The University of Jordan
School of Engineering
Electrical Engineering Department
1st Semester – A.Y. 2019/2020

Course: **Electrical Engineering Lab – 0903204 (1 Cr. – Core Course)**

Instructor: Prof. Mohammed Hawa + Eng. Reem AlDebs
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Office Hours: will be posted soon

Course website: https://www.hawa.work/204

Catalog description: Electric measuring equipment. DC circuits. Basic Laws and network theorems. Impedance concept and phase shift in RL and RC circuits. Three-phase wye and delta connected loads. Measurement of power and power factor. Transistor amplifiers. Operational amplifiers (Op-Amps).

Prerequisites by course: **EE 0903203 – Electrical Engineering** (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: **Lab Manual which can be obtained from the course Website.**

References:
- Principles and Applications of Electrical Engineering by Giorgio Rizzoni and James A. Kearns, McGraw-Hill Education, 6th edition, 2015.
- Fundementals of Electric Circuits by Charles K. Alexander and Matthew Sadiku, McGraw-Hill Education, 6th edition, 2016.
- Black & Decker The Complete Guide to Wiring by Editors of Cool Springs Press, 7th edition, Cool Springs Press, 2017.
- Electrical Wiring Residential by Ray C. Mullin and Phil Simmons, 19th edition, Cengage Learning, 2017.
- Basic Electrical Troubleshooting for Everyone by Darrel P. Kaiser, Darrel Kaiser Books, 1st edition, 2012.
- Everything Electrical How To Test Circuits Like A Pro Part 1 by Vincent Keler, Independently published, 1st edition, 2018.
- Beginner's Guide to Reading Schematics by Stan Gibilisco, 4th edition, McGraw-Hill Education, 2018.

Schedule: 16 Weeks, 10 Lab sessions (3 Hours each) plus exams.

Course goals: The overall objective is to allow the student to perform a set of experiments to validate different circuit theorems, to examine the practical details and characteristics of various electronic components, and to utilize some basic measurement instruments such as multimeters and the oscilloscope.

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

Upon successful completion of this course, a student will: **[SO]**

1. Be able to conduct appropriate experimentation to measure fundamental electrical parameters (including voltage, current, power, frequency, etc) in electrical and electronic circuits, and validate the fundamental theories related to such circuits. [6]
2. Be able to analyze and interpret measured data, and use engineering judgment to draw conclusions. [6]
3. Know the basics of electrical laboratory instruments (including multimeters, power supplies, function generators and oscilloscopes) and be able to properly use such instruments. [6]
4. Understand the requirements and pre-requisites for technical reporting, and be able to properly report experimental results. [3]
5. Be able to effectively function in a team in a collaborative and inclusive manner, to reach the lab goals and objectives. [5]

Course topics:

		Hrs
1.	Measurement Devices: Familiarization with the main devices and equipment used in the Lab, including: multimeters, oscilloscopes, power supplies, function generators and breadboards. A simple circuit is connected, and basic measurements are made.	**3**
2.	Resistors and DC Circuits: Identification of resistor values by color coding. Testing different DC circuit analysis techniques, including parallel/series combinations, voltage/current division (using resistive networks), Ohm's and Kirchhoff's laws, and nodal/mesh analysis..	**3**
3.	Network Theorems: Verify superposition theorem. Examine both the Thevenin and Norton theorems. Investigate the conditions for maximum power transfer in DC circuits. Learnt about adjustable resistances, namely the potentiometer and rheostat.	**3**
4.	AC Signals: Learnt how to read the values of capacitors and inductors from their number or color codes. Generate different sinusoidal waveforms using a function generator. Compute and measure Vp-p, Vp, Vavg, and Vrms. Measure the period and frequency of periodic AC signals. Use an oscilloscope to measure phase difference.	**3**
5.	Capacitive Reactance: Relationship of capacitive reactance to AC source frequency. Calculating AC power and power factor.	**3**
6.	Inductive Reactance: Relationship of inductive reactance to AC source frequency.	**3**
7.	Resonance: Voltage and current relationships in series and parallel resonant RLC circuits. Understanding resonant frequency and quality factor of the circuit.	**3**
8.	Diode Applications: Basic properties of diodes including the i-v curve. Common applications of diodes. Diode Rectification: comparison of half-wave and full-wave rectification. AC-to-DC converters (envelope detectors).	**3**
9.	Transistor Applications: Identify the different types of transistors such as: Bipolar junction transistor (BJT), junction field-effect transistor (JFET), metal-oxide-semiconductor field-effect transistor (MOSFET), etc. Testing transistors using a digital multimeter. Basic principles and using the transistor as an amplifier. Basic principles and using the transistor as a switche.	**3**
10.	Home Wiring Basics: Residential wiring, lighting, electrical installation and safety.	**3**

Ground rules:

Attendance is required and highly encouraged. To that end, attendance will be taken every lab session. Eating and drinking are **not** allowed during the lab, 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.

Assessments:

Exams, Quizzes, Projects, and Assignments.

Assessment & grading policy:

Assignments	**0 %**	Quizzes	**10 %**
First Exam	**0 %**	Projects	**0 %**
Midterm Exam	**30 %**	Lab Reports	**20 %**
Final Exam	**40 %**	Presentation	**0 %**
		Total	**100 %**

Last Updated:

September 2019