SYLLABUS

DATE OF LAST REVIEW: 02/2013

CIP CODE: 46.0201

SEMESTER: Departmental Syllabus

COURSE TITLE: Electrical (Level 2)

COURSE NUMBER: CONS0215

CREDIT HOURS: 3

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.


REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckccbookstore.com/, for the required tests for your particular class.

COURSE DESCRIPTION: This is the advanced course in Electrical. It is in alignment with NCCER (selected Modules) and the Kansas Board of Regents. The course topics include: Environmental sustainability, Alternating Current, Motors: Theory and Application, and Electric Lighting.

METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. They may include but are not limited to lecture, multimedia, cooperative/collaborative learning, demonstrations, labs, on-the-job, internships, performance tests, and other learning experiences outside the classroom. Methodology will be selected to best meet student needs.
COURSE OUTLINE:

I. MODULE 26201-08 – ALTERNATING CURRENT
   A. Peak and effective voltage.
   B. Phase relationships.
   C. Voltage and current phase.
   D. Voltage and current transients.
   E. Inductive reactance.
   F. Voltage and current transients that occur in a capacitive circuit.
   G. Capacitive reactance.
   H. Voltage and current in AC circuits:
      1. RL circuit
      2. RC circuit
      3. LC circuit
      4. RLC circuit
   I. Terms in AC circuits:
      1. True power
      2. Apparent power
      3. Reactive power
      4. Power factor
   J. Transformer action.

II. MODULE 26202-08 – MOTORS: THEORY AND APPLICATION
   A. Define:
      1. Controller
      2. Duty cycle
      3. Full-load amps
      4. Interrupting rating
      5. Thermal protection
      6. NEMAdesign letter
      7. Overcurrent
      8. Overload
      9. Power factor
      10. Rated full-load speed
      11. Rated horsepower
      12. Service factor
   B. Types of motor enclosures.
   C. Speed, frequency, and the number of poles in a three-phase induction motor.
   D. Percent slip.
   E. Changing motor direction.
   F. Three-phase wound-rotor induction motor.
   G. Three-phase synchronous motor.
   H. DC motors.
      I. Motor connections.
   J. National Electrical Code® (NEC®).
   K. Braking requirements.
   L. Rotation of a DC motors.
M. DC shunt, series, and compound motor.
N. Dual-voltage motors.
O. Motor connections.
P. Motor protection.

III. MODULE 26203-08 – ELECTRIC LIGHTING
A. Characteristics of light.
B. Types of lamps:
   1. Incandescent
   2. Halogen
   3. Fluorescent
   4. High-intensity discharge (HID)
C. Lighting fixtures.
D. Installation requirements:
   1. Surface-mounted
   2. Recessed
   3. Suspended
   4. Track-mounted
E. Ballasts and their use.
F. Kelvin temperature.
G. Occupancy sensors, photoelectric sensors, and timers.

IV. 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.

EXPECTED LEARNER OUTCOMES:
A. Module 26201-08. The student will be able to identify and describe alternating current, voltage, capacity and current.
B. Module 26202-08. The student will be able to identify and describe motors: theory and application, terms, phases, and DC current.
C. Module 26203-08. The student will be able to identify and describe the types of electric lighting, mounting, ballasts, and timers.
D. The student will identify and describe sound environmental practices for electricians, including waste disposal, life cycle analysis, green practices and low impact

COURSE COMPETENCIES:
Module 26201-08. The student will be able to identify and describe alternating current, voltage, capacity and current.

1. The student will be able to calculate the peak and effective voltage or current values for an AC waveform.
2. The student will be able to calculate the phase relationship between two AC waveforms.
3. The student will be able to describe the voltage and current phase relationship in a resistive AC circuit.
4. The student will be able to describe the voltage and current transients that occur in an inductive circuit.
5. The student will be able to define inductive reactance and state how it is affected by frequency.
6. The student will be able to describe the voltage and current transients that occur in a capacitive circuit.
7. The student will be able to define capacitive reactance and state how it is affected by frequency.
8. The student will be able to explain the relationship between voltage and current in the following types of AC circuits:
   RL circuit
   RC circuit
   LC circuit
   RLC circuit
9. The student will be able to explain the following terms as they relate to AC circuits:
   True power
   Apparent power
   Reactive power
   Power factor
10. The student will be able to explain basic transformer action.

Module 26202-08. The student will be able to identify and describe motors: theory and application, terms, phases, and DC current.

11. The student will be able to define the following terms:
    Controller
    Duty cycle
    Full-load amps
    Interrupting rating
    Thermal protection
    NEMA design letter
    Overcurrent
    Overload
    Power factor
    Rated full-load speed
    Rated horsepower
    Service factor
12. The student will be able to describe the various types of motor enclosures.
13. The student will be able to explain the relationships among speed, frequency, and the number of poles in a three-phase induction motor.
14. The student will be able to define percent slip and speed regulation.
15. The student will be able to explain how the direction of a three-phase motor is changed.
16. The student will be able to describe the component parts and operating characteristics of a three-phase wound-rotor induction motor.
17. The student will be able to describe the component parts and operating characteristics of a three-phase synchronous motor.
18. The student will be able to describe the design and operating characteristics of various DC motors.
19. The student will be able to describe the methods for determining various motor connections.
20. The student will be able to describe general motor protection requirements as delineated in the National Electrical Code® (NEC®).
21. The student will be able to define the braking requirements for AC and DC motors.
22. The student will be able to explain how the direction of rotation of a DC motor is changed.
23. The student will be able to describe the design and characteristics of a DC shunt, series, and compound motor.
24. The student will be able to describe dual-voltage motors and their applications.
25. The student will be able to describe the methods for determining various motor connections.
26. The student will be able to describe general motor protection requirements as delineated in the NEC®.

**Module 26203-08. The student will be able to identify and describe the types of electric lighting, mounting, ballasts, and timers.**

27. The student will be able to describe the characteristics of light.
28. The student will be able to recognize the different kinds of lamps and explain the advantages and disadvantages of each type:
   - Incandescent
   - Halogen
   - Fluorescent
   - High-intensity discharge (HID)
29. The student will be able to properly select and install various lamps in lighting fixtures.
30. The student will be able to recognize and describe the installation requirements for various types of lighting fixtures:
   - Surface-mounted
   - Recessed
   - Suspended
   - Track-mounted
31. The student will be able to recognize ballasts and describe their use in fluorescent and HID lighting fixtures.
32. The student will be able to explain the relationship of Kelvin temperature to the color of light produced by a lamp.
33. The student will be able to recognize basic occupancy sensors, photoelectric sensors, and timers used to control lighting circuits and describe how each device operates.

The student will identify and describe sound environmental practices for electricians, including waste disposal, life cycle analysis, green practices and low impact.

34. The student will be able to describe waste disposal methods for this industry according to EPA and industry guidelines.

35. The student will be able to describe the process of life cycle analysis in this industry based on industry guidelines.

36. The student will be able to identify recycled materials by label and industry practice.

37. The student will be able to define “low emission” and give two examples.

38. The student will be able to identify new “green” materials now being introduced or currently used in this industry.

39. The student will be able to describe new “green” practices and methods being instituted or currently employed within this industry.

40. The student will be able to identify and explain the term “low Impact” as it relates to the environment.

ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but not limited to, exams, written assignments, performance tests, and class participation.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center in Rm. 3354 or call (913) 288-7670.