

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Residential Electrical
COURSE NUMBER	BEMT 0112
DIVISION	Career and Technical Education
DEPARTMENT	BEMT
CIP CODE	46.0401
CREDIT HOURS	4
CONTACT HOURS/WEEK	Class: 2 Lab: 4
PREREQUISITES	BEMT 0101

COURSE DESCRIPTION

This is the basic course in residential electrical and repair. The course topics include: Environmental sustainability, sources of electricity, meter reading, voltage, resistance, watts, current, home distribution systems, circuit breakers, and codes. It will also cover types of conductors, circuit loads, switches, outlets, boxes, fixtures, and wiring. Students will study surface mounted wiring, low voltage, door chimes, thermostats, telephones and burglar alarm systems. Safety will be emphasized.

PROGRAM LEARNING OUTCOMES

Students will demonstrate an adherence to safety standards and proficiency in the installation or repair of residential electrical, plumbing, HVAC, exterior building materials, roofing, irrigation systems, landscape/hardscape, concrete placement and finish, masonry install and repair.
Interpersonal Skills

TEXTBOOKS

<http://kckccbookstore.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. Introduction – Sources of Electricity
- II. How to Read a Meter

- III. Electrical Energy
 - A. Voltage
 - B. Current
 - C. Resistance
 - D. $(EQ\{f(V, AxR)\})$
 - E. Watt
 - 1. Formula
 - F. Watt-Hour
 - 1. Formula
- IV. The House Distribution System
 - A. Service Line Cable
 - 1. Black Insulated
 - 2. Bare Cooper
 - 3. Simple Branch Circuits
 - B. Circuit Breakers
 - 1. Amperage Capacity
 - 2. Short-Circuit
 - C. Color Codes
 - 1. White Insulation
 - 2. Black Insulation
 - 3. Red Insulation
 - 4. Bare or Green
- V. Types of Conductors
 - A. NM
 - B. VF
 - C. Armored or Conduit
- VI. Circuit Loads
 - A. Size of Wire
 - B. Length of Conductors
 - 1. Formula
 - 2. Special Circuits
- VII. Switches
 - A. 15A 125V
 - B. 20 A 120V
- VIII. Wiring Switches
 - A. Silent Switches
 - B. Lighted Toggle Switches
 - C. Dimmer Switches
 - D. Three and Four Way Switches
- IX. Duplex Outlets
 - A. 3 Wire Polarized 3 Pole 3 Wire
 - B. 3 Wire Grounding 2 Pole 3 Wire
 - C. 4 Wire Grounding 3 Pole 4 Wire
- X. Replacing Duplex Outlet or Switch

- A. Ten Step Process
- XI. Ceiling Boxes
- XII. Ceiling Fixtures
 - A. Types
- XIII. Surface-Mounted Wiring
 - A. Types
 - B. Four Step Installation
- XIV. Low Voltage Circuits
 - A. Heating and Cooling Thermostat
 - B. The Step-Down Transformer
 - C. Reduced Voltage
- XV. Door Chime Failure
 - A. Step Down Transformer
 - B. Low Voltage
 - C. Chime Check
- XVI. Thermostat Controls
 - A. Primary Control
 - B. Placement
 - C. Thermostat Operation
- XVII. Checking Thermostat Mounting
 - A. Level Thermostat
 - B. Mounting
- XVIII. Calibration of the Thermostat
 - A. Six Step Process
- XIX. Miscellaneous Wiring
- XX. 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. Describe and explain electrical energy.
 - 1. Describe and understand the term voltage.
 - 2. Describe and understand the term current.
 - 3. Describe and demonstrate an example of resistance.
 - 4. Describe and demonstrate the term watts.
 - 5. Describe and perform a voltage check.
 - 6. Describe and identify and demonstrate how to use an OHM meter.
 - 7. Describe and demonstrate safe electrical practices.

- B. Describe and explain the house distribution system.
 - 8. Describe and understand the service box system.
 - 9. Describe and perform a check of the service line cable.
 - 10. Describe and demonstrate safety practices.
 - 11. Describe and demonstrate a circuit breaker.
 - 12. Describe and perform a short circuit.
 - 13. Describe and demonstrate color coding.
 - 14. Describe and demonstrate safe electrical practices.

- C. Describe and explain types of conductors and circuit loads.
 - 15. Understand and demonstrate NM cable.
 - 16. Understand and perform a cut on armored cable.
 - 17. Identify and demonstrate proper circuit loading.
 - 18. Understand and demonstrate proper wire sizing.
 - 19. Understand and perform wire twisting connecting.
 - 20. Identify and demonstrate safe electrical practices.

- D. Describe and explain switches.
 - 21. Understand and demonstrate 15 amp circuitry.
 - 22. Understand and perform a 20 amp circuit connection.
 - 23. Identify and demonstrate 7.5 amp 220 v connections.
 - 24. Understand and demonstrate a knowledge of switch types.
 - 25. Understand and perform wiring a three way switch.
 - 26. Identify and demonstrate changing a light ballast.
 - 27. Describe and demonstrate safe electrical practices.

- E. Describe and explain Duplex Outlets.
 - 28. Understand and demonstrate three wire polarized.
 - 29. Understand and perform three wire grounding.
 - 30. Identify and demonstrate four wire grounding.
 - 31. Understand and demonstrate the ten step process.
 - 32. Understand and perform a continuity check.
 - 33. Identify and demonstrate safe electrical practices.

- F. Describe and explain Ceiling Boxes and Ceiling Fixtures.
 - 34. Understand and demonstrate the types of boxes.
 - 35. Understand and perform prepping the boxes.
 - 36. Identify and demonstrate mounting a box.
 - 37. Understand and demonstrate a knowledge of ceiling fixtures.
 - 38. Understand and perform a ceiling fixture install.
 - 39. Identify and demonstrate safe electrical practices.

- G. Describe and explain Low Voltage Circuits.

40. Understand and demonstrate a thermostat.
 41. Understand and explain a step down transformer.
 42. Identify and demonstrate ways to reduce voltage.
 43. Understand and demonstrate a chime check.
 44. Understand and perform a thermostat install.
 45. Identify and demonstrate safe electrical practices.
- H. Describe and explain Thermostat Controls.
46. Understand and demonstrate a primary control.
 47. Understand and explain thermostat operation.
 48. Identify and demonstrate a level thermostat mounting.
 49. Understand and demonstrate how to calibrate a thermostat.
 50. Understand and perform a telephone wire check.
 51. Identify and demonstrate a burglar alarm wiring check.
- I. Describe and explain environmental sustainability.
52. Describe waste disposal methods for this industry according to EPA and industry guidelines.
 53. Describe the process of life cycle analysis in this industry based on industry guidelines.
 54. Identify recycled materials by label and industry practice.
 55. Explain and define "low emission" and give two examples.
 56. Identify new "green" materials now being introduced or currently used in this industry.
 57. Describe new "green" practices and methods being instituted or currently employed within this industry.
 58. Describe and 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>.