

2021-2022	Common Trunk	<i>Year1- Sem. 2</i>
ELEC 101	ELECTRICITY I	Mandatory
<i>ECTS: 3</i>	Instructors: Dr.Ali Harmouch, Dr. Majed Elsaid	<i>Language: English</i>
<i>Total hours: 39</i>	<i>Period: March-June</i>	

Description:

This course is the basic introductory course in electric circuits, given to all students majoring in electrical engineering. The aim of this course is to provide an understanding of the fundamentals and analysis of electric circuits. The course encompasses the fundamental concepts of electric circuits, such as Ohm's and Kirchhoff's laws. It develops into the circuit analysis techniques such as nodal and mesh analyses and the equivalent circuits. Energy storage elements and first order transient circuits are included in the course. The course also covers the analysis of sinusoidal circuits, including the power calculation

Course Objectives:

This course is needed to provide a fundamental understanding of electric circuit theory, which forms the basis for future skills acquired in measurements, instrumentation, and experimentation. This course is necessary for meeting the requirements of the Fundamentals of Engineering (FE) examination; and is a good model for study in other areas of engineering, especially energy systems.

Course Outcomes

At the end of the course students are capable of

- Use Kirchhoff's Laws, voltage divider rules, and current divider rules to solve for single unknown voltages and currents in resistive circuits
- Use the Node Voltage and Mesh Current methods to solve systems of equations for multiple unknown voltages and currents in resistive circuits
- Construct Thevenin and Norton equivalent circuits
- Calculate the gain of an operational amplifier and calculate its output voltage if given its input voltage
- Write the first order differential equation describing the transient of an RC or RL circuit, develop an expression for the equation's solution as a function of time, and evaluate this expression at specific times to determine voltage or current
- Write the second order differential equation describing the transient of an RLC circuit, and use this equation to determine the system's natural frequency and damping constant
- Solve for unknown currents and voltages in an AC circuit by replacing resistors, capacitors, and inductors with impedance elements
- Calculate complex power based on given RMS voltage, current, or impedance; separate complex power into real and reactive components; determine the value of a capacitor or inductor needed to maximize real power
- Calculate a transformer's output voltage based on its input voltage and turns ratio

References

- Nilsson, Riedel; Electric circuits, eighth edition, ISBN: 0 13 503165 6
- Fundamentals of Electric Circuits, Fourth Ed. by Alexander and Sadiku, McGraw-Hill, 2009
- Schaum's Outline of Basic Circuit Analysis, Second Ed. by O'Malley, Mc-Graw-Hill, 1992

Evaluation Method:

The final grade will be calculated according the following policy:

Midterm Exam: 40%

Final Exam : 60%