)
- Notepad and pen or pencil
- **Safety Glasses (NO EXCEPTIONS)**

Required Reading

- ***Lab Exercises (Online Content)***
- ***Textbook Assignments***

Recommended Readings:

- None

Other:

- For current texts and materials, use the following link to access bookstore listings:
<http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to <http://www.panola.edu/student-success/disability-support-services/> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder*:
<http://www.panola.edu/student-success/documents/pathfinder.pdf>

SCANS CRITERIA

1) **Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.**

- a) **Basic Skills:** A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
 - 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 flowcharts.
 - iii) Arithmetic and 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:** A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
 - 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) Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
 - vi) Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
- c) **Personal Qualities:** A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.
 - 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 accurately, set personal goals, monitor progress, and exhibit self-control.
 - v) Integrity and Honesty: choose ethical courses of action.

2) **Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.**

- a) **Resources:** A worker must identify, organize, plan, and allocate resources effectively.
 - 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 and Facilities: Acquire, store, allocate, and use materials or space efficiently.
Examples: construct a decision time line chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.
- b) **Interpersonal Skills:** A worker must work with others effectively.
 - i) Participate as a Member of a Team: contribute to group effort.

- ii) Teach Others New Skills.
- iii) Serve Clients/Customers: work to satisfy customer's expectations.
- iv) Exercise Leadership: communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and 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.

Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.

c) **Information:** A worker must be able to acquire and use information.

- i) Acquire and Evaluate Information.
- ii) Organize and Maintain Information.
- iii) Interpret and Communicate Information.
- iv) Use Computers to Process Information.

Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use online computer databases to research a report; use a computer spreadsheet to develop a budget.

d) **Systems:** A worker must understand complex interrelationships.

- i) Understand Systems: know how social, organizational, and technological systems work and operate effectively with them.
- ii) Monitor and Correct Performance: distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.
- iii) Improve or Design Systems: suggest modifications to existing systems and develop new or alternative systems to improve performance.

Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.

e) **Technology:** A worker must be able to work with a variety of technologies.

- 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.

Examples: read equipment descriptions and technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.