DATE OF LAST REVIEW: 11/11/2014

CIP CODE: 46.0302

SEMESTER: Departmental Syllabus

COURSE TITLE: Commercial Wiring I

COURSE NUMBER: ELET0200

CREDIT HOURS: 4

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: Departmental Syllabus

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

PREREQUISITE (S): ELET0101 Electromechanical Systems

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

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.

METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. These may include but are not limited to lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations,
speeches, debates, and 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.
   J. 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 boxfill
    A. Identify different sizes of raceways.
    B. Calculate how many raceways.
    C. Determine boxfill 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

EXPECTED LEARNER OUTCOMES:

A. The student will be able to identify various types of feeder/branch circuit wiring methods.
B. The student will be able perform conduit bending.
C. The student will be able to identify and perform conductor installation.
D. The student will be able to calculate raceway and box fill per NEC.
E. The student will be able to identify components of distribution equipment.
F. The student will be able to identify the NEC requirements for grounding and bonding.
G. The student will be able to perform service calculations per NEC.
H. The student will be able to apply NFPA 70 E requirements.
CORE COMPETENCIES:

Upon successful completion of this course the:

*The student will be able to identify types of feeder/branch circuit wiring methods.*

1. The student will be able to determine how many branches are needed.
2. The student will be able to determine how many feeders are needed.
3. The student will be able to explain types of switches and receptacles needed.
4. The student will be able to explain emergency receptacles in key locations.
5. The student will be able to identify emergency lighting.
6. The student will be able to determine how many 3-way switches are needed.
7. The student will be able to explain install for appliances.
8. The student will be able to explain power for appliances.
9. The student will be able to explain power for central heating and cooling.

*The student will be able to perform conduit bending.*

10. The student will be able to explain how to measure for various types of conduit bends.
11. The student will be able to explain the how to bend an offset conduit bend.
12. The student will be able to bend a ninety degree bend with precision.
13. The student will be able to bend a back to back ninety degree bends.
14. The student will be able to bend three point saddles.
15. The student will be able to bend four point saddles for large obstructions.
16. The student will be able to explain where and why certain bends are needed.
17. The student will be able to explain why no conduit bends can exceed 360 degrees.

*The student will be able to identify and perform conductor installation.*

18. The student will be able to determine conductor wire size based on circuit amperage use.
19. The student will be able to determine what equipment needed to install conductors.
20. The student will be able to identify conductors based on their color scheme.
21. The student will be able to determine what type of conductor lubricates for installation.
22. The student will be able to determine the raceway for conductor installations.
23. The student will be able to determine what method of securing the conductors.
24. The student will be able to calculate raceway and box fill per NEC.
25. The student will be able to calculate percentage of boxfill.
26. The student will be able to calculate the size of raceway.
27. The student will be able to determine how many conductor in the raceway.
28. The student will be able to calculate size of raceway.
29. The student will be able to determine the type of raceway.
30. The student will be able to identify components of distribution equipment.
31. The student will be able to determine how many branch circuits are needed.
32. The student will be able to determine lay out equipment for raceway system.
33. The student will be able to identify over current devices.
29. The student will be able to identify single pole from three pole circuit breakers.
30. The student will be able to identify high voltage versus low voltage.
31. The student will be able to identify power panels.
32. The student will be able to identify delta transformers
33. The student will be able to identify wye transformers.
34. The student will be able to identify three phase distribution
35. The student will be able to identify motor control centers

The student will be able to identify the NEC requirements for grounding and bonding.

36. The student will be able to identify grounding electrodes.
37. The student will be able to identify a ground ring.
38. The student will be able to identify an isolated grounding.
39. The student will be able to identify bonding on separately derived systems.
40. The student will be able to identify lightning arrestors.
41. The student will be able to identify an effective grounding path.
42. The student will be able to identify bonding equipment.
43. The student will be able to identify bonding jumpers.
44. The student will be able to identify grounds on motors
45. The student will be able to identify supplemental grounds.

The student will be able to perform service calculations per NEC.

46. The student will be able to calculate how many ohms per 1000 feet.
47. The student will be able to determine the transformer size needed.
48. The student will be able to calculate the conductor size for motors.
49. The student will be able to determine a step-up or step-down transformer is needed.
50. The student will be able to calculate voltage drop on three phase systems.
51. The student will be able to calculate how many circuits will be needed.
52. The student will be able to calculate the power needs.

The student will be able to apply NFPA 70 E requirements.

53. The student will be able to explain the National Fire Protection Agency.
54. The student will be able to apply 70 E code requirements for employers.
55. The student will be able to explain the need for retraining employees.
56. The student will be able to explain the lockout and tag out procedure.
57. The student will be able to apply the code for protective clothing.
58. The student will be able to explain the four hazard groups.
59. The student will be able to explain why employees wear personal protection equipment.

ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, 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 anytime.

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 at: 288-7670.