

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Residential Wiring I
COURSE NUMBER	ELET 0150
DIVISION	Career and Technical Education
DEPARTMENT	ELET
CIP CODE	46.0302
CREDIT HOURS	4
CONTACT HOURS/WEEK	Class: 1 Lab: 6
PREREQUISITES	ELET-0101 Electromechanical Systems or ELET-0110 National Electric Code I

COURSE DESCRIPTION

This is an introductory course on residential wiring methods that includes practical application and hands-on experience in implementing the code requirements. Upon successful completion of this course, the student should acquire the necessary skills to wire a residence to meet the minimum requirements as set forth in the current National Electrical Code for residential occupancies. 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. General Information for Electrical Installations
 - A. Identify branch circuit loads
 - B. Explain specifications on branch circuits
 - C. Identify symbols and notations for circuits
 - D. Explain the American National Standards Institute
 - E. Explain how the Code uses metric (SI) measurements
 - F. Identify Underwriters Laboratories, Inc. (UL)
 - G. Use safe work practices in the lab
- II. Electrical Calculations for Residential Service
 - A. Determine load based on square footage and utilization
 - B. Calculate the wire sizes for service entrance
 - C. Determine specifications for service per authority having jurisdiction
 - D. Install Ganged switch (device) boxes
 - E. Size boxes for conduit wiring
 - F. Describe special-purpose outlets
 - G. Calculate the voltage drop on a branch circuit
 - H. Select a box size when conductors are different sizes
- III. Electrical Luminaries for the Residence
 - A. Explain the basics of fluorescent lighting
 - B. Identify and install outdoor lighting
 - C. Identify and install recessed lighting
 - D. Determine the minimum number of lighting circuits in a dwelling
 - E. Identify and install energy efficient luminaries
 - F. Explain the different types of lamps and their colors
- IV. Branch Service for Appliances
 - A. Explain the need for current supply to appliances
 - B. Calculate the voltage supply for major appliances
 - C. Describe armored cable usage on appliances
 - D. Explain the wiring requirements for a counter-mounted cooking unit circuit
 - E. Calculate the demand for a wall-mounted oven circuit
 - F. Select the circuit requirements when more than one wall-mounted oven and counter-mounted cooking unit are supplied by one circuit

- V. Residential Switches and Receptacles for Residential
 - A. Explain and install three-way switches
 - B. Install single pole toggle switches
 - C. Bonding a receptacle to a metal box
 - D. Describe non-grounding and self-grounding receptacles
 - E. Calculate the small appliance branch circuits for convenience receptacles in a kitchen
 - F. Explain split-circuit receptacles and Multiwire circuits
 - G. Explain the rules for receptacles and outlets in a kitchen
- VI. Electrical Requirements for Grounding and Bonding
 - A. Describe general grounding considerations in a kitchen
 - B. Explain Code requirements for ground-fault circuit interrupters
 - C. Install ground-fault circuit interrupter in a residential circuit
 - D. Explain and install bonding
 - E. Explain and install grounding on all receptacles
 - F. Explain and install grounding on service entrance
 - G. Explain how an isolated ground receptacle functions
 - H. Explain and install grounding on metal boxes
- VII. Electrical Protection from Short Circuits and Ground Faults
 - A. Identify and install circuit breakers
 - B. Identify and install grounding protection on circuits
 - C. Explain the purpose of grounding electrical circuits
 - D. Explain and identify the purpose of service entrance grounding
 - E. Explain and identify the purpose of ground fault circuit interrupters
 - F. Explain and identify the purpose of arc fault circuit interrupters
 - G. Install ground fault and arc fault circuit interrupters

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Identify and install required branch circuits per NEC.
 1. Explain and identify conductor size and type per branch circuit.
 2. Demonstrate wiring methods and wire connections.
 3. Determine using the NEC minimum number of small appliances and lights required.
 4. Identify and install various types of switches and receptacles per NEC.
 5. Install multi-wire branch circuits.
- B. Install and calculate residential services per NEC.
 6. Calculate the service-entrance equipment requirements for a dwelling.
 7. Determine using the National Electric Code the minimum number of small appliances and lights are required.
 8. Explain the drip line needed for service entrance.
 9. Explain the correct wire size for service entrance.

10. Explain the strain relief attachment for the service mast.
 11. Calculate the size of service-entrance cable for residential homes.
 12. Demonstrate conductor size and types.
 13. Demonstrate wiring methods and wire connections.
 14. Determine voltage drop and neutral sizing for services.
 15. Explain the purpose of ground fault circuit interrupters
 16. Explain the purpose of arc fault circuit interrupters.
- C. Identify and install various types of luminaries.
17. Describe the characteristics of various lights.
 18. Identify and explain different types of lights.
 19. Explain the advantages and disadvantages of incandescent lights.
 20. Explain the advantages and disadvantages of High-intensity discharge lights (i.e.- metal halide lights, low- and high-pressure sodium and mercury vapor).
 21. Identify and install fluorescent lights.
 22. Identify and install different types of ballast or fluorescent lights.
 23. Install track lighting, recessed lighting, surface-mounted lighting, and suspended lighting.
 24. Explain the Kelvin temperature and the color of light produced.
 25. Identify different types of fluorescent light fixtures.
- D. Describe branch circuit requirements for appliances per NEC.
26. Explain how ground-fault circuit interrupters work.
 27. Explain causes of transient voltage occurs in a circuit.
 28. Explain how surge suppressors eliminate high voltage or current.
 29. Explain importance of isolated ground receptacles.
 30. Explain receptacle bonding.
 31. Explain the minimum appliance circuits per NEC.
 32. Explain installations rules for appliances in the home per NEC.
 33. Explain dedicated circuits for appliances per NEC.
- E. Identify and install various types of switches and receptacles per NEC.
34. Explain switch controls of lighting circuits.
 35. Install single pole switches, three-way switches and four-way switches.
 36. Identify and install 15 amp and 20-amp receptacles.
 37. Identify and install 30-amp receptacles for electric dryers.
 38. Identify and install 40- or 50-amp receptacles for electric range.
 39. Identify and install safety switches per NEC.
 40. Identify and install ground-fault circuit interrupter receptacles.
 41. Identify and install arc-fault circuit interrupter receptacles.
 42. Describe isolated ground receptacles.
- F. Identify NEC requirements for grounding and bonding.
43. Identify grounding equipment.

44. Explain the purpose of grounding metal appliances.
 45. Explain the importance of grounding and bonding.
 46. Identify bonding versus grounding.
 47. The proper distance and depth for grounding rods.
 48. Identify the importance of grounding all receptacles.
 49. Explain grounding and bonding in article 200 thru 250 in the NEC.
- G. Identify and install over current/short circuit and ground fault protection.
50. Explain the purpose of ground fault circuit interrupters.
 51. Identify where ground-fault circuit interrupters must be installed.
 52. Identify and install over current protection for circuits.
 53. Identify why a short circuit occurred.
 54. Explain the causes of a short circuit or ground fault.

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>.