

Course Number and Title: ELM 130 Industrial Electricity

Campus Location:

Dover

Effective Date:

2018-51

Prerequisite:

MAT 180 or concurrent, SSC 100 or concurrent

Co-Requisites:

none

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

3.00 lab hours/week

Course Description:

This course provides an overview of three-phase circuits, protective devices, transformer connections, motors, motor starters, and industrial maintenance techniques. Electrical and solid state motor controls are introduced. Emphasis is placed on electrical and industrial safety circuits.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

None

Schedule Type:

Classroom Course

Disclaimer:

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Core Course Performance Objectives (CCPOs):

1. Work safely in a lab/shop environment. (CCC 2, 3, 4; PGC 2, 3, 4, 5)
2. Examine single-phase circuits, three-phase circuits, transformers, and motor control. (CCC 2, 4, 6; PGC 2, 3, 4, 5)
3. Perform various motor and drive maintenance techniques such as infrared thermography, power analysis, and vibration testing. (CCC 1, 2, 4, 6; PGC 3)
4. Perform experiments in industrial electricity applications. (CCC 1, 2, 3, 4, 6; PGC 4, 5, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Work safely in a lab/shop environment.
 1. Identify worker safety regulations and standards.
 2. Describe three types of sensors used in machine safety operations.
 3. Perform lockout /tag-out procedures in accordance with Occupational Safety and Health Administration (OSHA) regulations.
 4. Describe the proper level of personal protection when working on a live circuit in accordance with the National Fire Protection Association (NFPA) 70E.
 5. Describe the emergency actions in the treatment for electric shock.
2. Examine single-phase circuits, three-phase circuits, transformers, and motor control.
 1. Identify the four main components of an electrical circuit.
 2. Sketch a motor starting circuit.
 3. Describe the functions of a multi-meter.
 4. Use a voltmeter to locate a fault in an electrical circuit.
 5. Determine the condition of an electrical component with an ohmmeter.
 6. Determine the current draw of a component using an ammeter.
 7. Calculate power in a single-phase circuit.
 8. Calculate power in a three-phase circuit.
 9. Describe the functions of a transformer.
 10. Determine the output voltage of a transformer based on the input voltage.
3. Perform various motor and drive maintenance techniques such as infrared thermography, power analysis, and vibration testing.
 1. Explain the benefits and techniques of proper lubrication.
 2. Explain how to perform a bearing inspection and interpret the results.
 3. Perform a bearing inspection using a thermometer, an infrared scanner, and a stethoscope.
 4. Explain how to perform an inspection of a rotor and stator, and interpret the results.
 5. Perform a belt inspection, and interpret the results.
 6. Perform vibration analysis, and interpret the results.
4. Perform experiments in industrial electricity applications.
 1. Apply safety principles to laboratory activities.
 2. Document laboratory activities and results accurately.
 3. Diagram and describe the circuits and programming of laboratory activities.
 4. Discuss each of the following laboratory topics:
 1. Capacitive reactance
 2. Impedance
 3. Three-phase power measurements
 4. Squirrel cage induction motors
 5. Three-phase motor starters
 6. Frequency conversion
 7. Infrared thermography maintenance

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Under engineers' direction, design basic circuitry and draft sketches to clarify details of design documentation.
2. Build, modify, and test circuitry or electronic components according to engineering instructions, technical manuals, and knowledge of electrical or electronic systems.
3. Install, maintain, adjust, and calibrate electrical or electronic equipment.
4. Identify and resolve equipment malfunctions.
5. Read blueprints, wiring diagrams, schematic drawings, and engineering instructions for assembling, maintaining, or repairing equipment.
6. Employ ethical standards, sound leadership and management principles, and participate in lifelong learning.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.