COURSE DESCRIPTIONS

Faculty	**College of Engineering**				
Department	**Department of Renewable Engineering**			**NQF level**	7
Course Title	Electric Circuits 1 Laboratory	**Code**	701222	**Prerequisite**	701221
Credit Hours	1	**Theory**	30 min	**Practical**	150 min
Course Leader	Dr. Amer Al-Canaan	**email**	a.alcanaan@jadara.edu.jo		
Lecturers	Dr. Amer Al-Canaan	**emails**	a.**alcanaan**@jadara.edu.jo		
Lecture time	13:00- 16:00 Tuesday	**Classroom**	C 108	**Attendance**	Fulltime
Semester	Second 2023/2024	**Production**	2021	**Updated**	2024
Type of Teaching	■ Face to Face	☐ Blended	☐ Online		

Short Description

This practical course introduces the student to the basic principles of connecting and testing DC resistive, inductive and capacitive circuits. Students learn proper measurements of current, voltage, resistance using test equipment including power supplies, multi-meters and function generators, oscilloscope.

The student will also learn how to practically apply/verify their theoretical knowledge in circuit analysis using Ohm's law, voltage and current divider rules, superposition, Kirchhoff laws, Norton and Thévenin equivalent circuits, node-voltage and mesh-current methods.

Course Objectives

1. Using various test equipment including oscilloscope, digital multi-meter and function generator.
2. Applying Kirchhoff voltage and current laws in measuring a DC closed circuits.
3. Connecting DC electric circuits on breadboard and conduct different measurements of voltage and current.
4. Applying Ohm's Law, super position theorem, node-voltage and mesh current methods for linear resistors to analyse linear electric circuits.
5. Determining the equivalent resistance and perform Thevenin and Norton source transformations.

Course Intended Learning Outcomes (CILOs)

A. Knowledge - Theoretical Understanding

a.1 Explain/understand basic electrical concepts, including electric charge, current, electrical potential, electrical power, Norton and Thevinin equivalent circuits, power and energy; Identify electric network topologies; nodes, branches, and loops to solve circuit problems. (K1)

B. Knowledge - Practical Application

a3.
C. Skills - Generic Problem Solving and Analytical Skills
b.1 Compute voltage, current, power and **analyse** electric circuits using Kirchhoff's current, node-voltage and mesh current methods. (S1)
D. Skills - Communication, ICT, and Numeracy
b2. **b.2 Conduct** experiments and **measure** resistance, equivalent resistance, voltage and current. (S2)
E. Competence: Autonomy, Responsibility, and Context
c1.
Teaching and Learning Methods
☐ Face to Face Lectures ☐ Brain Storming ☐ Synchronous remote ☐ Asynchronous remote ■ Using Video ■ Discussions ☐ Research Project ☐ Case Study ☐ Field visit ■ Problem solving
Assessment Methods
☐ Formative Assessment ■ Quiz ■ Lab Exam ■ Homework ☐ Project Assessment ☐ Oral Presentation ■ Midterm ■ Final Exam

Course Contents					
Week	**Hours**	**CILOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1	3	a1, b1, b2	Introduction to measurements and significant numbers	Lab. session	
2	3	a1, b1, b2	Fundamental of electric circuits, DC power supply, DC meters, switches	Lab. session	
3	3	a1, b1, b2	Introduction to circuit simulation	Lab. session	
4	3	a1, b1, b2	Measurement of voltage and current (verification of Ohm's law) in an electrical circuit	Lab. session	Quiz-1
5	3	a1, b1, b2	Verification of Kirchhoff's Laws	Lab. session	
6	3	a1, b1, b2	Determination of voltage division and current division in series and parallel circuits	Lab. session	
7	3	a1, b1, b2	Verification of the Node-Voltage Method and the Mesh-Current Analysis	Lab. session	Quiz-2
8	3	a1, b1, b2	The Wheatstone Bridge	Lab. session	

9	3	a1, b1, b2	**Midterm**	Lab. session	Midterm exam
10	3	a1, b1, b2	Verification of Thévenin's Theorem and Norton's Theorem.	Lab. session	
11	3	a1, b1, b2	Measuring the time constant of an RC and RL Circuits	Lab. session	Quiz-3
12	3	a1, b1, b2	Verification of the superposition method and the maximum power transfer condition	Lab. session	
13	3	a1, b1, b2	The Natural and Step Response of an RC Circuit	Lab. session	
14	3	a1, b1, b2	The Natural and Step Response of an RL Circuit	Lab. session	Quiz-4
15	3	a1, b1, b2	The Natural and Step Response of an RLC Circuit	Lab. session	
16	3	a1, b1, b2	**Final exam**	Lab. session	**Final exam**

Infrastructure	
Textbook	Electronics Fundamentals Circuits, Devices and Applications Thomas L. Floyd David L. Buchla Eighth Edition, 2014
References	Engineering Circuit Analysis, W.H.Hayat, Kemerly and Durbin, 6th Edition.
Required reading	Experiment procedures, simulator manuals
Electronic materials	**Tables, manuals**
Other	Laboratory notes and manual

Course Assessment Plan						
Assessment Method		**Grade**	**CLOs**			
			a.1	**b.2**	**b.1**	**b.3**
First (Midterm)		**30%**	10	14	6	
Second (if applicable)						
Final Exam		**50%**	24	14	12	
Coursework		**20%**				
Coursework assessment methods	Assignments					
	Case study					
	Discussion and interaction					
	Group work activities					
	Lab tests and assignments/attends	14.5%	2.9	8.05	3.55	
	Presentations					
	Quizzes	5.5%			5.5	
Total		**100%**	**36.9**	**36.05**	**27.05**	

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code). Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.