

The University of Tennessee at Chattanooga

Applied Electric Power and Machinery

Fall 2020

Department of Engineering Technology and Management, ETME 4130, CRN 42150, 3 hrs

Instructor: Dr. Khalid Tantawi

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Course website: <https://blog.utc.edu/khalid-tantawi/etme4130/>

Office Phone Number: 423-425-5778

Office Hours and Location: Mondays and Wednesdays 1:00 PM – 3:25 PM at EMCB 326C
Tuesdays and Thursdays 2:30 PM – 5:30 PM at EMCB 326C

Course Meeting Days, Times, and Location: Mondays and Wednesdays 3:25 PM – 4:40 PM

Course Meeting Location: Engineering Building Rooms 233 and 308

Course Catalog Description: Principles and application of electric machinery and equipment including generators, motors, switchgear, protective relaying, overloads, and fuses. Electric power generation, transmission, and distribution with emphasis on components and measuring instruments associated with single and three-phase AC and DC electricity. Methods of operation and control of common motors and generators. Application of protective relays, overloads, and fuses for protection of motors, generators, buses, and transformers. Methods of power factor correction. Circuit and single-line diagrams; extensive use of software for simulation.

Course Prerequisites: ETME 3110 Engineering Tech Mechatronics

Course Objectives:

1. To define the principles of operation of rotating AC and DC machines and transformers.
2. To identify common motor control components and their symbols
3. To define the different speed control methods of DC and AC motors.
4. To the different starting and braking methods of DC and AC motors.
5. To describe the basic control, forward-reverse, and control circuits.
6. To demonstrate the ability to protect electric motors and prevent motor failures.
7. To apply safety rules, procedures, and guidelines while working on motorized systems.
8. To utilize computer software and build electrical circuits that involve electric machinery

Recommended Course Textbook: Understanding Motor Controls, S. Herman, 4th ed (2020) or 3rd ed (2017), Cengage Learning

Lecture Notes can be found online at: <https://blog.utc.edu/khalid-tantawi/courses/etme-4130/>

*This course was revised to reduce the cost of course materials for students with the assistance of an Affordable Course Materials grant in Summer 2020.

Supplementary References:

1. Electric Machinery Fundamentals, S. Chapman, 5th edition, McGraw Hill, 2012
2. Article 430 of the National Electric Code can be found at UTC Library here:
https://utc.primo.exlibrisgroup.com/permalink/01UTC_INST/1ojesla/alma991004272167903991
3. **Power Electronics Handbook**, Muhammad Rashid, Prentice Hall, 2011: this book can be found at the UTC Library here:
https://utc.primo.exlibrisgroup.com/permalink/01UTC_INST/1ikrq5t/cdi_proquest_ebookcentral_EBC625336

Required Course Materials: Safety glasses, Scientific Calculator, Notebook

Lab Experiments are available on the web from Labvolt.com

Technology Skills Required for Course: Basic computer applications

Campus Safety Policy: Due to COVID-19, there is a [campus safety policy](https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php) (<https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php>) for classes that meet on campus; please review this policy.

COVID-19 Absence Policy: Due to COVID-19, there is an [absence policy](https://www.utc.edu/walker-center-teaching-learning/covid-19-absence-policy.php) (<https://www.utc.edu/walker-center-teaching-learning/covid-19-absence-policy.php>) for Fall 2020.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](https://new.utc.edu/information-technology/learning-from-home) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](https://www.utc.edu/disability-resource-center/index.php) (<https://www.utc.edu/disability-resource-center/index.php>) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements:

- Quizzes: 15%
- Labs: 25%
- Homeworks: 10%
- Midterm Exam: 25%
- Final Exam: 25%

Course Grading Policy:

95 – 100: A+	90-94.99: A	85-89.99: A-
80-84.99: B	75-79.99: B-	
70-74.99: C+	65-69.99: C	
55-64.99: D	Less than 55: F	

Course and Institutional Policies

Student Conduct Policy: UTC’s Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page \(https://www.utc.edu/student-conduct/codes.php\)](https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity

Class and Course Attendance Policy:

- No make-up sessions will be given for absence without a documented reasonable excuse.
- **Attendance is very important.** Missing six classes/sessions or more may result in an F grade.
- It is your responsibility to regularly check your default UTC email address to be aware of any important/emergency notice about the course or class schedule.
- **Neatness counts.** Please submit neat homework and class work. Points may be taken off if your exam or work paper is unreadable or not neat and organized.
- You are encouraged to ask questions in the class, in my office, through email, or on the phone.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and Barnes and Noble (<https://www.barnesandnoble.com/>) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the [Bookstore Price Match](#)

[Program \(https://bnc.pgtb.me/MMt77F\)](https://bnc.pgtb.me/MMt77F), visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

Course Calendar/Schedule:

Week of 8/17/2020: Lesson 1: Safety and Symbols

Week of 8/24/2020: Lesson 2: Introduction and Review

Week of 8/31/2020: Lesson 3: Overload Relays and Control Transformers

Week of 9/7/2020: Lesson 3: Overload Relays (continued), Lesson 4: Basic Controls

Week of 9/14/2020: Lesson 5: Intro to Power Electronics, **Quiz 1**

Week of 9/21/2020: Lesson 6: DC Machines

Week of 9/28/2020: Review, Mid Term Exam

Week of 10/5/2020: Lesson 7: Three Phase Power, **Fall Break**

Week of 10/14/2020: Lesson 7 (continued)

Week of 10/21/2020: Lesson 8: AC Machines

Week of 10/28/2020: Lesson 8 (Continued)

Week of 11/2/2020: Lesson 9: AC Motor Starting, Quiz 2

Week of 11/9/2020: Lesson 10: AC Motor Speed Control

Week of 11/16/2020: Lesson 10 (Continued),

Week of 11/23/2020: Lesson 11: Motor Braking

Week of 11/30/2020: Final Exam

Note 1: This schedule may change. If changes are made, announcements will be made in advance regarding those changes. **It is your responsibility to conform to all announcements, changes, and additions made during the classes.**

Safety Rules and Measures:

It is extremely important to follow the safety guidelines before you start and during the lab sessions. Some of the rules and measures that you must take are listed below.

1. Wear safety glasses.
2. Remove watches, jewelry, rings, and ties.

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3. If you have a long hair, you must tie it up or put it in a cap.
4. Avoid loose clothes, and remove jackets.
5. Wear short sleeves, or properly rolled-up long sleeves.
6. Wear heavy duty shoes.
7. Make sure the floor is dry before you start and stays dry during the lab session. Never start your lab session if the floor is wet or greasy.
8. **Familiarize yourself with the location of the emergency stop buttons** before you start your lab session.
9. Some labs may require wearing electrically-insulating gloves. Please be aware when they are needed.
10. Perform proper Lockout/Tagout procedures, and **inform other students around you and your group members, if you are working in a group, before you plug in or operate, or turn on an electrical equipment.**