

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Commercial Wiring I
COURSE NUMBER	ELET 0200
DIVISION	Career and Technical Education
DEPARTMENT	ELET
CIP CODE	46.0302
CREDIT HOURS	4
CONTACT HOURS/WEEK	Class: 1 Lab: 6
PREREQUISITES	ELET0101 Electromechanical Systems

COURSE DESCRIPTION

This course covers commercial wiring methods. Upon successful completion of this course, the student should be able to read commercial blueprints and apply the current National Electrical Code to commercial wiring systems. The student will gain working knowledge and hands-on experience with commercial wiring techniques. The student will be required to provide ANSI Z87 safety glasses and may be expected to provide other basic hand tools and/or equipment.

PROGRAM ALIGNMENT

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:

https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1. The Student will be able to identify workplace safety issues in accordance with OSHA standards.
2. Upon successful completion of this course, the student should be able to identify the job skills necessary to have a successful career in the Electrical Profession.
3. Inspect electrical circuit connections in accordance with the N.E.C. standards of compliance.

TEXTBOOKS

<http://kckccbookstore.com/>

METHOD OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

- I. Commercial Building Feeders and Branch Circuit Wiring Methods
 - A. Calculate a branch-circuit from the load demand
 - B. Explain the rules for branch circuits
 - C. Determine conductor size and type
 - D. Use correction factors for ambient temperature
 - E. Explain derating factors (ampacity adjustment) for more than three current-carrying conductors in one raceway
 - F. Calculate over current protection and circuit rating
 - G. Explain conductor selection procedure
 - H. Calculate voltage drop
 - I. Describe energy savings considerations
- II. Conduit Bending for Commercial Installations
 - A. Calculate and measure for conduit installations
 - B. Identify and install ninety-degree bends
 - C. Identify and install offset bends
 - D. Identify and install three-point saddle bends
 - E. Identify and install four-point saddle bends
 - F. Explain the calculation for various bends
- III. Commercial Conductor Installations
 - A. Explain size of conductors for loads
 - B. Explain how many conductors in raceways
 - C. Identify and explain derating
 - D. Use charts to determine conductors short time current rating
 - E. Explain tap rules for conductors
- IV. Commercial raceways and box fill
 - A. Identify different sizes of raceways
 - B. Calculate how many raceways
 - C. Determine box fill per Chapter 9 NEC
 - D. Explain adjustment for raceways
 - E. Identify and explain pull box
 - F. Identify different types of raceways
- V. Commercial distribution
 - A. Install receptacles in a wall space
 - B. Explain hospital grade receptacles
 - C. Install ground-fault circuit interrupters receptacles
 - D. Explain the rules for receptacles in electric baseboard heaters

- E. Explain multi-outlet assemblies
- F. Identify and explain low voltage distribution
- G. Identify and explain distribution for lighting
- VI. Commercial Requirements for grounding and bonding
 - A. Calculate for adequate grounding system.
 - B. Install bonding commercial appliances.
 - C. Identify isolated grounds.
 - D. Ground all metal boxes.
 - E. Ground all commercial motors.
 - F. Ground transformers.
 - G. Identify and explain main bonding jumper.
 - H. Identify and explain ground ring
 - I. Explain separately derived systems
 - J. Identify lightning arrestors.
- VII. Commercial Calculations
 - A. Calculate ohms per k/feet.
 - B. Size the transformer over current protection.
 - C. Calculate three phase transformer rating.
 - D. Calculate the conductor size for several motors on one feeder.
 - E. Determine transformer buck or boost.
 - F. Calculate voltage drop on three phase system
 - G. Calculate how many circuits
 - H. Calculate power needs.
- VIII. National Fire Protection Association 70E
 - A. Explain NFPA.
 - B. Explain standards for employers.
 - C. Explain need for retraining
 - D. Identify and explain Lockout/tagout.
 - E. Explain protective clothing
 - F. Identify hazards
 - G. Explain PPE

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Identify types of feeder/branch circuit wiring methods.
 1. Determine how many branches are needed.
 2. Determine how many feeders are needed.
 3. Explain types of switches and receptacles needed.
 4. Explain emergency receptacles in key locations.
 5. Identify emergency lighting.
 6. Determine how many 3-way switches are needed.
 7. Explain install for appliances.
 8. Explain power for appliances.

9. Explain power for central heating and cooling.
- B. Perform conduit bending.
 10. Explain how to measure for various types of conduit bends.
 11. Explain the how to bend an offset conduit bend.
 12. Bend a ninety-degree bend with precision.
 13. Bend a back-to-back ninety-degree bends.
 14. Bend three-point saddles.
 15. Bend four-point saddles for large obstructions.
 16. Explain where and why certain bends are needed.
 17. Explain why no conduit bends can exceed 360 degrees.
 - C. Identify and perform conductor installation.
 18. Determine conductor wire size based on circuit amperage use.
 19. Determine what equipment needed to install conductors.
 20. Identify conductors based on their color scheme.
 21. Determine what type of conductor lubricates for installation.
 22. Determine the raceway for conductor installations.
 23. Determine what method of securing the conductors.
 - D. Calculate raceway and box fill per NEC.
 24. Determine percentage of box fill.
 25. Calculate the size of raceway.
 26. Determine how many conductors in the raceway.
 27. Calculate size of raceway.
 28. Calculate the type of raceway.
 - E. Identify components of distribution equipment.
 29. Determine how many branch circuits are needed.
 30. Determine lay out equipment for raceway system.
 31. Identify over current devices.
 32. Identify single pole from three pole circuit breakers.
 33. Identify high voltage versus low voltage.
 34. Identify power panels.
 35. Identify delta transformers
 36. Identify wye transformers.
 37. Identify three phase distributions.
 38. Identify motor control centers.
 - F. Identify the NEC requirements for grounding and bonding.
 39. Identify grounding electrodes.
 40. Identify a ground ring.
 41. Identify an isolated grounding.
 42. Identify bonding on separately derived systems.

43. Identify lightning arrestors.
 44. Identify an effective grounding path.
 45. Identify bonding equipment.
 46. Identify bonding jumpers.
 47. Identify grounds on motors.
 48. Identify supplemental grounds.
- G. Perform service calculations per NEC.
49. Calculate how many ohms per 1000 feet.
 50. Determine the transformer size needed.
 51. Calculate the conductor size for motors.
 52. Determine a step-up or step-down transformer is needed.
 53. Calculate voltage drop on three phase systems.
 54. Calculate how many circuits will be needed.
 55. Calculate the power needs.
- H. Apply NFPA 70 E requirements.
56. Explain the National Fire Protection Agency.
 57. Apply 70 E code requirements for employers.
 58. Explain the need for retraining employees.
 59. Explain the lockout and tag out procedure.
 60. Apply the code for protective clothing.
 61. Explain the four hazard groups.
 62. Explain why employees wear personal protection equipment.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

College Catalog

<https://www.kckcc.edu/academics/catalog/index.html>

College Policies and Statements

<https://www.kckcc.edu/about/policies-statements/index.html>

Accessibility and Accommodations

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.