

## **CUYAHOGA COMMUNITY COLLEGE OFFICIAL COURSE OUTLINE**

**SUBJECT AREA TITLE**

Applied Industrial Technology (Healthcare and Institutional Facilities Maintenance)

**COURSE TITLE**

Electrical Fundamentals

**SUBJECT AREA CODE:** ATHM**COURSE NUMBER:** 1120**COURSE CREDIT HOURS:** 2**I. DESCRIPTION OF COURSE:****CATALOG DESCRIPTION**

Study of three and four wire two-phase circuits, three-phase induction star and delta circuits, power balanced and unbalanced loads, transformer principles, characteristics and connection, electrical instruments, self synchronous systems, protective relays, lamps and illumination. Topics include using electrical drawings and symbols, determining total electrical load, branch circuit specifications and installation, calculating dimensions, bending, sizing and selection of materials, and installation techniques.

**LECTURE HOURS:** 2**LAB HOURS:** None**OTHER REQUIRED HOURS:** 00**PREREQUISITE(S):** ATHM 1020 or Departmental Approval**II. OUTCOMES/OBJECTIVES:**

- A. Follow OSHA and institutional guidelines for proper procedures in working with electricity and electrical systems while performing maintenance within the healthcare facility.
  1. Work safely and follow set safety procedures for electrical systems.
  2. Interpret various drawings and electrical symbols used in installations.
  3. Determine electrical loads for the purpose of material and equipment selection for a project.
  4. Apply proper procedures pertaining to branch circuit specifications and installation.
  5. Select and install a variety of luminaries found in a typical health care or commercial facility.
  6. Select and install switches and receptacles.
  7. Install and repair electrical circuits associated with appliances.
  8. Select and install overcurrent protection devices.
  9. Select and install special systems such as multioutlet assemblies, floor outlet systems, and branch circuits for computers.

10. Perform circuit calculations of current, voltage, and resistance in circuits.
  11. Identify proper terminal connections for single and three-phase transformers.
- B. Use established institutional safety practices and OSHA standards when working with AC/DC circuits.
1. Differentiate between direct current (DC) and alternating current (AC) circuits.
  2. Construct, install and maintain a simple AC circuit
  3. Identify OSHA standards/safe practices for working with AC circuits

### III. COURSE CONTENT

- A. Safety
1. General Safety Rules
  2. Effects of Electric Current on the body
  3. OSHA Standards
  4. Protective Clothing
  5. Grounding Devices
- B. Basic Electrical Theory
1. Terms
  2. AC (alternating current) and DC (direct current)
  3. Law of Changes
  4. Methods of producing electricity
  5. Ohm's Law
  6. Resistors
  7. Circuits
    - a. Series
    - b. Parallel
    - c. Combination
  8. Capacitors
  9. Transformers
  10. Motors
- C. Electrical Instruments
1. Meters
    - a. Analog
    - b. Voltmeter
    - c. Ammeter
    - d. Ohmmeter
    - e. Digital

- D. Wire Tables and Conductor Sizes
  - 1. National Electric Code (NEC)
  - 2. Factors that determine wire capacity
  - 3. Computing Conductor sizes and resistance
  - 4. Testing wire installations
  
- E. Magnetic Induction
  - 1. Fleming's Left-Hand Generator Rule
  - 2. Lenz's Law
  - 3. Exponential Curve
  - 4. Inductance
  - 5. R-L Time Constants
  - 6. Induced Voltage Spikes

**IV. METHODS OF STUDENT EVALUATION MAY INCLUDE ANY OF THE FOLLOWING:**

- A. Quizzes
- B. Exams
- C. Classroom participation
- D. Completion of assigned projects
- E. Completion of homework assignments

**V. RESOURCES MAY INCLUDE ANY OF THE FOLLOWING:**

- A. Electrical Protection Handbook. N.P.: Cooper/Bussman Fuse Co., 2004
- B. Mathematics, N.p.: Thomson-Delmar, 2005
- C. Square D. Transformer Handbook. N.p.: Square D. Corporation, 2005.