### ***Spring 2021***

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### Electrical and Hydraulic Fundamentals

### **Syllabus**

**Course Name: MAG 43 Units:** 03

**Total Contact hours: 90**

**Instructor:** **Manuel Torres, Jr.**

**E-mail: manuel.torres@wusd.ws**

**Office Hours: By appointment only**

**Class Meeting: M-F 8-3:45 pm.**

**Location: RM L-2**

**Course Description:** This course provides instruction in electrical systems and hydraulic systems. Students will receive training on the fundamentals of hydraulic and electrical systems including theory, application and troubleshooting.

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| **Student Learning Outcomes:** | |  |
|  | ***Upon completion of this course, students will be able to:*** | |
|  | Use acquired knowledge and skills to safely repair electrical components.  Use acquired knowledge and skills to safely repair hydraulic systems. | |
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**Objectives:**

*In the process of completing this course, students will:*

Demonstrate the ability to safely work around electrical components.

Use Ohms law as it applies to series and parallel circuits.

Demonstrate the ability to use a millimeter.

Troubleshoot and repair lighting and accessories.

Read, draw and interpret basic electrical symbols and schematics.

Demonstrate the ability to test starting and charging circuits.

Demonstrate the ability to test batteries.

Demonstrate the ability to safely work on hydraulic systems and components.

Explain the basic principles of a hydraulic system.

Understand the theory of Pascal’s Law.

Explain the physical properties to enclosed liquids.

Evaluate difference between filters based on construction.

Explain how vain, piston and gear pumps work.

Demonstrate the proper procedure to rebuild a hydraulic cylinder.

**Lab Dress:** Work clothes, shop coats, or coveralls. No loose clothing. Long hair must be restrained. Closed toe shoes and pants are required. Safety glasses will be worn at all times.

**Required Classroom/Lab Equipment:**

OSHA approved Z87.1 or higher safety glasses

Long pants of denim or other flame resistant material

1” binder for handouts, assignments, and course materials

**Lockers:** Lockers are available in the Agricultural Mechanics building. Provide your own lock.

**Safety:** Safety is a primary concern while working in the shop. Students that are not working in a safe manner will be required to leave the shop. This includes failure to wear adequate eye protection. You will receive instruction on the safe operation of the equipment; any unsafe operation will be dealt with accordingly. **Proof of tetanus immunization is required.**

**Required Text:**

Recommended Andrew D. Althouse, Carl H. Turnquist, William A. Bowditch, Kevin E. Bowditch and Mark A. . Modern Welding, 11th ed. Goodheart-Willcox Company, 2004 or newer. Students are expected to have read the assigned reading before lecture.

**Students Responsibility:**

Students are strongly advised not to miss labs since this time may be difficult or impossible to make them up.

No makeup’s will be allowed unless by prior permission of the instructor.

Cleanup of the shop is part of the laboratory exercise. Students not participating in shop cleanup will have points deducted from their lab grades.

No written assignments will be accepted after the last lecture meeting. Late assignments are subject to a 20% penalty. No lab projects will be accepted after the final exam.

**Evaluation:**

Students will be evaluated on the basis of their performance on quizzes (announced and unannounced), written assignments, unit tests, lab projects and final examination according to the following scale.

Your grade in this course will be based on the following scale:

A – 90 – 100%

B – 80 – 89%

C – 70 – 79%

D – 60 – 69%

F – 59% and below

Final Exam = 10% - Exams = 35% - Projects = 35% - Written Assignments=20%

**Lecture Content:**

**Class outline Electrical**

Shop Safety

Electrical Safety

Theory of Electricity

Electrical components

Batteries

Charging Circuits

Starting Circuits

Ignition Circuits

Lighting and accessory Circuits

General Maintenance

**Class Outline Hydraulics**

Hydraulic Safety

Hydraulic Symbols

Hydraulic Pumps/Motors

Hydraulic Valves

Hydraulic Filters

Reservoirs and Coolers

Lines, Couplers and Seals

**Electrical Labs**

1. Electrical safety – lab orientation
2. Electrical symbols
3. Ohm’s law
4. Identification of electrical components
5. Testing batteries
6. Testing charging circuits
7. Testing starting circuits
8. Testing lighting circuits
9. General maintenance

**Hydraulic Labs**

1. Safety of hydraulics – Lab orientation
2. Hydraulic symbols
3. Force, pressure, area
4. Hydraulic pumps/motors
5. Hydraulic valves – pressure control
6. Hydraulic valves – Direction control
7. Hydraulic valves – Flow control
8. Hydraulic cylinders
9. Hydraulic filters
10. General maintenance
11. Diagnostic and testing

**Subject to Change:**

This syllabus and schedule are subject to change. If you are absent from class, it is your responsibility to check on any changes made while you were absent.

**Attendance**

Lecture: Attendance is required and roll will be taken at each class meeting. There is no difference between an “excused” or “unexcused” absence. A “tardy” is considered an absence unless the student contacts the instructor at the end of class to change the status from absent to tardy. Two tardies will count as an absence. Any student who misses more than two weeks of class meetings within the first 9 weeks of class may be dropped from the class by the instructor (i.e., class meets two times per week, 4 absences; class meets 1 time per week, 2 absences).

Lab: Attendance in all labs is mandatory. Students must make prior arrangements with the instructor to be excused from the lab. At that time, the instructor will determine, if any, make-up work will be appropriate.

Quizzes: There will be no make-ups for quizzes.

Tests: Make-up tests are limited to students who have made arrangements with the instructor prior to the required testing period or those students who have been excused by Sanger High School Attendance Office.

**Grading Policy/Scales/Evaluation Criteria**

For maximum point consideration, all written assignments and term reports should be typed and double-spaced. Lecture assignments (homework) will be accepted late up to the test for that unit of the course or 2 weeks past the deadline, whichever is sooner; however, late assignments will be penalized 1/5 of the possible points. Late laboratory assignments turned in within one week of the required due date will be accepted with a penalty equal to 1/5 of the maximum points. Any lab assignment turned in after that time up to the last regular class meeting will be accepted with a 50% penalty.

**College Policies:**

**Cheating & Plagiarism**

In keeping with the philosophy that students are entitled to the best education available, and in compliance with Board Policy 5410, each student is expected to exert an entirely honest effort toward attaining an education. Violations of this policy will result in disqualification for the course.

**Accommodations for Students with Disabilities**

If you have a verified need for 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 the instructor as soon as possible.

**Work Ethic -** Most students are enrolled in college classes to obtain a quality job or to enhance their skills for advancement with their current employment situation. Employers look for a punctual, responsible individual who is prepared to go to work. Our goal is to replicate the workplace environment where a student can develop and demonstrate these desirable traits.

· Punctual: It is customary to arrive at least 5 minutes before work begins. Individuals will be terminated if they are not punctual.

· Responsible: It is expected than an employee work every scheduled work day. Individuals will be terminated if they are not responsible.

· Prepared: It is expected that an employee be prepared with he/she arrives for work. Students must have work shirts, safety glasses, and appropriate footwear to participate in the laboratory. If a student is not prepared, he/she cannot participate and will receive a zero (see “responsible”).

**Language -** English is expected to be spoken in class for the following reasons:

· All course content and materials are presented in English and class discussions all take place in English.

· All lab activities are conducted in groups and must have effective communication between all group members.

· Shop activities can be hazardous and it is vital that instructors receive feedback in English to ensure safe practices.

· This policy is designed so that instructors and all students may communicate in a common language.

· All individuals must have freedom of expression and are allowed and encouraged to communicate in the language of their choice outside of class times, including breaks.

**Cancellation Class Notification**

Check the high school website for any notification, Foggy Day Schedule, etc.

**Behavioral Standards**

· Each student is responsible for his/her own work. Written assignments are not group assignments and no credit will be awarded for students who turn in the same work. Students suspected of cheating on tests and quizzes will receive no credit for that particular assignment and may be removed from the class.

· It is considered polite to turn off cell phones when in the classroom or shop. Please do so.

· There is no smoking, chewing tobacco, alcohol, or drugs allowed in classrooms, shops, or school vehicles.

· This class is set for the semester. All doctor’s appointments, interviews, meetings with counselors, and other types of appointments should be scheduled during your time outside of class.

**Important Dates Spring 2021**

* Martin Luther King, Jr. Holiday January 18
* No Class February 8
* Presidents’ Day Holidays February 15
* Spring Break March/April 3/29-4/5
* Finals Week June 5-9

\*\* Withdrawal (W): A student will be assigned a grade of “W” for classes dropped on or after 20 percent of the duration of the class, up to and including 50 percent of the duration of the class. After the 50 percent point, the student must receive a letter grade other than a “W” (i.e., A, B, C, D, F, I, P, NP). Check with your instructor for the deadline applicable to your class.