**ELMEC1110-002PauschSpring 2014**

**COLLEGE OF DUPAGE**

**ELECTROMECHANICAL TECHNOLOGY**

**Motor Fundamentals**

**Syllabus**

**Course Name ELMEC 1110-002 Motor Fundamentals**

Spring Semester 2014

Technical Education Center: Room TEC 2023

**Credit and Contact Hours:** 3 Credit hours

2 lecture hours and 2 lab hours per week

Monday 6:00-10:05 PM

**Course Description:**

Basic Principles for Alternating Current (AC) and Direct Current (DC) motors. Motor Theory, operation, ratings, speeds and enclosures. Analysis of Efficiency, power service factors and Frame sizes. Motor Control concepts, including ladder and wiring drawings. Control devices, including sensors, control Transformers and Starters.

**Course Objectives**

Upon successful Completion of the course the student should be able to do the following:

1. Explain basic motor control circuits
2. Define control circuit component functions
3. Identify component symbols given in ladder and wiring diagrams.
4. Analyze current and logic flow through a given drawing
5. Identify actual component give a schematic symbol
6. Describe the basic concept of electromagnetic induction as it relates to motors and generators
7. Construct basic motor control circuits including various control devices
8. Determine operational ratings of motors and generators and control equipment
9. Perform various troubleshooting procedures to diagnose problems and performance of motor, generator and control circuits
10. Explain electromagnetic induction
11. Describe motor and generator operation: single phase, three phase, DC Motors and generators
12. Perform Troubleshooting and evaluation methods on motors, generators and control circuits
13. Understand the electronic and mechanical parts of an automated system.
14. Understand and implement safety regulations required for operation of the system.
15. Diagnose and resolve equipment problems by utilizing technical assessment skills that include planning, reliability, logical thinking, and ability to use drawings, schematics and documentation.

**Topical Outline**

1. Symbol identification
2. Ladder Diagram
3. Wiring Diagram
4. Correlation of components
5. Ladder diagram interpretation
6. Electrical continuity
7. Wiring connections
8. Wiring diagram interpretation
9. Electromagnetic induction
10. Control Circuit
11. Motor and generator operation
12. Motor and generator control and maintenance
13. Troubleshooting

**Instructor:** Bob Pausch

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**Required Textbook :** Electrical Motor Controls for Integrated Systems 4th Edition by Rockis and Mazur , American Technical Publishers – ISBN: 978-0-8269-1217-6

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**Assignments, Labs and Examinations**

Weekly assignments are due before class the following week. Most Labs will be done in class during Lab time . A Mid-Term and Final Examination will be given on pre-announced dates.

**Class Preparation, Attendance and Tardiness Policy**

Class Preparation and attendance are essential if students are to receive maximum benefit from the class. Class preparation includes completion of reading and assignments by their due dates. Class attendance is strongly encouraged but your course grades will not be affected by periodic absences or tardiness, provided that the required work is completed and submitted on or before the due dates. Tardy students may enter a room in a fashion that will not disrupt a class in progress.

**Make –up Policy:**

If you cannot attend class on the scheduled date for a test, please let the instructor know beforehand so that a make-up test can be arranged. Failure to pre-arrange a make-up will result in the loss of credit for the test. Allowing a make- up exam is at the sole discretion of the instructor. Assignments and Labs may be turned in late with points being deducted.

**Grading:**

Weekly Assignments…………………………………………… 20%

Labs ……………………………………………………………………….30%

Midterm……………………………………………………………… 25%

Final ……………………………………………………………………. 25%

**Final Grades:**

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F Below 59%

**Academic Honesty:**

See COD catalog, Course-Related Academic Integrity, Board Policy 5050 and Board Procedure 5715. Academic dishonesty is prohibited. Disciplinary actions will be pursued in all instances in which it is determined that dishonesty has occurred. Disciplinary action may include, but is not limited to:

1. Assignment of a failing Grade for a test, examination or assignment.
2. Assignment of a failing grade for a course.
3. Student disciplinary sanction under Board Procedure 5715, “Students Rights and Responsibilities”

**Withdrawal Policies**

**Withdrawing from a Course** You may withdraw up until the “Last day to Withdraw without Instructor Permit” (see the registration Calendar) through myACCESS or in person at the Registration Office, Student Resource Center (SRC) Room 2048.

After the “Last Day to Withdraw without Instructor Permit” date (see registration Calendar) you may withdraw only with your Instructor’s written permission. The Instructor’s permission to withdraw must be brought or faxed to the Registration Office. The Registration fax Number is (630) 790-3785. You will NOT be automatically withdrawn.

**Medical Withdrawals** Requests for Medical withdrawals should be made to the office of the Director of Admissions, Registrations and Records, SRC 204B (630) 942-4248. Requests should be made in writing and accompanied by documentation from a physician or medical institution to verify the medical condition, date of onset and estimated length of treatment. **Request forms for medical with drawals** are reviewed individually. Refunds are issued when appropriate within the guidelines of the College of DuPage refund policy. You will receive written notification within two (2) weeks from the office of the Director of Admissions, Registration and Records.

**Incomplete Grade Policy:**

The Instructor of record may give an Incomplete or “I” Grade when a student has been unable to complete the course within the prescribed time due to unforeseen circumstances. The student is responsible for contacting the instructor of record or, when the instructor of record is no longer employed at the college, the appropriate dean regarding course completion. Course work must be completed within the time limits prescribed by the Instructor of record but not to exceed twelve (12) months from the end of the term in which the “I” grade was assigned. The “I” grade may be changed within the time limit prescribed by the Instructor of record.

If the “I” has not been changed by the instructor at the end of the twelve (12) month period the “I” will automatically be changed to an “F”. During the time the “I” is on the students record , it will not be calculated into the grade point average.

**Classroom Policies / Student Conduct:**

In order to achieve the course objectives, it is essential that you enjoy the class in addition to complying with the above requirements and the rules and policies of the College of DuPage contained in the Catalog and other College materials. If you are having course / College related problems, please feel free to talk to me so that we may resolve them to your satisfaction and benefit. All class work is done individually, but students may assist fellow classmates.

**ELMEC 1110**

**Calendar and Assignments**

**Date Chapter Review Questions Lab**

**Odd Number only!**

1/27/2014 Chapter 1 Chapter 1 LV 39163

Electrical Quantities Chapter 2 EX 1-1 Lockout Tag-Out

Chapter 2 EX 1-5 Current Protection

Electrical Tools Devices

Chapter 3

Electrical Safety

2/3/2014 Chapter4 Chapter 4 LV 39163

Electrical Symbols Chapter 5 EX 1-2 Control Panel

Chapter 5 Chapter 11 EX 2-1 Specification Reading

Logic applied to EX 2-2 Symbols , Designations

Line Diagrams and Diagrams

Chapter 11

Control Devices

2/10/2014 Chapter 6 Chapter 6 LV39163

Solenoids only Q’s 1-15 EX 1-3 Manual Starters

Pg 121-137 Chapter 9 EX 1-4 Contactors and Relays

Chapter 9 EX 3-1 Motor Starters

Contactors and

Motor Starters

2/17/2014 Chapter 6 cont’d Chapter 6 LV39163

Pg 137- Q’s 16-27 EX 3-2 Two and Three wire control

Chapter 7 Chapter 7 EX 4-2 Motor Starters with Jogging

AC Motors and

` Generators

2/24/2014 Chapter 8 Chapter 8 LV 11627

Power Distribution EX 11 The DC motor

Systems EX 30 DC Series Generator

3/3/2014 Chapter 12 Chapter 12 LV39163

Reversing Motor EX 3-3 Manual Reversing Starters

Circuits EX 3-4 Reversing Starters

Reversing Starters with Jogging

3/10/2014 Chapter 14 Chapter 14 LV39163

Timers and Counters EX 6-1 Time Relays

EX6-2 Plugging with Time Relays

3/17/2014 **Midterm Exam**

3/24/2014 Chapter 15 Chapter 15 LV11627

Relays and Solid EX 65 Thyristor Speed Controllers

State Starters EX 66 Thyristor Speed Controllers

With Regulation

3/31/2014 **Spring Break – No Class**

4/7/2014 Chapter 16 Chapter 16 LV39654

Sensing Devices EX 2 Background Suppression

And Controls Photoelectric Switch

EX 4 Polarized Retro reflective

Photoelectric Switch

EX 4 Capacitive Proximity Switch

4/14/2014 Chapter 18 Chapter 18 LV 39163

Reduced Voltage EX 5-1 Primary Resistor Starters

Starting EX 5-2 Soft Starters

4/21/2014 Chapter 19 Chapter 19 LV 39163

Accelerating and EX 4-1 Friction Brakes

Deacelerating Methods LV 39653

EX 1-3 Ramp and Voltage Boost

EX 1-5 Braking and Jogging

4/28/2014 Chapter 20 Chapter 20 LV 85082

Preventative EX 1-3 Troubleshooting a Basic

Maintenance Electrical Circuit

And Troubleshooting EX 2-2 Troubleshooting a Motor Starter with Jogging Circuit

5/5/2014 Chapter 17 Chapter 17 LV 85082 Programmable Ex 4-2 Troubleshooting an AC Drive

Logic Controllers

Review for Final

5/12/2014 **Final**

From the grant agreement’s Part IV  Special Conditions, Item 15, Intellectual Property Rights, the following needs to be on all products developed in whole or in part with grant funds:

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timelines, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use, by an organization and/or personal use by an individual for  non-commercial purposes, is permissible. All other uses require the prior authorization of the copyright holder.