EE 316  

Circuits Laboratory

Catalog Data  Circuits Laboratory  (0-3-1) - 1 credits  
Resistors and resistive circuits; potentiometers; superposition principle; Thevenin’s theorem and maximum power transfer; RLC current and voltage characteristics; frequency response of RL, RC and RLC circuits; series and parallel resonant circuits; transient response.

Pre-requisites: EE 214

Homepage  
The course homepage is http://www.just.edu.jo/~nihad . This homepage will contain all information about the course such as syllabus, pre-lab, exams, etc.

Textbook  

Reference  

Grading  
Pre-Labs: 5 points  
Reports (to be filled in the lab): 10 points  
Quizzes: 10 points  
Performance: 10 points  
Midterm Exam: 25 points  
Final Exam: 40 points

Coordinator  
Dr. N. Dib

Course Objectives  
1. Ability to use test and measurement equipment like multimeter, power supply, function generator and oscilloscope.  
2. Ability to measure voltages and currents in DC circuits  
3. Ability to analyze and verify DC circuit theorems experimentally  
4. Ability to measure AC voltage magnitude and phase  
5. Ability to use PSPICE to simulate DC and AC circuits, as well as transients.

Pre-Requisites by Topic  
1. Calculus  
2. Ordinary Differential Equations  
3. Electricity and Magnetism

Topics  
1. Introduction to laboratory test and measurement equipment: DC power supply, Function Generator, Digital Multimeter.  
2. Introduction to laboratory test and measurement equipment: Oscilloscope  
3. Resistors, Potentiometers and Rheostats  
4. DC circuit measurements: Kirchhoff’s current and voltage laws, series, parallel and series-parallel circuits  
5. DC circuit measurements: Current-limited DC power supply characteristics, circuit loading by measurement equipment  
6. DC circuit analysis: Mesh and nodal analysis, superposition, Thevenin’s and maximum power-transfer theorems, source transformations  
7. Inductance and capacitance I-V relations, RL and RC circuit transients  
8. RLC circuit transients: the under-damped, critically-damped, and over-damped cases  
9. Sinusoidal AC circuit measurements: Phase angle, average power and power factor (p.f.), phasors, Thevenin’s and maximum power-transfer theorems  
10. Series and parallel resonance: Impedance and current response, resonant and half-power frequencies, bandwidth, quality factor

Computer Usage  
PSpice Circuits Simulator
<table>
<thead>
<tr>
<th>Estimated Content</th>
<th>0.5 Credits</th>
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</thead>
<tbody>
<tr>
<td>Engineering Science</td>
<td>0.5 Credits</td>
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<tr>
<td>Engineering Design</td>
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**Pre-lab**

Pre-lab report is due before your lab. No one can take the quiz without a satisfactory pre-lab report. All pre-lab reports are to be done individually and independently. Don't cheat! The pre-lab should include objectives, background, and theoretical calculations that reflect the expected results from the experiment. A format of the pre-lab will be posted on the course homepage.

**Quizzes**

For every experiment, students will take a 10 minutes quiz. The quiz will be from the pre-lab.

**Report**

Students will be divided into groups. Each group consists of two students. At the end of very lab, each group should submit one report, to be filled in the lab.

**Performance**

Performance of students will be evaluated every lab. At the end of each experiment a grade will be given for his/her practical performance.

**Exams**

Students will take two exams: midterm exam and a final exam. Each exam consists of a theoretical part and a practical part.

**Attendance**

Students should attend the lab on time.

**Prepared by**

Dr. N. Dib

**Date**

22/6/2008
## Mapping of course (EE316) objectives to program objectives

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Delivery Methods</th>
<th>Assessment Methods</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
<th>(i)</th>
<th>(j)</th>
<th>(k)</th>
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</thead>
<tbody>
<tr>
<td>1. Ability to use test and measurement equipment like multimeter, power supply, function generator and oscilloscope.</td>
<td>Lectures, Lab Experiments, Documentation</td>
<td>Reports, Assignments, quizzes, Exams.</td>
<td>X</td>
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<td>2. Ability to measure voltages and currents in DC circuits</td>
<td>Lectures, Lab Experiments, Documentation</td>
<td>Reports, Assignments, quizzes, Exams.</td>
<td>X</td>
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<td>3. Ability to analyze and verify DC circuit theorems experimentally</td>
<td>Lectures, Lab Experiments, Documentation</td>
<td>Reports, Assignments, quizzes, Exams.</td>
<td>X</td>
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<tr>
<td>4. Ability to use PSPICE to simulate DC and AC circuits.</td>
<td>Lectures, Lab Experiments, Documentation</td>
<td>Reports, Assignments, quizzes, Exams.</td>
<td>X</td>
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<tr>
<td>5. Ability to use PSPICE to simulate DC and AC circuits, as well as transients.</td>
<td>Lectures, Lab Experiments, Documentation</td>
<td>Reports, Assignments, quizzes, Exams.</td>
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### ABET a-k Engineering and Technology program objectives

(a) An ability to apply knowledge of mathematics, science, and engineering  
(b) An ability to design and conduct experiments, to analyze and interpret data  
(c) An ability to design a system, component, or process to meet desired needs  
(d) An ability to function on multidisciplinary teams  
(e) An ability to identify, formulate, and solve engineering problems  
(f) An understanding of professional and ethical responsibility  
(g) An ability to communicate effectively  
(h) The broad education necessary to understand the impact of engineering solutions in a global and societal context  
(i) A recognition of the need for, and an ability to engage in life-long learning  
(j) A knowledge of contemporary issues  
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice