

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Electrical (Level 1)
COURSE NUMBER	CONS 0115
DIVISION	Career and Technical Education
DEPARTMENT	CONS
CIP CODE	46.0201
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 1 Lab: 4 Clinical:
PREREQUISITES	KBOR approved Core Curriculum. OSHA 10, Math Level 3 Recommended

COURSE DESCRIPTION

This is the basic electrical course. It is in alignment with NCCER (selected modules) and the Kansas Board of Regents. The course topics include: Environmental sustainability, Fasteners and Anchors, Electrical Theory One, Electrical Theory Two, Electrical Test Equipment, Introduction to the National Electrical Code®, Boxes, and Fittings, Conductors, and Wiring: Residential.

PROGRAM LEARNING OUTCOMES

1. Demonstrate appropriate safety practices and procedures.
2. Demonstrate proper methods for completion of interior finishes.
3. Demonstrate proper methods for mechanical installation

TEXTBOOKS

<http://kckccbbookstore.com/>

METHODS 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. Orientation to the Electrical Trade
 - A. Apprenticeship/training.
 - B. Career paths.
 - C. Sectors of the electrical industry.
 - D. Tasks typically performed.
 - E. Responsibilities and aptitudes.
- II. Electrical Safety
 - A. Safe working practices.

- B. OSHA safety.
 - C. Electrical hazards.
 - D. Safety issues.
 - E. Task plan and a hazard assessment.
- III. Introduction to Electrical Circuits
- A. Voltage.
 - B. Conductors and insulators.
 - C. Units of measurement.
 - D. Meters used to measure voltage, current, and resistance.
 - E. Series and parallel circuits.
- IV. Electrical Theory
- A. Combination circuits.
 - B. Kirchhoff's voltage law.
 - C. Kirchhoff's current law.
 - D. Ohm's law.
- V. Introduction to the National Electrical Code®
- A. The *NEC*®.
 - B. Layout of the *NEC*®.
 - C. Navigate the *NEC*®.
 - D. National Electrical Manufacturers Association.
 - E. Testing laboratories.
- VI. Device Boxes
- A. Nonmetallic and metallic boxes.
 - B. Boxes under 100 cubic inches.
 - C. Box type and size.
 - D. Mounting a box.
- VII. Residential Electrical Services
- A. National Electrical Code®.
 - B. Grounding requirements.
 - C. Service-entrance equipment.
 - D. Wiring methods.
 - E. Branch circuit loads.
 - F. Equipment grounding conductors.
 - G. Ground fault circuit interrupters.
 - H. Outlet boxes.
 - I. Space heating and HVAC equipment.
 - J. Swimming pools, spas, and hot tubs.
 - K. Wiring device selection and.
 - L. Lighting fixtures.
- VIII. Residential Electrical Services
- A. Operation of:
 - 1. Voltmeter
 - 2. Ohmmeter
 - 3. Clamp-on ammeter
 - 4. Multimeter
 - 5. Megohmmeter

- 6. Motor and phase rotation testers
 - B. Category ratings.
 - C. Hazards of test equipment.
- IX. Environmental Sustainability
- A. Environmentally safe waste disposal.
 - B. Life cycle analysis.
 - C. Recycled material.
 - D. Low VOC emissions.
 - E. New “green” materials.
 - F. New “green” methods and practices.
 - G. “Low impact” designs.

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. identify and describe careers in the electrical trade, the industry, and typical tasks.
 - 1. Identify and describe the apprenticeship/training process for electricians.
 - 2. Identify Describe various career paths/opportunities one might follow in the electrical trade.
 - 3. Identify Define the various sectors of the electrical industry.
 - 4. Identify State the tasks typically performed by an electrician.
 - 5. Identify Explain the responsibilities and aptitudes of an electrician.
- B. Identify and describe electrical safety, OSHA, and identify hazards.
 - 6. Identify Recognize safe working practices in the construction environment.
 - 7. Identify Explain the purpose of OSHA and how it promotes safety on the job.
 - 8. Identify electrical hazards and how to avoid or minimize them in the workplace.
 - 9. Identify Explain safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.
 - 10. Identify Develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.
- C. Identify and describe voltage, use of meters and circuits.
 - 11. Identify Define voltage and identify the ways in which it can be produced.
 - 12. Identify Explain the difference between conductors and insulators.
 - 13. Identify Define the units of measurement that are used to measure the properties of electricity.
 - 14. Identify the meters used to measure voltage, current, and resistance.
 - 15. Identify Explain the basic characteristics of series and parallel circuits.
- D. Identify and describe types of electrical circuits.
 - 16. Identify Explain the basic characteristics of combination circuits.
 - 17. Identify Calculate, using Kirchhoff’s voltage law, the voltage drop in series, parallel, and series-parallel circuits. Calculate, using Kirchhoff’s current law, the total current in parallel and series-parallel circuits.
 - 18. Identify Using Ohm’s law, find the unknown parameters in series, parallel, and series-parallel circuits.
- E. Identify and describe the NEC and testing labs.

19. Identify Explain the purpose and history of the NEC®.
 20. Identify Describe the layout of the NEC®.
 21. Identify Demonstrate how to navigate the NEC®.
 22. Identify Describe the purpose of the National Electrical Manufacturers Association and the NFPA.
 23. Identify Explain the role of nationally recognized testing laboratories.
- F. Identify and describe metallic and non-metallic device boxes.
24. Identify Describe the different types of nonmetallic and metallic boxes.
 25. Identify Calculate the NEC® fill requirements for boxes under 100 cubic inches.
 26. Identify the appropriate box type and size for a given application.
 27. Identify Select and demonstrate the appropriate method for mounting a given box.
- G. Identify and describe the residential electrical code, services boxes, wiring and HVAC.
28. Identify, explain the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.
 29. Identify and explain the grounding requirements of a residential electric service.
 30. Identify and calculate and select service-entrance equipment.
 31. Identify and select the proper wiring methods for various types of residences.
 32. Identify and compute branch circuit loads and explain their installation requirements.
 33. Identify and explain the types and purposes of equipment grounding conductors.
 34. Identify and explain the purpose of ground fault circuit interrupters and tell where they must be installed.
 35. Identify and size outlet boxes and select the proper type for different wiring methods.
 36. Identify and describe rules for installing electric space heating and HVAC equipment.
 37. Identify and describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
 38. Identify and explain how wiring devices are selected and installed.
 39. Identify and describe the installation and control of lighting fixtures.
- H. Identify and describe residential electrical services.
40. Identify and explain the operation of and describe the following pieces of test equipment:
 - Voltmeter
 - Ohmmeter
 - Clamp-on ammeter
 - Multimeter
 - Megohmmeter
 - Motor and phase rotation testers
 41. Identify and select the appropriate meter for a given work environment based on category ratings.
 42. Identify the safety hazards associated with various types of test equipment.
- I. Identify and describe sound environmental practices for electricians, including waste disposal, life cycle analysis, green practices and low impact.
43. Describe waste disposal methods for this industry according to EPA and industry guidelines.
 44. Describe the process of life cycle analysis in this industry based on industry guidelines.
 45. Identify recycled materials by label and industry practice.

46. Define “low emission” and give two examples.
47. Identify new “green” materials now being introduced or currently used in this industry.
48. Describe new “green” practices and methods being instituted or currently employed within this industry.
49. Identify and explain the term “low Impact” as it relates to the environment.

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>.