Template of Course Specification

Name and Scientific title of the subject instructor: Lec. Dr. Taif Aied Faisal Alawsi

Name of Course: Electrical Engineering Fundamentals

Course Specification

This is a must-take course core fundamental topic for all electrical engineering sub-majors. In this course, students are expected to understand the basic principles of electric circuits in both its form the direct current (DC) circuits and alternating current (AC) circuits. These are the main domains of electrical circuit operations. The course goes from understanding each individual circuit component (Resistors, capacitors, inductors) to the main theories and laws that governs the behavior of circuits including Ohm's law, Kirchhoff Voltage and Current Laws. Then introducing the series, parallel, and combination configuration of circuits. Current, voltage, and power calculations are to be performed easily. Then definition of delta and star connections and conversions. Introducing current sources as an alternative to voltage source and perform source conversion. Solve linear equations that raises from mesh and nodal analysis of circuits. Introducing dependent sources in all their formats and make the necessary conversion and calculations. Understanding the modern circuit theories including superposition, Thevenin, Norton, and Maximum power theories. Understanding the series, parallel, and combination configuration of both capacitive and inductive circuits. Introducing RC, RL, CL, and RCL circuits. Perform phasor and vector calculations. Introducing resonant circuits and defining the resonant frequency of circuits.

1.	**Teaching Institution**	**Al-Ayen University / Technical Engineering College**
2.	**University Department / Center**	**Department of Computer Technical Engineering**
3.	**Course Title / Code**	**Electrical Engineering Fundamentals**
4.	**Program(s) to which it contributes**	**MTE & CTE B.Sc. Program**
5.	**Modes of Attendance offered**	**In Class and Online Class (Google Classroom)**
6.	**Semester/Year**	**--- / 2022**
7.	**Number of hours tuition (total)**	**(60H) Theoretical & (120H) Practical Total (180H)**
8.	**Date of production/revision of this Specification**	**2021-Jan-05**
9.	**Aims of the Course**	
1-	**Understanding the Basic principles of circuit element**	
2-	**Perform calculations of multiple circuits configurations**	
3-	**Establish a wider knowledge of modern circuit theories**	
4-	**Analyze DC & AC circuits with linear algebra**	
5-	**Examine circuits, understand circuit functions, base a strong and reliable background for students to maximize their potential in critical thinking and essential elemental circuit design for general and specific functions.**	
10.	**Learning Outcomes, Teaching, Learning and Assessment Methods**	
A.	**Knowledge and understanding** **Component Realization, connection and measurements** **Circuit theories and circuit connections** **Series, parallel and combination configuration calculation for DC and AC circuits** **Dependent sources and source conversions** **Modern circuit theories and design criteria**	
B.	**Subject-specific skills** **Design and Analyze DC & AC circuits with full spectrum of design specifications**	
C.	**Assessment methods** **Quiz, Midterm, Final Exam, Reports, In-Class Activities, Home works**	
D.	**Thinking Skills** **Critical thinking, visual intuition, design focus**	
E.	**Teaching and learning methods** **Lectures on power point presentation + on white board with extensive analytical methods, Online classes and software-based learning, prepared lecture notes, summaries, active class and student engagement**	
F.	**General and Transferable Skills (other skills relevant to employability and personal development)** **Online search for problem & solution** **Report writing** **Out-Class activities (Fritzing Software)**	

11.	Course Structure				
Week	**Hours**	**ILOs**	**Unit/Module or Topic Title**	**Teaching Methods**	**Assessment Methods**
1.	2	The Student Understand the lecture	Symbols and abbreviations, units, classification of power sources and general overview	Theoretical lecture both in-class and online	Quiz and student engagement
2.	2	The Student Understand the lecture	Ohm's law and Kirchhoff voltage and current laws	Theoretical lecture both in-class and online	Quiz and student engagement
3.	2	The Student Understand the lecture	Circuit connections series, parallel, and combination	Theoretical lecture both in-class and online	Quiz and student engagement
4.	2	The Student Understand the lecture	CDR and VDR, Source conversion	Theoretical lecture both in-class and online	Quiz and student engagement
5.	2	The Student Understand the lecture	Capacitive and Inductive circuits (Series, parallel, and combination)	Theoretical lecture both in-class and online	Quiz and student engagement
6.	2	The Student Understand the lecture	RLC circuits I	Theoretical lecture both in-class and online	Quiz and student engagement
7.	2	The Student Understand the lecture	RLC circuits II	Theoretical lecture both in-class and online	Quiz and student engagement
8.	2	The students unleash their acquired skills	Examination	Midterm Exam	Midterm Exam
9.	2	The Student Understand the lecture	Superposition theory	Theoretical lecture both in-class and online	Quiz and student engagement

10.	2	The Student Understand the lecture	Thevenin and Norton theory I	Theoretical lecture both in-class and online	Quiz and student engagement
11.	2	The Student Understand the lecture	Thevenin and Norton theory II	Theoretical lecture both in-class and online	Quiz and student engagement
12.	2	The Student Understand the lecture	Dependent sources	Theoretical lecture both in-class and online	Quiz and student engagement
13.	2	Full Review of course materials	Full Course review	Review	Student engagement
14.	2	The students unleash their acquired skills	Examination	Midterm Exam	Midterm Exam
15.	2	The Student Understand the lecture	Vector & Phasor notation	Theoretical lecture both in-class and online	Quiz and student engagement
16.	2	The Student Understand the lecture	Kirchhoff's laws in frequency domain	Theoretical lecture both in-class and online	Quiz and student engagement
17.	2	The Student Understand the lecture	Impedance	Theoretical lecture both in-class and online	Quiz and student engagement
18.	2	The Student Understand the lecture	Phase shifter	Theoretical lecture both in-class and online	Quiz and student engagement
19.	2	The Student Understand the lecture	AC Bridges	Theoretical lecture both in-class and online	Quiz and student engagement

20.	2	The Student Understand the lecture	AC Power Analysis	Theoretical lecture both in-class and online	Quiz and student engagement
21.	2	The Student Understand the lecture	RMS Value	Theoretical lecture both in-class and online	Quiz and student engagement
22.	2	The Student Understand the lecture	Apparent Power and Power Factor	Theoretical lecture both in-class and online	Quiz and student engagement
23.	2	The students unleash their acquired skills	Examination	Midterm Exam	Midterm Exam
24.	2	The Student Understand the lecture	Complex Power	Theoretical lecture both in-class and online	Quiz and student engagement
25.	2	The Student Understand the lecture	Conservation of AC Power	Theoretical lecture both in-class and online	Quiz and student engagement
26.	2	The Student Understand the lecture	Power Correction Factor	Theoretical lecture both in-class and online	Quiz and student engagement
27.	2	The Student Understand the lecture	Single & Three-Phase Circuits	Theoretical lecture both in-class and online	Quiz and student engagement
28.	2	The Student Understand the lecture	Balanced Wye-Wye Connection	Theoretical lecture both in-class and online	Quiz and student engagement
29.	2	The Student Understand the lecture	Balanced Wye-Delta Connection & Balanced Delta-Delta Connection	Theoretical lecture both in-	Quiz and student engagement

				class and online	
30.	3	The Student Unleash their potential in Final examination	Final Examination	Exam	Exam

12.	**Infrastructure**
Required reading: **·CORE TEXTS** **·COURSE MATERIALS** **· OTHER**	1. Robert L. Bolyestad, "Introductory Circuit Analysis," 11th edition, Pearson Prentice Hall, 2007. 2. William H. Hayt, et al. "Engineering Circuit Analysis," 8th edition, McGraw Hill, 2012. 3. Robbins & Miller, "Circuit Analysis: Theory and Practice," 2nd edition, Delmar Publications, 2000. 4. Charles K. Alexander, Matthew Sadiku, "ISE Fundamentals of Electric Circuits," 7th edition, McGraw Hill, 2020.
Special requirements (include for example workshops, periodicals, IT software, websites)	Circuit Insights (Fritzing Software) Reading of Evil Genius Series Reading of Make Magazine Reading of IEEE Spectrum Magazine Reading of Servo Magazine Watching Youtube series entitled "Circuits and Systems (By Prof. Ali Hajimiri, Caltech)" Watching Youtube series entitled "Crash Course Physics " offered by the PBS digital studios
Community-based facilities (include for example, guest Lectures, internship, field studies)	Basic training might be required

13.	**Admissions**
Pre-requisites	---
Minimum number of students	100
Maximum number of students	110