

King Saud University  
Electrical Engineering Department  
EE 318: Basics of Electrical & Electronic Circuits  
Second Semester 1425/26 (2004/2005)

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**Textbook:** "Introduction to electricity electronics and electromagnetism" By Robert L .Boylested, Louis Nashelsky, Published by Prentice -Hall Inc., New Jersey 07458, 2002.

**Description:** This course being assigned to non-electrical engineers includes the basic concepts of electricity: charges , electric field and potential, DC network fundamentals, AC network fundamentals, introduction to solid state electronics, pn junction, transistors, logic and digital circuits, introduction to microprocessor .

**Prerequisite:** -----

**Co requisites:** -----

**Course Objectives:** This course is assigned for mechanical engineers. The course informs students about electricity and its role associated with mechanical systems. The majority of modern mechanical system contains electrical or electronic parts. Two different areas are of interest: the power generation and utilization in mechanical systems and the role of electronics in modern machines. Within these two areas of interest the basic fundamentals of electricity and electronics is introduced with some application examples.

**Class/Tutorial Schedule:** Class is held three times per week in 50-minute lecture sessions. There is also a 50-minute weekly tutorial associated with this course.

**Professional Component Contributions:** Students understand the nature of electric energy and its fundamental laws. In this direction the student can perform electrical analysis for simple circuits and get information about different components he used in his daily life like the electric network of his house , the function of control and fuse board, the power rating of the equipments , standard values of voltages and frequencies ...etc . The car network is another important example where dc network and coupling between mechanical and electrical system is very clear. The introduction of simple electronic

devices like diodes, transistors and integrated circuits helps the student to imagine and understand how modern control can be achieved and implemented. The concept of computer based automated system starts by introducing the logic gates and the binary numbering system. Some real examples are given in this area like lift control, displays and CNC machines.

**Relationship to Program Objectives:**

**Objective A:** By teaching students how to analyze his designed circuit and relate it to systems, this course supports the objective of producing graduates with a strong foundation in basic science.

**Objective B:** By teaching students how to deal with electric & electronic circuits and networks and solve the problems associated with electrical signals, the course helps in the department's production of students with a strong foundation in electrical engineering.

**Objective C:** By encouraging students to participate in class, acquire basic group dynamics skills and provide personal assessments on alternative solutions to operating problems and discuss such alternatives among themselves, this course supports the objective of producing graduates with good communication skills.

**Objective D:** By encouraging students to learn pertinent ethical and professional standards in dealing with real-life systems and acquire mutual respect for diverse opinions relating electromechanical system problems, this course supports the objective of providing graduates with a broad-based education so that they can appreciate diversity of opinion, better understand ethical issues and develop a more global perspective of the profession.

**Objective E:** By teaching students how to integrate electric circuit into a complete system, this course supports the objective of producing graduates with the relevant engineering design experience.

**Evaluation:** There are graded home works, two 2-hour mid-term exams and a three-hour final exam. The course grade distribution is as follows:

- 20% Attendance, in-class quizzes and tutorial home-work
- 40% Two Midterm Exams
- 40% Final Examination

**Challenges and Actions Taken to Improve the Course:** Some basic background and prerequisite-type material are often reviewed during this course, notably those related to

recent IC,s and their functions . Some additional background material is often handed to students to introduce digital techniques in control circuits.

### **Course schedule**

<b>week</b>	<b><i>Description</i></b>
<b>1</b>	<b>Introduction to electricity , electric potential &amp; current</b>
<b>2</b>	<b>DC network, series parallel connection, loop &amp; mesh analysis of electric circuits.</b>
<b>3</b>	<b>Super position, Thevenin &amp; Norton theorems, concept of current and voltage sources.</b>
<b>4</b>	<b>Capacitor and inductors in DC circuit: example ignition system in vehicles. Fuses and relays</b>
<b>5</b>	<b>AC network, effective and average values , RLC circuits , series and parallel of impedances</b>
<b>6</b>	<b>Phase relation in Ac circuits and the power factor Application house wiring , control board and circuit breakers</b>
<b>7</b>	<b>Introduction to semiconductor materials , pn junction diode , rectifier circuits , simple dc power supply</b>
<b>8</b>	<b>Transistor structure and operation ,biasing , the basic transistor amplifier</b>
<b>9</b>	<b>The transistor as a switch application example in power control.</b>
<b>10</b>	<b>The operational amplifier: characteristics, basic inverting non inverting amplifiers .</b>
<b>11</b>	<b>Difference amplifiers in instrumentation , other application of op-amp</b>
<b>12</b>	<b>Binary numbering system, basic logic gates, introduction to Boolean algebra.</b>
<b>13</b>	<b>Realization of simple logic function using standard gates, example :lift logic controller</b>
<b>14</b>	<b>Introduction to microprocessor and microcomputer based automated systems.</b>
<b>15</b>	<b>Review</b>

Prepared by: *Mohamed Alturaigi Dr. Mohamed A. ABOU ELELA* June. 10, 2005