

I. COURSE INFORMATION:

- A. Division: Technical
- Department: Electricity/Electronics
- Course ID: ELEC 217B
- Course Title: Industrial Electricity
- Units: 4
- Lecture: 3 hours
- Laboratory: 3 hours
- Prerequisite: ELECTR 115 and ELECTR 116
- Corequisite: None
- Dept. Advisory: None

- B. Catalog and Schedule Description: Study of DC motors, single and polyphase AC motors, and the necessary controls and measuring equipment, industrial circuit protection and switching equipment.

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. Explain the general principles of direct and alternating current electricity.
- B. Apply the general principles of electricity to the construction and operation of the more common types of power circuits, AC/DC motors and generators.
- C. Assemble and disassemble electric motors.
- D. Troubleshoot electric motor circuits.
- E. Practice safe electrical procedures for high voltage.

IV. COURSE CONTENT:

- A. Introduction
 - 1. Magnetism and electromagnetism
 - 2. Cells and batteries
 - 3. Direct current
 - 4. Alternating current
- B. Direct Current Motors
 - 1. The DC shunt motor
 - 2. The DC series motor
 - 3. The DC compound motor
- C. Direct Current Generators
 - 1. DC shunt generator
 - 2. DC compound generator
 - 3. DC series generator
- D. AC Motors
 - 1. Split phase induction motor
 - 2. Capacitor start motor
 - 3. Capacitor run motor
 - 4. Universal motor
- E. Three Phase Circuits
 - 1. Three phase transformer connections
 - 2. The wound rotor induction motor
 - 3. The squirrel cage induction motor
 - 4. The synchronous motor
- F. Alternators
- G. Maintenance of Rotating Equipment

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: Practical laboratory exercises to include different generators and motors.
- 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 the Three Phase Circuits, discuss in small groups the three phase transformer connections.
- 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: Explain the operation of the two main methods used in thermal overload devices.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: Calculate the speed of a four-pole squirrel-cage induction motor rated at 208V, 60Hz, 3 Φ has a 3 percent slip.

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. Alerich, W., Electricity 4, 7th Edition, Delmar, New York, 2001
- C. Kaiser, Joe, Electrical Power, Goodheart Wilcox, Tinley Park, Illinois, 2001

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Scientific calculator

**PREREQUISITE/COREQUISITE/ADVISORY
COURSE GRID FORM**

Target Course: ELEC 217B Industrial Electricity

Prerequisite Course: ELECTR 115 Alternating Current Circuit Analysis

Instructions:

- 1) List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to...")
- 2) Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
- 3) Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:

1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Entry Skills in Target Course	Exit Skills Provided by Prerequisite Course (Mark with an X if needed and indicate Prerequisite Course if more than one).	Degree of Importance (Rate 1 – 3)
-------------------------------	--	--------------------------------------

1. Define magnetism, electromagnetism, and electromagnetic induction.	X	1
2. Explain the generation of AC voltage from electro-mechanical generators.	X	1
3. Define reactance; inductive/capacitive, units of measurement, their source, and their relation to resonance.	X	1
4. Describe the interaction between volts, ohms, current, and frequency in AC series and parallel circuits.	X	1
5. Apply circuit analysis to series and parallel and complex circuits.	X	2
6. Use rectangular and polar number systems, in series and parallel variational analysis.	X	3
7. Distinguish between half-wave, full-wave, and bridge rectifier circuits.	X	3
8. Analyze the filtering process of an LC pi filter network.	X	3

**PREREQUISITE/COREQUISITE/ADVISORY
COURSE GRID FORM**

Target Course: ELEC 217B Industrial Electricity

Prerequisite Course: ELECTR 116 Alternating Current Circuit Laboratory

Instructions:

- 1) List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to...")
- 2) Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
- 3) Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:

1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Entry Skills in Target Course	Exit Skills Provided by Prerequisite Course (Mark with an X if needed and indicate Prerequisite Course if more than one).	Degree of Importance (Rate 1 – 3)
1. Explain the oscilloscopes operation and controls and be able to use it to measure voltage and time.	X	2
2. Use the function generators operation and controls.	X	3
3. Explain the layout of a QT board and be able to construct circuits on it.	X	3
4. Use a multi-meter to measure voltage, check for continuity, and verify polarity.	X	1
5. Describe electrical safety procedures.	X	1