ECE405 Engineering Fundamentals

Credits: 3 Contact hours: 3 hrs

Instructor: Ratna Raj
Email: ratna.raj@njit.edu , **Phone: 973-569-8289** **Office:** ECE 347

4. Textbook:

Electrical Engineering,
PRINCIPLES and APPLICATIONS
Seventh Edition *by Allan R. Hambley*

- PUBLISHER:McGraw-Hill
- ISBN:978-0-13-311664-9

5. Course Description:

Provides non-electrical engineering students a basic understanding of the principles and analysis of electric circuits while exposing them to key electrical engineering applications.

Pre-Requisite:

Phy 121

Course Learning Outcomes: At the end of course a student should be able to

1	Apply Ohm's Law to solve circuit problems.
2	Apply Kirchhoff's Current Law and Voltage Law to solve circuit problems.
3	Understand circuit elements and i-v characteristics.
4	Determine electrical power sources and sinks in a circuit and calculate the magnitude of the power.
5	Analyze electrical DC circuits using various techniques: Equivalent resistance of ciruits,Node Analysis, Mesh Analysis, THevenin's and Norton's Equivalent circuit
6	Understand and use the idea of maximum power transfer.
7	Understand how to solve DC and AC circuits with inductors and capacitors.
8	Understand and use first-order differential equations for transient analysis of First Order Circuits
9	Analyze AC circuits using phasors

10	Calculate Complex power in AC circuits and apply power factor correction to AC circuits
11	Understand the use of transformers and solve circuits with transformer as an element in the circuit.
12	Understand the working principle of DC generators and motors and learn to draw the circuits for separately excited and shunt machines. Understand how the power flows and how losses occur at various stages.
13	Understand the working principle of Induction motors.
14	Understand the working principle of Synchronous Machines.

Relevant Student Outcomes:

At the End of the course the student is able to:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Tentative Course Schedule:

WEEK	Topics	Chap	Pages
1	Overview; Circuits Currents and Voltages; Power and Energy; Kirchhoff's Current and Voltage Laws; Introduction to Circuit Elements Introduction to Circuits	Ch1,	2-35
2	Resistances in Series and Parallel Voltage divider and Current Divider circuits Network Analysis using Node Voltage Method and Mesh Current Method,	Ch2	46-87
3	Principle of Superposition , Thevenin's Equivalent, Norton's Equivalent, Maximum Power Transfer, Wheatstone Bridge	Ch2	88-107
4	Energy Storage Circuit Elements: Capacitors and Inductors	Ch3	124-144 Sec 3.1-3.5
5	Transients	Ch4	162-174 Sec 4.1-4.4
6	MIDTERM I Complex Numbers		

7,8	Steady-State Sinusoidal Analysis	Ch 5	209-230
9	AC Power,	Ch5	231-243
10	Transformers	Ch 15	709-737
11	Midterm 2		
12	DC Machines	Ch16	754-793
13	AC Machines	Ch17	803-
14	Over-run, Review for Finals		

Honor Code: The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students.

Grading Policy :

- Midterm 1 - 20%
- Pre-Read Quizzes – 5%
- HomeWork -10%
- Quizzes - 15%
- MidTerm 2 - 20%
- Final Exam- 30%