** REEDLEY COLLEGE – MANUFACTURING TECHNOLOGY**

**SPRING 2020 MFGT 95-56099 MOTOR CONTROL M-TH 7:30 AM-12:00 PM**

**4 Units, 9 weeks (01/13 - 03/13)**

**Instructor:** Michael Ornelas

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**E-mail:** **michael.ornelas@reedleycollege.edu**

**Office:** IND 23

**Classroom:** IND 17

**Lab:** IND 16

**Office hours: M** 12:00pm-12:30pm, **W** 7:00am-7**:**30am **&** 12:00pm-12:30pm, **TTH** 7:00am-7:30am **&** 3:00pm-3:30pm**,** **F VIRTUAL OFFICE VIA EMAIL\_9AM-10AM\_ michael.ornelas@reedleycollege.edu**

**Instructional Materials:**

**Textbook (Required): Electrical Motor Controls for Integrated Systems**; 5th Edition, American Technical Publishers (ATP), Rockis, G, Mazur, G, A. **ISBN: 978-0-8269-1226-8**

**Workbook (Recommended): Electrical Motor Controls for Integrated Systems**; 5th Edition, American Technical Publishers (ATP), Rockis, G, Mazur, G, A. **ISBN: 978-0-8269-1227-5**

**Reference (Recommended): Ugly’s for Electric Motors & Controls,** 2017 Edition, Jones & Bartlett

 **ISBN: 978-1-284-11942-8**

**Description:**

This course covers the study of basic and intermediate motor controls found in the manufacturing industry and the methods used to diagram, wire, operate, and troubleshoot motor controls and their accessories in a safe manner.

**Expected Outcomes:**

1. Identify types of motors and their characteristics.
2. Design motor control circuits such as start stop circuits, holding circuits, and motor overload circuits.
3. Identify control system components such as solid state devices, sensing devices, and motor controls.
4. Assemble motor control system components, using safe practices, into fully operational systems in a lab environment.
5. Diagram and document motor control circuits that have been designed.
6. Practice safe maintenance and repair of industrial motor control systems

**COURSE OUTLINE**

**Lecture Content:**

1. **Review**
2. Safety
3. Electrical fundamentals
4. Using test instruments
5. **Symbols and Diagrams**
6. Language of control
7. Electrical circuits
8. **Transformers**
9. Connections
10. Selection
11. Troubleshooting
12. **Loads and Torque Requirements**
13. Variable torque
14. Constant torque
15. Constant HP
16. **Contactors and Magnetic Starters**
17. **Motors**
18. DC
19. AC
20. **Reversing Motors**
21. **Timers & Counters**
22. TON
23. TOF
24. **Semiconductor and Input Devices**
25. Thermistor
26. Sensors
27. **Motor Drives**
28. VFD

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

**Lab Content:**

1. **Transformers**
2. **Load calculations**
3. **Motor Fundamentals**
4. **Motor Operation and Characteristics**
5. **Integration process**
a. Designing circuits
b. Simulating circuits
c. Wiring circuits
6. **VFD Operation**
7. **Troubleshooting**
a. Skills development
b. Process of troubleshooting
8. **Testing circuits**

**Required Materials:**

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

**How class will be conducted:**

* Lecture
* Demonstrations
* Lab Tasks/Assignments
* Homework Assignments
* Quizzes
* **Final Exam- TH- 3/12/20 (SUBJECT TO CHANGE)**

**Attendance:**

* Arrive on time and prepared for class
* Attendance and participation is 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.
* Quizzes/tests may be made up at the instructor’s direction.

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

 **Grades are based on your weighted combined points earned in Lab and Lecture:**

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

**Participation Daily Point Loss System:**

**May be changed as deemed necessary by the instructor**

* Absent -3
* Morning Tardy -1
* Break Tardy -1
* Early Leave -2

**Grading Scale:**

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

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**Essential Information:**

* Any assignment turned in up to one week late will receive 50% credit.
* Homework will not be accepted more than one week 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 and pagers are **PROHIBITED** during lecture/lab. If family or work requires you to have either on, **PLEASE** select vibrate mode and text or talk outside of classroom/shop so not to disturb instruction.
* Foul language will not be tolerated, and student will be asked to leave the classroom if not contained.

**IMPORTANT DATES:**

**January 13** (M) Start of Spring 2020 semester

**January 13 - March 13** (M-F) Short-term classes, first nine weeks

**January 20** (M) Martin Luther King, Jr. Day observed (no classes held, campus closed)

**January 24** (F) Last day to drop a Spring 2020 full-term class for full refund

**January 31** (F) Last day to register for a Spring 2020 full-term class in person

**January 31** (F) Last day to drop a Spring 2020 full-term class to avoid a “W” in person

**February 2** (SU) Last day to drop a Spring 2020 full-term class to avoid a “W” on WebAdvisor

**February 21** (F) Last day to change a Spring 2020 class to/from Pass/No-Pass grading basis

**February 14** (F) Lincoln Day observance (no classes held; campus closed)

**February 17** (M) Washington Day observance (no classes held; campus closed)

**March 13** (F) Last Day to drop a full-term class (letter grades assigned after this date)

**March 16 - May 22** (M-F) Short-term classes, second nine weeks

**April 6-9** (M-Th) Spring recess (no classes held, campus open)

**April 10** (F) Good Friday observance (no classes held; campus closed) (classes reconvene April 13)

**May 18-22** (M-F) Spring 2020 final exams week

**May 22** (F) End of Spring 2020 semester/commencement

**May 25** (M) Memorial Day Holiday (campus closed)

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

**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.

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