King Saud University
College of Engineering
Electrical Engineering Department

Course Title: "Power System Planning".

Text books: The contents of this course encompass both reliability criteria and economic concepts and there is no one available text that addresses both topics in the meantime. Therefore, the book that I use in this course for reliability evaluation is titled: "Power System Reliability Evaluation" authored by: Roy Billinton, plus supplementary prepared handouts and selected materials covering economic concepts and probabilistic modeling. The text as well as prepared handouts and selected materials are expected to explain the concepts and theory in a concise but clear manner. They also should have an adequate number of solved examples and plenty of exercise problems.

Instructor: Professor Abdullah M. Al-Shaalan عبد الله محمد الشعلان
EM: shaalan@ksu.edu.sa

Topics Covered: Future electric loads forecasting. Electric loads characteristics: definitions and analysis. Consumers categories. Load variation curves. Power and energy concepts in the load curves. Conversion of load curves to Load Duration Curve (LDC). Study and analysis of base, intermediate and peak loads constituting energy profile in the LDC. Some important factors used in power systems diagnosis. Economic aspects in power system planning (related to fixed and variable costs). Input/Output (I/O) curve. Derived important curves from the I/O curve. Basic probability concepts. Forced outage rate (FOR). Network modeling and reliability assessment implementing probability and conditional probability methods. Capacity model and Capacity Outage Probability Table (COPT). Introduction to reliability evaluation in power system planning. Reliability indices used in power system planning such as: Loss of Load Expectation (LOLE), Expected Demand Not Served (EDNS), Expected Energy not Served (EENS) and Energy Index of Reliability (EIR). Energy production evaluation based on probabilistic modeling.

Course allocated time: the course is given in 50-minute lecture session three times per week plus one 50-minute each week as a tutorial implementing the concepts and theoretical basis taught in the course.

Teaching Statement: As much as I am aware of the importance of research and the thrill it involves, I always have found teaching exciting, therapeutic, and rewarding. Seeing the faces of student brighten as they comprehend and appreciate what I teach, brings me tremendous delight and pleasure. For me, this has become a primary objective because it is exciting to watch the evolving process of affecting the lives of my students in a positive manner. Over the past years, I have come to believe that teaching is not a popularity contest rather it is a means to a positive and lasting impact on the lives of others and the future of the human society as a whole. I am known for demanding extra efforts from my students. However, they know that I do this to help

them to use their potential, to be the best at what they are doing, and to enhance the good image of the University.

Teaching Philosophy: As a result of the technological advances that have taken places in the last few decades, today's engineering students need a strong education system that is extremely effective. Such a system is expected to condense the information and train student to face present and future challenges in four to five years. The system must provide a balance between theory and practice.

Teaching Approach: Engineering students should have the utmost exposure to "real-life" analysis and design problems. Their understanding of theory is enhanced when they get involved in actual design applications. Their ability to better understand and use classroom material is reinforced with "hands-on" problem-solving situations. In each of my courses, students experience working together as a team designing projects that involve solving "real-life" problems. Motivating students to utilize their fullest potential is an essential part of my endeavor. I believe that care, attention and encouragement are important ingredients for excellence in teaching, so, I use every possible means to achieve this essential end.

Motivations and Incentives in Teaching Courses: I measure success in teaching courses to my students if the following results are substantiated:

1) Understand the basics and are prepared solidly on solid grounds.
2) Develop confidence in their problem solving ability.
3) Are motivated to learn more about the subject.
4) Are equipped with knowledge that is useful in their jobs.

Targeted Objectives Related to the Department Educational Plan: In order to match the targeted objectives of teaching this course with the desired objectives manifested in the recent updated department educational plan, the students should fulfill the following steps:

1) Comprehend and be acquainted with modern numerical and analytical methods associated with power system planning process.
2) Be acquainted with and aware of long-range electrification plans undertaken on behalf of the Kingdom of Saudi Arabia. This provides student with "real-life" insight and better realization.
3) Formulate and apply computerized-aided approaches to solve some problems frequently encountered by system planners.
4) Acquire vast and diversified theoretical and practical knowledge through given research topics assignments in some selected areas related to power system planning (i.e. economic aspects, reliability evaluation, load management, production costing, etc.).
5) Build confidence and self-esteem through presenting and talking about assigned projects and term-papers. This will prepare them for easy transition to their shortly assumed jobs and responsibilities.
6) By teaching the students how to carry out a "power system planning" task, this course supports the objective of preparing the students to enroll in graduate programs leading to higher degrees.

Suggested Ideas to enhance the visibility and perception of the Course: Throughout my years of teaching this course, I believe that, in order to improve the credibility and enhance the effectiveness of the course, some ideas may be adopted and put into action, and they are:

1) Inviting and encouraging students to participate in national and international conferences through presenting papers and/or organizing panel sessions on important issues that affect the current and future of the power industry.
2) Working with students on producing quality research studies and encouraging them to do publishable work.
3) Getting students to join reputable and well-known scientific societies. This will broaden their knowledge and experience of the current developments in electric power systems and on-going research state-of-the-art.
4) Organizing trips to the local electric company to expose the students to real-life situations and enable them to see closely generation stations and transmission facilities.

The Syllabus Sheet: The syllabus sheet is an essential document should be provided to the students containing the course syllabus listed in detail on a class-by-class basis so that the students can carefully plan their learning and reading schedules. Grading policies and general course policies such as homeworks, tests dates are also included on this sheet. In addition, the sheet contains the title and the author of the text book(s), my office number, telephone number, em address, and office hours, which allows the students accessibility to me. I also urge the students to call for an appointment or come by my office at any time should they have questions or need help.

Week No.	Syllabus Highlights
1	Electric Loads: Types and variations.
2	Load Forecasting.
3	Economic aspects of power system planning (fixed and variable costs).
4	Generating unit's characteristics: Input/output curve, assessment of produced unit energy cost.
5	Role of reliability evaluation in power system planning.
6	Introduction to basic probability theory and probabilistic modeling techniques.
7	Some useful and well-known reliability distributions used in power system reliability evaluation.
8	Load model: Peak Load Variation Curve (PLVC) and Load Duration Curve (LDC).
9	Capacity model: Forced Outage Rate (FOR) and Capacity Outage Probability Table (COPT).
10	Reliability indices: Loss of Load Expectation (LOLE) and Expected Demand not Served (EDNS).
11	Expected Energy not Served (EENS) and Energy Index of Reliability (EIR).
12	Energy production by generating units in the system based on reliability methods.
13	Series and parallel network systems modeling for reliability evaluation.
14	Series/parallel and complex network systems modeling for reliability evaluation.