ECE405 Electrical Engineering Principles

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

Textbook:

Electrical Engineering,
PRINCIPLES and APPLICATIONS
7thEdition *by Allan R. Hambley*

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

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Honor Code:

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

Communication and Information:

- All slides used in the class will be up on Canvas.
- The relevant problem numbers, to be done from the end of the chapter, will be put up on Canvas.
- Answer key to those problems will available on Canvas too.
- There will be a **Quiz** on each topic covered every week. So look out for quiz dates.

Grading :

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

  - Final Exam is cumulative.

- One lowest quiz grade will be dropped.

IMP: If you have any questions regarding grading of any quiz/ exam, you can reach out to me **within one week** after the grades have been declared. I will not entertain any such request or queries later.

Grading methods:

You will get no credit given if:

- Solution has just the answer and work is not shown
- Solution steps are not in order, and the answer does not match with the online answer .

Quizzes

- There will be a quiz at the end of each module
- Two lowest quiz grades will be dropped.
- There will be no make-up on quizzes unless authorized by the office of Dean of Students.

Midterms and Finals

- The exams will be closed book and closed notes.
- The exams will be taken on laptops with a lock-down browser .
- For midterms there will be partial credit for work shown on scratch paper.
- Finals will be multiple choice with no partial credit.
- The questions on the exams will be based on suggested practice problems (at the end of chapter) problems worked in the class, and quiz problems.
- Formula sheet will be provided to you. A copy of the formula sheet is available on Canvas for your reference.
- If anybody is caught with his own formula sheet, his/her exam will not be graded.
- There are no phones allowed in exam room. The phones are supposed to be switched off and put inside your backpack during the quizzes and exams. If anybody is found with possession of a phone, it will be considered Honor Code violation and will get an "F" in the course.

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,	Ch2	88-107

	Wheatstone Bridge		
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	Magnetic Circuits and 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		

Course Learning outcomes:

After successful completion of course a student should be able to:

1 Apply Ohm's Law to solve circuit problems.
2 Apply Kirchhoff's Current Law to solve circuit problems.
3 Apply Kirchhoff's Voltage Law to solve circuit problems.
4 Understand circuit elements and i-v characteristics.
5 Determine electrical power sources and sinks in a circuit and calculate the magnitude of the power.
6 Understand and use the Node Voltage method to solve circuits.
7 Understand and use the Mesh Current method to solve circuits.
8 Understand and use Norton and Thevenin equivalent circuits.
9 Understand and use Superposition to solve circuits.
10 Understand and use the idea of maximum power transfer.
11 Understand how to solve DC and AC circuits with inductors and capacitors.
12 Understand and use phasor and rectangular form for sinusoidal circuits.
13 Understand and use first-order differential equations for transient analysis of circuits containing a single capacitor or inductor.
14 Understand power in AC circuits and apply the concept of complex power.
15 Understand the use of transformers and solve circuits containing them.

16 Understand the basic principles of rotating electric machines.

Student Outcome:

Student Relevant

outcome	Course Outcome	
1	1to 16	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
7	1 to 16	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies