

 **COURSE DESCRIPTION**

Subject: **Circuit I &Circuit II**

Class: First Year

B. SC Degree in Electrical Engineering

Academic Year: 2017/2018

**Required or Elective Course:** Required

**Class schedule:** Four-hour lectures per week are typical.

|  |  |  |
| --- | --- | --- |
| **Date** | **Class schedule** | **Comments** |
| **8:30** | **9:30** | **Null** | **11:30** | **13:30** |
| Monday | E5 | E5 | Office | E6 | E6 |  |
| Wensday | E6 | E6 | Office | E3 | E3 |  |

Amin Abbas

**Course Objectives**

The course will cover all selective issues which deal with electrical circuit analysis. Instructional strategies attempt to:

1. Extending the general academic skills of students and increasing their basic knowledge of electricity.
2. Develop the students' ability to deal successfully with problems of electricity.

The course will give students a better understanding of a number of electrical engineering topics, the followings are examples:

1. How electricity is made.
2. Analysis of active and passive electric networks.
3. Analyze linear and nonlinear circuits by a variety of different methods.
4. Learn to apply node and loop analyses to circuit network analysis.
5. Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents.
6. Identifyandmodel first and second order electric systems involving capacitors and inductors.
7. Determine the power of DC and AC circuits.

**Form of Teaching** (Teaching Scheme).

 Different forms of teaching will be used to reach the objectives of the course and give all the contents of the lecture program: power point presentation is used for showing the head titles, the figures, definitions and some simple examples. Besides worksheet will be designed and will be given to students to help them getting a better understanding. Some examples will be solved manually and some others will be solved by students in the classroom. Furthermore, students will be asked to do home works on selective topics. There will be classroom discussions and the lecture will give enough background to analyze and solve examples, and evaluate the weak point of the students.

To get the best of the course, the students will be informed to attend classes, read the required lectures and teacher notes regularly. Also they will recommend participating in classroom discussions.

**Textbook and Reference Books:**

**Required book:**[Introductory Circuit Analysis (11th Edition)](http://www.amazon.com/Introductory-Circuit-Analysis-Robert-Boylestad/dp/0131730444/ref%3Dsr_1_4/105-8300911-6143652?ie=UTF8&s=books&qid=1194806908&sr=1-4) by Robert L. Boylestad (Hardcover - May 1, 2006).

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**Reference books:**[Basic Engineering Circuit Analysis 7th Edition, Problem-Solving Companion](http://www.amazon.com/Engineering-Circuit-Analysis-Problem-Solving-Companion/dp/0471686646/ref%3Dsr_1_6/105-8300911-6143652?ie=UTF8&s=books&qid=1194806908&sr=1-6) by J. David Irwin and R. Mark Nelms (Paperback - Jul 20, 2004).

This is an excellent reference site with good definitions and many worked examples. All aspects of physics are covered but you might be interested in the electricity, magnetism and electronics areas. (<http://230nsc1.phy-str.gsu.edu/hbase/hframe.html>).

And any other **electric textbook** published in 21st century.

The core materials of the course consist of the above book, articles and lecture’s notes. Students must read all the materials and prepare that given before getting in lecture hall.

Students are encouraged to search for any other materials that may help improve their ability in solving electrical problems.

**Examination (Assessment)Scheme:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Exam | Mid term  | First Course Quizzes & home works | Final  | **Mid** term | *Second Course Quizzes & home works* |  | Final  |
| Sessional | 1½ Hrs | Undefined | 3 Hrs | Undefined | Undefined |  | 3 Hrs |
| Grading(Marks) | 30 | 10 | 60 | 30 | 10 | 60 |

**Course Program**

|  |  |  |
| --- | --- | --- |
| SUBJECT NAME | Description | Weeks  |
| Introduction to Electricity | Units of Measurements, Powers of Ten, Engineering Numbers. | 1 |
| Voltage and Current | Theory of electricity, Electric charge Voltage Sources, Ah rating, Conductors and Insulators. | 1 |
| Resistance of Conductors | Types of Resistors, Temperature Effects, Conductance, Ohmmeters & Applications. | 1 |
| Ohm’s Law, Power and Energy | Ohm’s Law, Power in Electrical Systems, Energy & Kwh meter, Cost of Energy. Efficiency, Applications. | 1 |
| Series dc Circuits | Series Resistors, Power Distribution, KVL, VDR, Some important Notation, Applications | 2 |
| Parallel dc Circuits | Parallel Resistors, Power Distribution, KCL, CDR, Voltage Sources in Parallel, Open and Short Circuits, Applications. | 2 |
| Series-Parallel Circuits | Reduce and Return Approach, Notations. | 1 |
| Methods of Analysis | Passive and active elements, Independent Voltage and current Source, Source Conversions, Circuits with dependent sources, Mesh Analysis Supermesh approach, Nodal Analysis, Supernode approach, Operational Amplifiers. Δ-Y and Y-Δ Conversions. | 3 |
| Network theorems | Superposition Theorem, Thevenin’s Theorem, Maximum Power Transfer Theorem, Norton’s Theorem, Millman’s Theorem, Application. | 4 |
| Capacitors | Capacitance,Types of Capacitors,The capacitor Current, and Voltage, Capacitors in Series and Parallel, Application. | 1 |
| Inductors | Inductance, Types of Inductors, The induced Voltage and current, Inductors in Series and Parallel, Applications. | 1 |
| Sinusoidal Waveforms | Types of Electricity, How Ac electricity is made, Sinusoidal ac Voltage Characteristics, Sinusoidal Alternating Waveforms,General Format for the Sinusoidal Voltage or Current, Phase Relations,Average Value,Effective (rms) Values, Applications. | 3 |
| The Basic Elements and Phasors | Average Power and Power Factor, Power and the Basic Elements, Complex Numbers, The Basic Elements and Phasors. | 2 |
| Series and Parallel AC Circuits. | Impedance and the phasor diagram, AC Series Configuration, AC Parallel Configuration. | 3 |
| Series and Parallel AC Circuits and the Power Triangle. | Applying Rules | 2 |
| Network Theorems for AC Circuits | Nodal Analysis, Mesh analysis, Superposition, Norton’s and Thevenin’s Theorem | 2 |

**Final exam:** Will be determined by the exam board.

This **syllabus** may be subject to changes, i.e, we may take either longer or shorter time to finish a topic, and if any changes happened the student will be notified well in advance.