

COURSE SYLLABUS

MN 226 – Applied Electricity and Motor Controls

Instructor:
Phone:
E-mail:

Credit Hours: 3
Semester:
Room:

Catalog Course Description

Overview of electrical motor control for industrial automation; study of magnetism and electromagnetism, electrical distribution equipment, single-phase and three-phase distribution systems; motor control systems and electronic sensing systems; preventive maintenance and troubleshooting. (class 2 hours, lab 3 hours)

Prerequisites:

None

Corequisites:

None

Textbook/Materials (indicate whether required or recommended)

DC Equipment and Controls, 726.2; Single Phase Motors, 727.1; AC Control Equipment, 729.1; Three-Phase Systems, 728.1; Schoolcraft Publishing (all required)

Institutional Student Learning Outcomes

- ISLO2. Competence in a Specialty Area
- ISLO5. Information and Technology

Program Student Learning Outcomes

- PSLO2. An ability to conduct experiments, collect, analyze, and interpret data. [ISLO5]
- PSLO11. The ability to use the techniques, skills, and modern engineering tools necessary to function as a industrial maintenance technician. [ISLO2]

I. Course Student Learning Outcomes

Students will demonstrate the ability to:

- CSLO1: Employ the principles, procedures, and applications of magnetism and electromagnetism. [PSLO2] [PSLO11]
- CSLO2: Employ the principles, procedures, and applications of direct current motors and control. [PSLO2] [PSLO11]
- CSLO3: Employ the principles, procedures, and applications of single-phase and three-phase motors and AC control basics. [PSLO2] [PSLO11]

| Alignment of Assessments with CSLOs (actual assessments are defined below) | | | |
|---|------------------------------------|------------------------------------|------------------------------------|
| CSLOs | CSLO1 | CSLO2 | CSLO3 |
| Assessments: | a) Lab Exercises b) Pop Quizzes | a) Lab Exercises b) Pop Quizzes | a) Lab Exercises b) Pop Quizzes |

| | | | |
|--|---------------------------------|---------------------------------|---------------------------------|
| | c) Hourly Exam d) Final Exam | c) Hourly Exam d) Final Exam | c) Hourly Exam d) Final Exam |
|--|---------------------------------|---------------------------------|---------------------------------|

II. Course Objectives

- O1. Identify and describe basic electrical systems. [CSLO1 – CSLO3]
- O2. Describe the fundamentals of DC motors and control. [CSLO1- CSLO3]
- O3. Describe the components of DC motors and control components. [CSLO1- CSLO3]
- O4. Describe the fundamentals of AC motors single-phase motors and controls. [CSLO1 – CSLO3]
- O5. Describe the components of single-phase motors and controls. [CSLO1 – CSLO3]
- O6. Describe the fundamentals of AC motors three-phase motors and controls. [CSLO1 – CSLO3]
- O7. Describe the components of AC motors three-phase motors and controls. [CSLO1 – CSLO3]
- O8. Describe the fundamentals of sensing and timing devices and systems. [CSLO1 – CSLO3].
- O9. Describe the fundamentals of Optoelectronics and digital devices and systems. [CSLO1 – CSLO3]

III. Assessment

Grades will be determined in the following manner:

| | | <u>Assessment Method</u> |
|-----|---|--------------------------|
| A1. | Laboratory Participation/Reports = 15%/15% | Test/Performance |
| A2. | Pop Quizzes = 15% | Test |
| A3. | Hourly Exam = 30% | Test |
| A4. | Final Exam (written comprehensive) = <u>25%</u> | Test |
| | | 100% |

- A1. Lab exercises/ Reports will be performed throughout the semester to apply the concepts discussed in the class lecture. The instructor will observe the students and sign off on each student's lab work. **Regular classroom/laboratory attendance and participation is mandatory.** Missed lab work must be made up in a timely manner (see note below) in order to receive credit for that portion of the course. **Multiple unexcused absences may result in automatic failure of the class.** [CSLO1- CSLO3]
- A2. Pop Quizzes (either written or performance-based) will be given intermittently throughout the semester to encourage students to attend class prepared for the week's lesson and to review their understanding of the material. [CSLO1 – CSLO3]
- A3. Hourly exam will be given during the course of the semester. This cognitive-based exam will require students to demonstrate knowledge of DC motors and control, AC single-phase motors and three-phase motors and control applications. [CSLO1 – CSLO3]

A4. A final written exam will be given at the end of the semester to assess the student's cognitive understanding of DC motors and control, AC single-phase and three-phase motors and control. [CSLO1 – CSLO3]

Note: Make-up tests (A3, A4) will be given only in the case of an excused absence, at the discretion of the instructor.

IV. **Topics:**

Topics discussed in this course shall include, but not be limited to, the following:

Week:

1. Introduction to electrical systems, tools, and safety
2. Electrical components, symbols, measurements
3. Electrical magnetism
4. Direct Current Motors and control
5. Review & Practical Exercises – Hour Test 1
6. Single-phase and three-phase motors
7. Electrical Control Basics
8. Motor Control Systems
9. Review & Practical Exercises – Hour Test 2
10. Electronic devices and sensing systems
11. Industrial Timing Systems
12. Optoelectronic control
13. Review & Practical Exercises – Hour Test 3
14. Basics of Digital Control
15. Review for Final Exam
16. Final Exam (A4)

V. **Grading Scale**

Letter grades will be assigned in accordance with the Academic Regulations in the Chattanooga State catalog as follows:

| | |
|----------|---|
| 90-100 | A |
| 80-89 | B |
| 70-79 | C |
| 65-69 | D |
| Below 65 | F |

VI. **Course Delivery Format**

Standard Format – This format is the traditional format and may use an on-line format (**eLearn**) to provide access to “static” materials which include the syllabus, course material, contact information, and presentations. Faculty must make available, when requested, a copy of the syllabus and any other instructor provided course materials, including instructor contact information. Faculty may require on-line activities and assignments to include on-line tests and submission of all written

and on-line communications. The extent of on-line activities/assignments may vary by course but will be specified on the syllabus.

VII. College Policies

This class is governed by the policies and procedures stated in the current Chattanooga State Student Handbook. Additional or more specific guidelines may apply.

ADA Statement

Students who have educational, psychological, and/or physical disabilities may be eligible for accommodations that provide equal access to educational programs and activities at Chattanooga State. These students should notify the instructor immediately, and should contact Disabilities Support Services within the first two weeks of the semester in order to discuss individual needs. The student must provide documentation of the disability so that reasonable accommodations can be requested in a timely manner. All students are expected to fulfill essential course requirements in order to receive a passing grade in a class, with or without reasonable accommodations.

Disruptive Students

The term “classroom disruption” means – student behavior that a reasonable person would view as substantially or repeatedly interfering with the activities of a class. A student who persists in disrupting a class will be directed by the faculty member to leave the classroom for the remainder of the class period. The student will be told the reason(s) for such action and given an opportunity to discuss the matter with the faculty member as soon as practical. The faculty member will promptly consult with the division dean and the college judicial officer. If a disruption is serious, and other reasonable measures have failed, the class may be adjourned, and the campus police summoned. Unauthorized use of any electronic device constitutes a disturbance. Also, if a student is concerned about the conduct of another student, he or she should please see the teacher, department head, or division dean.

Affirmative Action

Students who feel that he or she has not received equal access to educational programming should contact the college affirmative action officer.

Academic Integrity/Academic Honesty

In their academic activities, students are expected to maintain high standards of honesty and integrity. Academic dishonesty is prohibited. Such conduct includes, but is not limited to, an attempt by one or more students to use unauthorized information in the taking of an exam, to submit as one's own work, themes, reports, drawings, laboratory notes, computer programs, or other products prepared by another person, or to knowingly assist another student in obtaining or using unauthorized materials. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions, which

may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has the authority to assign an "F" or zero for an activity or to assign an "F" for the course.

Children

It is Tennessee Board of Regents policy that children are not permitted in the classrooms or laboratories. If you have children who must stay home for some reason, you must make other arrangements for their care than bringing them with you to class.

Communication

Tigermail is the official communication for students.

The instructor reserves the right to modify this syllabus in writing during the course of the semester.

VIII. Instructor Policies

Cell Phones

Activation of these devices represents a distraction and their use during lectures and labs (including instant messaging, games, and etc.) will be considered extremely disruptive to the learning environment. Please turn off (or set to vibrate) all such devices before entering the classroom. Please excuse yourself from the room if an emergency requires you to make or receive a phone call during class. If your cell phone goes off during a testing period, five points will be deducted from your test.

Use of Computers/Printers

The use of a computer is mandatory for all students. Students will have access to the computers in C24, C33, C54, C84, & C87. These computers are connected to the ET server and can be used to access Microsoft Office and other software. There may be times when one of the computer rooms will not be available; these times will be posted with as much advance notice as possible. **It is the student's responsibility to see that his or her username and password are working properly and that his or her password is protected.** It is also the student's responsibility to back-up needed files. The school will not be responsible for any computer files that get "lost" or damaged.

Back-up documentation for this class (such as the class syllabus, handouts, description of class assignments, etc.) will be available to the students through eLearn. Printers are to only be used by Engineering Technology students for assignments related to engineering and engineering technology classes or labs. Paper availability may be subject to print management activities and will be requested through assigned faculty. Please help conserve paper.

Classrooms & Labs

Food and drinks are prohibited in all Engineering Technology classrooms and labs located in the Branch Center for Technology. Only plain water in a sealable container is permitted. Any form of tobacco products are also prohibited in accordance with College and TBR policy.

To Log-in C24, C33, C54, C84, & C87: Username: ET_last name first initial
middle initial (*no spaces*)

Password: student

Domain (log-in): CSTCC

Note: Be sure to change your password after your initial log-in.