Jordan University of Science and Technology
Faculty of Engineering
Biomedical Engineering Department

BME 212 Electrical Circuit Ananlysis
Summer 2024

Course Catalog

Circuit Analysis (3 hours lecture)– 3 credits
Units and definitions; experimental laws and simple circuits; useful techniques of circuit analysis; inductance and capacitance; source-free RL and RC circuits; application of the unit step forcing function; RLC circuits; the sinusoidal forcing function; the phasor concept; the sinusoidal steady state response. Average power and RMS values.

Textbooks

W. H. Hayt, Jr., J. E. Kemmerly, and S.M. Durbin, Engineering Circuit Analysis, Eighth Edition, McGraw-Hill, 2012

References

Books

1) R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuits, Seventh Edition, Wiley, 2006.
2) C. K. Alexander and M. N. O. Sadiku, Fundamentals of Electric Circuits, Third Edition, McGraw-Hill, 2006.
3) R. E. Thomas and A. J. Rosa, The Analysis and Design of Linear Circuits, 5th Edition, Wiley, 2006.
4) J. David Irwin, Basic Engineering Circuit Analysis, Seventh Edition, Wiley, 2001.

Instructor

Instructor **Dr. Areen Al-Bashir,** E-mail**:** abashir@just.edu.jo

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Prerequisites

Prerequisites by topic Calculus, Ordinary Differential Equations, Electricity and Magnetism.
Prerequisites by course MATH 203, PHY 102.
Co-requisites by course --
Prerequisite for Electrical circuit lab, Medical Electronics.

Topics Covered

Week	Topics	Chepters in Text
	Introduction to Circuit Analysis and Design selfstudy	
1	Basic Components and Electric Circuits	Chapter 2
2	Voltage and Current Laws	Chapter 3
3-4	Basic Nodal and Mesh Analysis	Chapter 4
5-6	Circuit Analysis Techniques	Chapter 5
7	Capacitors and Inductors	Chapter 7
8-9	Basic RL and RC Circuits	Chapter 8
10-11	The RLC Circuit	Chapter 9
12-14	Sinusoidal Steady State Analysis	Chapter 10
15	AC Power Circuit Analysis	Chapter 11

Evaluation

Assessment Tool	Expected Due Date	Weight
First Exam	According to the University examination schedule	30 %
Second Exam	According to the University examination schedule	30 %
Final Exam	According to the University final examination schedule	40 %

Objectives and Outcomes[1]

Objectives	Outcomes
1. Ability to apply basic circuit laws and rules. [a, k]	1.1. The course homework and exams require direct application of mathematical, scientific, and engineering knowledge. 1.2. Apply techniques for the analysis and simulation of linear electric circuits, and measurements of their properties
2. Understand and apply circuit theorems. [a, k]	2.1. performe various linear circuit analysis methods in a formal manner and many supporting and follow-up calculations. 2.2. Ability to identify the system, formulate a circuit model, and solve the circuit model to determine circuit variables in circuits.
3. Ability to analyze first and second order transient circuits. [a, e, k]	3.1. Understand the difference between the resistive and energy-storage elements and controlled sources. 3.2. Ability to calculate system responses by solving differential equations by classical methods. 3.3. Abilty to solve for the transient response for RL, RC and RLC circuits.
4. Ability to analyze steady-state sinusoidal circuits [a, k]	4.1. Analyze the AC steady state behavior of a circuit by solving differential equations by classical methods. 4.2. Determine the frequency response of a circuit.
5. Ability to compute various types of power [a, k]	5.1. Determine the power supplied and distributed in three-phase systems, perform power factor correction.

Contribution of Course to Meeting the Professional Component

The course contributes to building the fundamental basic concepts, understanding, and analysis of electrical circuits.

Relationship to Program Outcomes (%)

A	B	C	D	E	F	G	H	I	J	K	L
40				20						40	

Relationship to Biomedical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO 4
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Prepared by: Dr. Areen Al.Bashir

[1] Lower-case letters in brackets refer to the Program outcomes