American University of Beirut

Department of Electrical and Computer Engineering

EECE 210 – Electric Circuits

Section 1, 3

MWF 8:00 – 8:50 in Irani 217

MWF 9:00 – 9:50 in Irani 217

Spring 2016

**Course instructor**

Dr. Lama Hamandi

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extension: 3617,

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Office hours: M 12:30 – 2:00, Th 10:00 – 11:30 **(by appointment)**

**Course description**

A course on fundamentals of electric circuits; basic elements and laws; techniques of circuit analysis: node voltage, mesh current, Thevenin, Norton, and source transformation; inductors, capacitors, mutual inductance, and transformers; transient response of RC, RL, and RLC circuits; steady state AC circuits; power calculations.

**Prerequisites by topic**

High-school calculus including simple differential equations, algebra including complex numbers, and physics (a link on complex numbers manipulation is provided on moodle).

**Course objectives**

The objectives of this course are:

* To introduce students to the general fields of electric circuits.
* To highlight the relevance of the study of electric circuits to engineering.
* To impart a sound understanding of basic concepts of electric circuits.
* To instruct students in techniques for analyzing electric circuits.
* To foster problem solving skills.
* To promote interaction and communication skills.

**Course textbook**

Nilsson J.W. and Riedel S.A.: Electric Circuits. 10th Edition (Global Edition). Pearson Prentice Hall, 2015, ISBN 10: 1-292-06054-9.

**Course website**

EECE210 – Electric Circuits, under http://moodle.aub.edu.lb

**Course outline (tentative)**

**(8 lectures)**

* Circuit variables: nature and limitations of circuit analysis, voltage, current, and power.
* Ideal circuit elements: voltage and current sources, independent and dependent sources, and resistance.
* Basic laws: Ohm’s law and Kirchhoff’s laws.
* Simple resistive circuits: series and parallel connections, current-divider and voltage-divider circuits, measurement, the Wheatstone bridge, and delta-to-wye equivalent circuits.

**(8 lectures)**

* Techniques of circuit analysis: Node-voltage and mesh-current methods, source transformations, Thevenin and Norton equivalents, superposition, and maximum power transfer.

**(4 lectures)**

* The operational amplifier: terminal voltages and currents, the inverting and non-inverting amplifier circuits, the summing-amplifier circuit, and the difference-amplifier circuit.

**(4 lectures)**

* Inductance, capacitance and mutual inductance: basic properties of inductors and capacitors, series and parallel combinations, mutual coupling, concept of mutual inductance, and the dot marking convention.

**(8 lectures)**

* Response of first-order *RL* and *RC* circuits: natural and step response of *RL* and *RC* circuits, sequential switching.
* Natural and step responses of *RLC* circuits: over damped, under damped, and critically damped response.

**(6 lectures)**

* Sinusoidal steady-state analysis: phasor representation, passive circuit elements in the frequency domain, circuit simplifications, techniques of circuit analysis, and ideal transformers.

**Course learning outcomes**

At the end of the course, students:

* Become familiar with the scope and general nature of the fields of electric circuits.
* Become aware of the relevance of the study of electric circuits to engineering.
* Acquire a sound understanding of basic concepts of electric circuits.
* Learn techniques for analyzing electric circuits.
* Acquire problem-solving skills.
* Acquire interaction and communication skills.

**Course assessment**

Final exam 40%

Two Quizzes 48% (Quiz 1: 24%, Quiz 2: 24%)

Short Tests 10%

Class attendance 2%

**Course policy**

The quizzes and final exams are closed-book, objective exams, and common to all sections.

Quiz 1 is scheduled on Friday **March 4**, 2016 at 6:00 pm.

Quiz 2 is scheduled on Friday **April 8**, 2016 at 6:00 pm.

**There is no makeup for quizzes or tests**. The lowest short test grade will be dropped.

The final exam is comprehensive. It will be scheduled by the Office of the Registrar.

**General Rules and Regulations**

* All graded work should be based on individual effort *without* external help. Any suspected misconduct will be handled according to the American University of Beirut rules and regulations. Consult the AUB’s website for details of these policies.
* You are required to be in class **on time**.
* You are not allowed to attend a different section.
* You are required to check the class website on Moodle and your email for information and updates.
* Suggested problems, some solutions and previous quizzes are posted on moodle.
* As per AUB policy, students who miss more than one fifth of the lectures in the first ten weeks of the semester will be dropped from the course: 1/5\*(10\*3) = 6.
* Cell phones, tablets, Laptops, … are not allowed in class.
* You can ask me as many questions as you want in class or during office hours to understand the material.