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**REEDLEY COLLEGE – MANUFACTURING TECHNOLOGY – HYDRAULICS**

**Spring 2022 MFGT 24-58874 T&TH 12:35PM – 3:00PM**

**2 Units, 9 weeks (01/10 – 03/11)**

**Instructor:** Michael Ornelas

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**E-mail:** [**michael.ornelas@reedleycollege.edu**](mailto:michael.ornelas@reedleycollege.edu)

**Office:** IND 23

**Classroom:** IND 17

**Lab:** IND 16

**Office hours: T&TH** 7:00am-7:30am **&** 3:00pm-3:30pm **VIRTUAL OFFICE VIA INSTRUCTOR EMAIL |F VIRTUAL OFFICE VIA INSTRUCTOR EMAIL 9AM-10AM**

**Textbooks:**

**Textbook (Required): INDUSTRIAL FLUID POWER;** Vol 1-3rd Ed. By: Robert C. Womack

**ISBN: 0-9605644-5-4**

**\*\*Materials will also be handed out in class. Handouts provided are to be read and treated as the course “text”.**

**Course Description:**

This course will cover the basic principles of fluid power, hydraulic sources, controls, systems and hydraulic components. Specific safety regulations in the design and application of hydraulic equipment will be explored.

**Course Objectives:**

1. Identify the basic components of a hydraulic system.

2. Apply hydraulic principles to operating hydraulic systems.

3. Compute mathematical formulas and understand basic physics principles that apply to hydraulic systems.

4. Learn proper maintenance of hydraulic systems.

5. Learn safety precautions as needed in hydraulic systems.

**Course Student Learning Outcomes:**

1. Practice safe shop techniques in operating and servicing hydraulic systems.
2. Calculate common mathematical problems associated with hydraulic systems.

**Course Outline:**

A. Introduction to Hydraulics  
1. History  
2. How fluid power works  
3. Components of the system  
4. Industrial application  
5. Mathematics and physics of hydraulics  
B. Hydraulic Principles  
1. Force and pressure  
2. Laminar and turbulent flow  
3. Fluids  
C. Distribution of Power  
1. Fluid lines  
2. fittings & hoses  
D. Actuators  
1. Cylinders  
2. Seals  
3. Cushioning  
4. Rotary actuators  
5. Fluid, gear, vane, piston, axial piston, and radial piston motors  
E. Safety and Maintenance Procedures  
F. System Records  
G. Trouble-shooting Systems

**Lab Outline:**

A. Hydraulic devices – assemble and disassemble  
1. Cylinders  
2. Motors  
3. Accumulators  
4. Pumps  
B. Hydraulic principles – desk top units or trainers  
1. Connect valves, pump, and cylinder  
2. Construct load arm  
3. Calculate forces involved in lifting a load with hydraulics  
C. Pneumatic principles – desk top units or trainers  
1. Connect valves, pump, and cylinders  
2. Lift loads

**Content and order may be changed as deemed necessary by the instructor**

**Required Materials:**

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| **#2 Pencil/Eraser** |
| **Basic Calculator (not on cell phone)** |
| **3-ring Binder w/ Lined Paper** |
| **Osha Approved Safety Glasses** |
| **Scan-Tron #882E (50 front/50 back)** |

**How class will be conducted:**

* Lecture
* Instructor Demonstrations
* Lab Tasks/Assignments
* Quizzes
* Homework Assignments
* **Final Exam-T- 3/10 (SUBJECT TO CHANGE)**

**Attendance:**

* Arrive on time and prepared for class
* Attendance and participation are very important. You must attend class to participate and complete all the work.
* Do not leave the classroom or shop area without the instructor’s permission. Knowledge of student’s presence relates directly to student safety.
* Campus policy requires that all students who miss 2 consecutive weeks before the add/drop deadline to be dropped (**2 class sessions for a 9-week class**).
* Campus policy requires students who have nonconsecutive absences which total the equivalent of two or more weeks are subject to being dropped from the class (**2 class sessions)**.
* Two tardies are equivalent to one absence. If you are tardy you must check with the instructor to ensure you are not marked absent.
* Contact the instructor if you know you will be missing class. Failure to do so will directly affect the opportunity to make-up any work given the day of an absence.
* It is the student’s responsibility to gather and complete any work missed during an absence.
* It is the students’ responsibility to drop any classes they no longer wish to continue.

**Grading Procedure: Procedure may be changed as deemed necessary by the instructor**

* Homework 10% of grade
* Lab work 30% of grade
* Tests 20% of grade
* Class participation 30% of grade
* Binder 10% of grade

**Grading Scale:**

* 100%-90% A
* 89%-80% B
* 79%-70% C
* 69%-60% D
* 59%-0% F

**Essential Information:**

* Any assignment turned in late will not receive credit.
* Homework will not be accepted late.
* Attendance and participation are very important. You must be in class in order to participate and complete all the work.
* In the event of class being cancelled you will be notified by a sign on the door.
* Cheating and/or plagiarism will not be tolerated. A student will receive no credit for the assignment if, in the opinion of the instructor, the individual has cheated.
* Cell phones are **PROHIBITED** during lecture/lab. If family or work requires you to have a device on, **PLEASE** select vibrate mode and text or talk outside of classroom/shop so not to disturb instruction and then return.
* Foul language will not be tolerated, and student will be asked to leave the classroom if not contained.

**Intellectual Property:**

Students are prohibited from any unauthorized recording, dissemination, or publication of any academic curriculum or presentations, including any online classroom instruction for any commercial purpose. In addition, students may not record or use instruction in any manner that would violate copyright law.

**Disruptive Classroom Behavior:**

The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. Differences of viewpoint or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop an understanding of the community in which they live. Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.

**IMPORTANT DATES:**

**January 10** (M) Start of Spring 2022 semester

**January 10 - March 11** (M-F) Short-term classes, first nine weeks

**January 17** (M) Martin Luther King, Jr. Day observed (no classes held, campus closed)

**February 18** (F) Lincoln Day observance (no classes held; campus closed)

**February 21** (M) Washington Day observance (no classes held; campus closed)

**March 1** (T) Deadline to apply for graduation for degree and certificate of achievement candidates to apply for Spring 2022 graduation.

**March 11** (F) Last day to withdraw from college or to be dropped from 18-week classes (letter grade assigned after this date).

**Policies and Procedures:**

**Failure to Attend Class**

Failure to attend class on a regular basis will adversely affect your performance in this course. Plagiarism or cheating of any kind will result in a grade of “F” for this course. There are no makeup exams without prior permission of the instructor.

**Required Reading**

Required reading should be completed before the corresponding lecture/demonstration. All grades are final unless an error in math has been made by the instructor. The instructor reserves the right to adjust the course outline, scoring, grading, and content as needed.

**Having Trouble?**

If at any time you find you are having trouble succeeding in this course whether because of a change in your life circumstances or because of something you do not understand about the material – please see me. There are several services available to assist Reedley College students to succeed in their course work. I would be happy to recommend one of these to you.

**Accommodations for students with disabilities:**

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or section 504 of the Rehabilitation Act, please contact me as soon as possible so that reasonable efforts can be made to accommodate your needs.

**Keep track of returned work.**

You should save all your work until the end of the semester, so you can double check the final grade earned as recorded by the instructor.