Eastern Mediterranean University

Faculty of Engineering
Department of Electrical and Electronic Engineering

EENG223 - Circuit Theory I

Year and Semester : **2, Fall**
Credit Hour : **(4,1) 4**
Pre/Co-requisite(s) : Math 151 Calculus I
Academic Term : **Spring 2018-19**

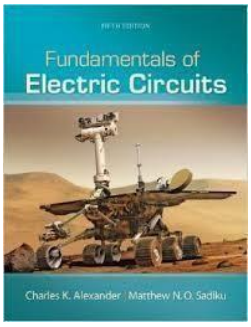
Catalog Description:
Definitions and units. Experimental laws and simple circuits. Techniques of circuit analysis. Inductance and capacitance. Source-free RL and RC circuits. Applications. The Unit-step forcing function. RLC circuits

Prerequisite by Topic:
As with most introductory circuit courses, the main prerequisites are physics and calculus.

Instructor:
Prof. Dr. Mustafa Kemal Uyguroğlu e-mail: mustafa.uyguroglu@emu.edu.tr

Lab Assistant:

Textbook:
C. K. Alexander, M. N. O. Sadiku, *Fundamentals of Electric Circuits (Fifth Edition)*, McGraw Hill, 2013.



References:
1. Electric Circuits, J. W. Nilsson, Addison-Wesley 1996 (fifth edition)
2. Basic Engineering Circuit Analysis, J. D. Irwin, Prentice Hall 1999 (sixth edition)
3. Introduction to Electric Circuits, R. C. Dorf, Wiley 1993 (second edition)
4. Electric Circuit Analysis, Johnson, Johnson, and Hilburn, Prentice-Hall 1992 (second edition)
5. Engineering Circuit Analysis, Hayt, Kemmerly, McGraw Hill, 1993 (fifth edition)

6. D. E. Johnson, J. R. Johnson, J. L. Hilburn, and P. D. Scott, *Electric Circuit Analysis*, Third Edition, Prentice-Hall International, Inc, 1997.

Course Objectives :

At the end of this course, students will be able to:

1. *Identify* linear systems and represent those systems in schematic form
2. *Apply* Kirchhoff's current and voltage laws and Ohm's law to circuit problems
3. *Simplify* circuits using series and parallel equivalents and using Thevenin and Norton equivalents
4. *Perform* node and loop analyses and set these up in standard matrix format
5. *Identify and model* first and second order electric systems involving capacitors and inductors
6. *Predict* the transient behavior of first and second order circuits

COURSE OUTLINE and Organization

WK #	HRS	DESCRIPTION
1-2	6	**1. Introduction** Definition of Units, Charge and Current, Voltage, Energy and Power, Passive and Active Elements.
2-4	8	**2. Resistive Circuits** Ohms Law, Nodes, Branches and Loops, Kirchhoffs Laws, Series Equivalents and Voltage Division, Parallel Equivalents and Current Division, Wye-Delta Transformation.
4-6	10	**3. Analysis Method** Nodal Analysis, Circuit Containing Voltage Sources, Mesh Analysis, Circuit Containing Current Sources. Nodal versus Mesh Analysis
6-7	6	**4. Network Theorems** Linearity and Proportionality, Superposition, Thevenin Theorem, Norton Theorem, Maximum Power Theorem
8-9		**Midterm Examinations**
10	4	**5. OP AMPS** Operational Amplifiers, Role of Negative Feedback, Operational Amplifier Building Block Circuits, Interconnecting Op Amp Building Blocks. Virtual Short Principle for Op Amps
12	4	**6. Energy Storage Elements** Capacitors, Energy Storage in Capacitors, Series and Parallel Capacitors, Inductors, Energ Storage in Inductors, Series and Parallel Inductors, DC Steady State, Practical Capacitor an Inductors.
12 - 13	5	**7. First- Order Circuits** Simple RC and RL Circuits without Sources, Time Constants, General First-Order Circuits witho Sources, Circuits with DC Sources, Superposition in First-Order Circuits, Unit Step Function, Step an Pulse Responses.
13-14	4	**8. Second-Order Circuits** Circuits with Two Storage Elements, Second Order Equations, Natural Response, Forced Response, Total Response, Unit Step Response.
15-17		**FINAL EXAMS**

Design Component

Engineering Science Credit:3

Engineering Design Credit: 1

Computer Usage:

Students are encouraged to use the Internet to search for various topics, including contents of similar courses offered elsewhere. P-spice software is used for circuit analysis. Students can reach the teaching material, solved problems, data sheets etc. on the allocated Web sites.

Laboratory Work: Laboratory sessions are organized in parallel to theoretical study given in classrooms. Students perform at least 10 different experiments and submit reports for evaluation.

GRADING POLICY

Homework and Quiz 15%, Midterm 30%, Lab. 15%, Final Examination 40%

VERY IMPORTANT: You cannot pass the course if you do not pass the laboratory!

NG Policy:

Attendance to the classes is compulsory. All students who receive a failing final grade and attend the classes less than 60% will receive the grade **NG**.

Make-Up Examination Policy:

Students missing an examination should provide a valid excuse within three days following the examination they missed. No separate make-up exams are administered for midterm and final exams. Only one make-up examination is given at the end of the final examination period. The date of the examination is announced by the department chair's office.

Students who fail to attend less than 60% of classes will not be given Make-up examination.