The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2020/2021

Course: **Electrical Circuits (II) – 0903212 (3 Cr. – Required Course)**

Instructor: Dr. Sereen Al-Dhaher
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Office Hours: Will be posted soon

Course website: http://elearning.ju.edu.jo/

Catalog description: Average power and rms values. Polyphase circuits. Three phase wye and delta connections. Complex frequency. The damped sinusoidal forcing function. Frequency response. Parallel and series resonance. Magnetically coupled circuits. General two-port networks. Impedance, admittance, hybrid and transmission parameters. Principles of basic filtering. Basic passive and active filters.

Prerequisites by course: **EE** **0903211** Electrical Circuits (I) (pre-requisite)

Prerequisites by topic: Students are assumed to have a background in the following topics:
- DC electric circuit analysis.
- AC electric circuit analysis.

Textbook: **Fundementals of Electric Circuits by Charles K. Alexander and Matthew Sadiku, McGraw-Hill Education, 6th edition, 2016.**

References:

1. Engineering Circuit Analysis by William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, McGraw-Hill Education, 8th edition, 2011.
2. Electrical Circuits by James W. Nilsson and Susan Riedel, Pearson, 11th edition, 2018.
3. Electric Circuits Fundamentals by Thomas L. Floyd, Pearson, 8th edition, 2009.
4. Principles of Electric Circuits: Conventional Current Version by Thomas L. Floyd, Pearson, 9th edition, 2009.
5. Schaum's Outline of Basic Circuit Analysis by John O'Malley, McGraw-Hill Education, 2nd edition, 2011.
6. Schaum's Outline of Electric Circuits by Mahmood Nahvi and Joseph Edminister, McGraw-Hill Education, 7th edition, 2011.
7. Introductory Circuit Analysis by Robert L. Boylestad, Pearson, 13th edition, 2015.

Schedule: 16 Weeks, 42 lectures (50 minutes each) plus exams.

Course goals: The overall objective is to provide the student with the knowledge and proficiency to analyze single-phase, three-phase, and mutually coupled circuits. In addition the student is introduced to the concepts of complex frequency, frequency response and two port networks.

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student will:	[SO]
1. Understand the relationship between instantaneous and average power. Identify and measure complex power and power factor.	[1]
2. Analyze wye and delta connected 3-phase circuits.	[1]
3. Understand mutual and self-inductance and analyze circuits containing linear and ideal transformers.	[1]
4. Understand complex frequency and circuit analysis in the s-domain in addition to identifying poles and zeros and creating plots in the s-domain as a function of damping coefficient and frequency or both.	[1]
5. Determine resonant frequency, quality factor and bandwidth of a network, in addition to drawing Bode plots and apply scaling techniques.	[1]
6. Characterize networks by admittance, impedance, hybrid and transmission parameters and to transform between, and analyze circuits using these parameters.	[1]
7. Design simple filter circuits.	[1, 2]

Course topics:	Hrs
1. AC Power Circuit Analysis: Instantaneous power, average power, effective values of current and voltage, apparent power and power factor, complex power.	8
2. Polyphase Circuits: Polyphase systems. The 3-phase wye connection. The 3-phase delta connection. Power measurement in 3-phase system.	6
3. Magnetically Coupled Circuits: Mutual inductance, energy considerations, the linear transformer, the ideal transformer.	8
4. Complex Frequency and Circuit analysis in the S-domain: Complex frequency, the damped sinusoidal forcing function, Z(s) and Y(s), circuit analysis in the s-domain, poles, zeros and transfer functions, the complex frequency plane, natural response and the s-plane.	8
5. Frequency Response: Parallel and series resonance, other resonant forms, scaling, bode diagrams, basic filters.	8
6. Two-Port Networks: Admittance, impedance, hybrid, and transmission parameters.	4

Ground rules: Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. Eating and drinking are not allowed during class, and cell phones must be set to silent mode. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Assessment & grading policy:

Assignments	0%	Quizzes	0%
First Exam	30%	Projects	0%
Midterm Exam	30%	Lab Reports	0%
Final Exam	40%	Presentation	0%
		Total	**100%**

Last Revised: March 2021