AC/DC Motor Controls (INTC 1457)

Credit: 4 semester credit hours (3 hours lecture, 4 hours lab)

Prerequisite/Co-requisite: CETT 1403&1405

Course Description

A study of electric motors and motor control devices common to a modern industrial environment. A presentation of motor characteristics with emphasis on starting, speed control, and stopping systems.

Required Textbook and Materials

1. *Electrical Motor Controls 4th Edition by* Gary J. Rockis & Glen A. Mazur
    a. ISBN number is 978-0-8269-1217-6
2. *Electrical Motor Controls 4th Edition* Workbook
    a. ISBN number is 978-0-8269-1218-3
3. Scientific calculator
4. Notebook.

Course Objectives

Upon completion of this course, the student will be able to:

1. Describe the types of electric motors. (SCANS C3.3, C4.3, C5.3, C6.4, C7.4, C9.3, C15.3, C18.3, C19.3, C20.3, F1.5, F2.4, F5.4, F6.3, F10.3, F11.4, F13.3, F14.
2. Explain the operation and function of various motor control devices. (SCANS C3.3, C4.3, C5.3, C6.4, C7.4, C9.3, C15.3, C18.3, C19.3, C20.3, F1.5, F2.4, F5.4, F6.3, F10.3, F11.4, F13.3, F14.4)

SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor **S**ecretary's **C**ommission on **A**chieving **N**ecessary **S**kills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991 the Commission announced its findings in *What Work Requires in Schools.* In its research, the Commission determined that "workplace know-how" consists of two elements: foundation skills and workplace competencies.

Course Outline

A. Introduction
    1. Introduction of faculty and students
    2. Review Syllabus
    3. Review Class Policies
    4. Review Lab Assignment

B. Electrical Tools and Test Instruments
    1. Tools
    2. Electrical Test Instruments

C. Electrical Safety

Approved 11/2010

1. Electrical Safety
2. Personal Protective Equipment
3. Lockout/Tagout
4. Lockout Devices
5. Fire Safety
6. Confined Spaces

D. Electrical Symbols and Diagrams
1. Language of Control
2. Electrical Circuits

E. Control Logic
1. Basic Rules of Line Diagrams
2. Signals, Decisions, and Actions
3. Logic Functions
4. Common Control Circuits
5. Control Circuit Troubleshooting

F. Solenoids, DC Generators, and DC Motors
1. Magnetism & Electromagnetism
2. Solenoids, Characteristics, Selection, and Applications
3. DC Generators
4. DC Motors

G. AC Generators, Transformers, and AC Motors
1. AC Generators
2. Transformers
3. AC Motors
4. Maintenance and Troubleshooting

H. Power Distribution Systems
1. Power Distribution Systems
2. Troubleshooting PDS

I. Contactors and Magnetic Motor Starters
1. Manual Switching
2. Magnetic Contactors
3. Magnetic Motor Starters
4. Modifications
5. Troubleshooting

J. Reversing Motor Circuits
1. Manual Starters
2. Drum Switches
3. Magnetic Starters
4. Wiring Methods
5. Troubleshooting

K. Timing and Counting Functions
1. Timers
2. Timing Functions
3. Wiring Diagrams
4. Counters
5. Troubleshooting

Grade Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Evaluation

Final grades will be calculated according to the following criteria:

Activity	***Percentage***
Homework/Labs	10%
Quizzes	10%
Major Test	50%
Final	30%

Late Penalties will be assessed on all work turned in late. 15 points per day

Course Requirements

1. Apply Ohm's law and the power formula to determine expected circuit values.
2. Identify types of electrical tools.
3. State the reason for grounding.
4. Identify electrical symbols in electrical power and control circuits.
5. Wire up a control circuit by following a line diagram.
6. Connect a dual-voltage wye-connected motor for high and low voltage.
7. Connect a dual-voltage delta-connected motor for high and low voltage.
8. Troubleshoot a Hand/Off/Auto circuit.
9. Hard wire and troubleshoot a reversing motor circuit.
10. Apply On-delay and Off-delay timers and troubleshoot timer circuits.

Attendance Policy

1. Missing more than 20% of classes will result in an automatic "F" for the course.
2. Absences are counted for unexcused, excused and coming to class late.
3. Missing more than 20% of a class period will count as an absence.
4. Being tardy 3 times equals 1 absence.

Course Policies

1. No food, drinks, or use of tobacco products in class.
2. No foul or harsh language will be tolerated
3. Turn off all Cell Phones during lectures
4. Do not bring children to class.
5. No Cheating of any kind will be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result from expulsion from LIT.
6. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an 'F' in the course.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Course introduction, policies, and safety. • Lecture • Lab: Examine Tools and Test Instruments	Handouts Chapters 2 & 3
2	Electrical symbols and diagrams • Lecture • Lab: Workbook exercises • Test 1	Chapter 4
3/4	Control Logic • Lecture • Lab: Motor Starting with memory and overload protection.. • Workbook excersises; Not,Nand, Nor,And, Or, Combo & Memory	Chapter 5
5/6	Solenoids, DC generators & DC motors • Lecture • Lab: Chapter Exercises and Workbook exercises	Chapter 6
7/8	AC generators, Transformers & AC motors • Lecture • Lab: Wire Wye and Delta Motors • Test 2	Chapter 7
9/10	Power Distribution • Lecture • Lab: Workbook Exercises	Chapters 8
11/12	Contactors and Motor Starters • Lecture • Lab: Workbook Exercises • Test 3	Chapter 9
14	Reversing Motor Circuits • Lecture • Lab: Workbook exercises	Chapter 12
15	Timing and Counting Functions • Lecture • Lab: Workbook exercises • Test 4	Chapter 14
16	Review for Final Exam	All Chapters

Contact Information

Instructor: Mr. Ron Perry
Office: Building: T1 Room: 111-b

Telephone: (409) 880-1739
E-mail: ronald.perry@lit.edu
Office Hours: 12:30 pm – 4:30 pm M & W
8:50 am – 10:50 am Friday