

## Academic Course Description

King Saud University  
Electrical Engineering Department

### **EE442: Utilization of Electric Energy**

**First Semester 1426/1427 (2005/2006)**

**Instructors:** (1) **Dr. Nazar Hussain Malik**  
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#### **Text Book:**

- N. V. Suryanarayana, “ Utilization of Electric Power including Electric Drives and Electric Traction” New Age International Limited Publishers, New Delhi, India
- G. C. Garg, “Utilization of Electric Power and Electric Traction”, Khanna Publishers, Delhi, India

**Support References :** A collection of supplementary reading material from other sources is also provided.

**Pre-requisites:** EE 340

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

**Course Objectives:** To clearly understand the basic concepts related to use of electric energy in various industrial, commercial and residential applications and important issues related to such usage. The course also discusses issues related to power quality, economics of energy system usage and renewable energy systems.

**Topics Covered:** Lighting and illumination design; Electric wiring design; Electric welding; Electric heating; Cooling and heating of buildings; Electrolysis; Power quality issues; Renewable energy sources; Power factor improvement.

**Class / Tutorial Schedule:** Two lectures are assigned per week with 50 minute for each lecture session. There is also a 50 minute weekly tutorial session associated with this course.

**Professional Component Contribution:** Students can learn the analytical methods and modern tools for solution of problems associated with utilization of electric energy in residential, commercial and industrial sectors. They acquire the basic skills of how to approach and deal with real life situations and solve simple design and operation problems. Students must also utilize

knowledge of mathematics, physics, system's control, circuits and basic engineering sciences in order to effectively analyze a diverse set of fundamental problems in the use of electric energy and important issues related to the use of such energy.

**Relationship to Program Objectives:** This course contributes to the general objectives listed for an Electrical Engineering Department.

**Objective A:** By teaching the student how to formulate basic problems and model the associated configurations, circuits and systems related to wiring and illumination designs for buildings, electric heating, welding, electrolysis and other applications, this course support the objective of producing graduate with a strong foundation in basic sciences.

**Objective B:** By teaching students how to deal with devices and systems for electric energy applications in various sectors and solve basic problems related to illumination, wiring, heating and cooling, electrolysis, power quality, energy economics and security of future energy supply, the course helps in the department's production of students with a strong foundation in electrical engineering.

**Objective C:** By motivating and encouraging students in discussions during lectures and tutorials to get basic information and skills in a group environment and provide individual opinion on alternative solutions to the design and operating problem related to the usage of electric energy in various systems, this course supports the objective of producing graduate with good communication skills.

**Objective D:** By encouraging the students to learn pertinent ethical and professional standards in dealing with alternative methods of design and selection of electric appliances , 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 how to design simple illumination and wiring systems and their individual components, this course supports the objective of producing graduates with relevant engineering design experience.

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

Two Mid-Term Exams.	45%
Home Works, Quizzes & Class Participation	15%
Final Exam	<u>40%</u>
Total	100%

**Challenges and Actions taken to improve the Course:** Some basic background and pre-requisite type material are often reviewed during the course, notably those related to the review of 3-phase systems, AC circuits and machines and basic principles of heat flow and thermodynamics. Visits are arranged to the distribution system within the college during the course in order to expose students to real life practical elements of the power system within buildings and factors which are important in the design and installation of such systems.

## Weekly Teaching Plan

<b>Week #</b>	<b>Deliverables</b>
1	Power factor correction methods
2	Power factor correction calculations and design
3	Lighting and illumination basics
4	Types of electric lamps and illumination calculations
5	Design of simple illumination systems
6	Electric heating principles and applications
7	Electric welding
8	Heating and cooling of buildings
9	Electrolysis and applications
10	Electric systems in buildings
11	Design and selection of electrical installations
12	Performance calculations for electrical systems
13	Power quality issues
14	Renewable energy sources

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