

**I. COURSE INFORMATION:**

- A. Division: Technical
- Department: Electricity/Electronics
- Course ID: ELEC 216B
- Course Title: Introduction to Industrial Electricity
- Units: 4
- Lecture: 3 hours
- Laboratory: 3 hours
- Prerequisite: None
- Corequisite: None
- Dept. Advisory: None

- B. Catalog and Schedule Description: The study of electrical power transmission, the National Electrical Code, electrical blueprints, and residential and commercial wiring.

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One**

**III. EXPECTED OUTCOMES:**

Upon successful completion of the course, the student should be able to:

- A. Identify the different types of AC generating systems.
- B. Analyze various problems with AC transmission.
- C. Explain and comprehend the use of the electrical codes.
- D. Apply the electrical code manual and the principles of the code to a specific job.
- E. Identify and analyze specific electrical circuits from electrical blueprints.
- F. Identify wiring tools, materials, and terms.
- G. Construct and draw electrical blueprints from electrical circuits.
- H. Construct both residential and commercial wiring circuits from blueprints.

**IV. COURSE CONTENT:**

- A. Alternating Current Power Systems
  - 1. Types of generation - voltage and frequency, hydroelectric, nuclear, solar
  - 2. Field excitation - voltage regulation
  - 3. On-site generating systems
  - 4. On-site prime movers
  - 5. Power line problems, momentary, short-term, extended
  - 6. Line drop problems
- B. Electric Conductors and the National Electric Code
  - 1. Copper conductors - annealed copper
  - 2. Standard gage sizes - circular and square mills
  - 3. Wire measurements - wire data, ampacity
  - 4. Voltage drop calculations
  - 5. Temperature correction factors
  - 6. Conduit fill - magnet wire
  - 7. National Electric Code
- C. Electric Circuits
  - 1. Series circuits - parallel circuits
  - 2. Series parallel circuits - short circuits
  - 3. Ground faults - open circuits
- D. Electrical Drawings
  - 1. Types of drawings - standard symbols
  - 2. Preparing electrical drawings
  - 3. Organization of drawing - lettering
  - 4. Templates - title block, legend
- E. Residential Wiring
  - 1. Local codes and utility regulations
  - 2. Wiring tools - trade terms

3. Identification of wiring material
  4. Planning a residential wiring system
  5. Floor plan - electrical symbols
  6. Planning for convenience and adequacy
  7. Branch circuits - receptacle requirements
  8. Grounding receptacles
  9. Planning for lighting, heavy appliances
  10. Wire sizes - calculating size of service
  11. Location of service equipment
  12. Installation of service entrances
  13. Service grounding - theory of grounding
  14. Outlet and junction boxes - switches
  15. Cable wiring methods - electrical connections
  16. Testing a wiring job
- F. Industrial Wiring
1. Raceways - rigid conduit
  2. Flexible metal conduit - raceway fittings
  3. Building wire - wire insulations
  4. Armored cable - nonmetallic cables
  5. Metal sheathed cable
  6. Special application conductors - busways
  7. Service entrance - service entrance feeders
  8. Motor wiring

**V. METHODS OF INSTRUCTION: (Please check all that apply and add any additional not listed.)**

- Lecture
- Class and/or small group discussion
- Critical evaluation of texts, newspapers, journal articles, and other printed research
- Critical evaluation of films, videotapes, audiotapes, or other media forms
- Classroom demonstrations
- Field trips
- Guest speakers
- Other: Residential wiring projects to include: Service entrance, receptacles, lighting, appliances, and more.
- Other:
- Other:

**VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:**

- A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: After reading the chapter on Residential Wiring, discuss in small groups the installation of service entrances.
- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Written homework assigned each week from the questions and problems in each chapter.
- Typical Question: Given the appropriate formula, calculate the voltage drop for a 1000 ft. run of #4 AWG copper wire drawing 125 amps at 240 volts.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: Drawings and diagrams to be completed to show their grasp of electrical symbols and blueprints.
- Typical Drawing: Draw a schematic utilizing two three-way switches providing power to two lamp bases. Then wire the circuit using the trainer provided.

**VII. EVALUATION:**

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

- Portfolios
- Projects
- Written papers or reports
- Presentations (oral and visual)
- Work performance (internships or field work)
- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other:
- Other:
- Other:

**VIII. TYPICAL TEXTS:**

- A. Hart, G. V. & Hart, S., Ugly's Electrical References, United Printing Arts, Houston, Texas, 2004
- B. Mullin, R. C., Electrical Wiring Residential, 14<sup>th</sup> Edition, Delmar, New York, 2004
- C. Smith, R., Electrical Wiring Industrial, Delmar, New York, 2004

**IX. OTHER SUPPLIES REQUIRED OF STUDENTS:**

Scientific calculator