

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY ELE 150 – A.C. AND D.C. CIRCUIT FUNDAMENTALS (3 CR.)

Course Description

Introduces transmission and distribution of electrical power. Includes application of transformers, distribution and over-current protection devices, substations, switchboards, feeders, bus-ways, motor control centers, generators, motors, and troubleshooting techniques associated with these systems and devices. Lecture 2 hours. Laboratory 2 hours. Total 4 hours per week.

General Course Purpose

This course is designed to teach students the basic theories of electricity as they relate to alternating and direct current (AC/DC) such as: electron theory, Ohm's Law, conductors, insulators, voltage, current, resistance, power, series and parallel circuits, magnetism, electromagnetic devices, batteries, capacitance, inductance, reactance, motors, generators, transformers, three-phase power, electrical nomenclature, graphic and electrical symbols. This course will teach students to apply theory to perform basic circuit analysis, the correct use of measuring instruments such as analog and digital multimeters, oscilloscope and wattmeter.

Course Prerequisites/Corequisites

None

Course Objectives

At the completion of the course, the student will be able to construct, verify and analyze basic AC/DC circuits and perform computations related to AC/DC electricity. Specifically, the student will be able to:

- a) Define and effectively use in computations the fundamentals of electricity and magnetism as applied to electrical machines and basic electrical circuits.
- b) Calculate the period and peak voltage of a sine wave from a scope trace or graph
- c) Use Ohm's law and Kirchhoff voltage law to solve circuits containing resistors, capacitors, and inductors
- d) Calculate the currents, voltages, and phase angles in circuits containing resistors, capacitors, and inductors.
- e) Calculate the resonant frequency and the impedance at any frequency of an RLC circuit.
- f) Identify and calculate the three types of powers within an alternating current system: resistive, reactive, and apparent.
- g) Demonstrate the safe and proper use of laboratory equipment including multimeter, wattmeter, oscilloscope, and power sources.
- h) Describe the effects of electric current on the body and discuss different types of protective clothing for electrical safety in a classroom and work environment

Major Topics to be Included

Basic structure of matter
Systems, quantities and units
Kirchhoff's and Ohm' Laws
Measuring instruments
Power and sources of electricity
Series, parallel and series-parallel circuits: AC and DC
Magnetism and electromagnetism
Inductors, capacitors and transformers as they apply to AC and DC
Power and sources of electricity
Safety requirements associated with AC and DC circuits