

Electrical Engineering 471: Electric Power Systems

Course Description: Electric Power Systems, 3 Cr. U/G. Elements of A Power System; Per-unit Quantities; Load Flow Study; Economic Dispatch; Symmetrical Components; Fault Study; System Protection; Stability. Prereq: Jr standing; EE362(P)

Textbook: Power System Analysis by Grainger & Stevenson, McGraw Hill.

Prerequisites by Topics:

- Phasor analysis
- Single and three phase A.C. circuit analysis
- The concept of real and reactive power

Course Learning Outcomes:

- Students will be able to perform per-unit calculation.
- Students will be able to analysis various types of transformers including both single phase and three phase.
- Students will be able to understand various matrix manipulations related to power systems.
- Students will learn how to control the real and reactive power flows.
- Students will be able to perform load flow analysis.
- Students will be able to perform symmetrical component calculation.
- Students will be able to analysis fault conditions including both balanced and unbalanced faults.
- Students will be familiar with typical commercial software packages used in power industry
- Students will be able to carry out the preliminary design and analysis of the different aspects in the power systems

Topics Covered:

- Basic concepts of a.c. single-phase and three-phase power.
- Per-unit calculation
- Transformer analysis
- Synchronous machines
- Y-bus and Z-bus matrices
- Load flow analysis
- Symmetrical components
- Balanced three-phase fault study
- Unbalanced fault study
- Economic Dispatch

Class Schedule: 42 lectures

Contribution of Course to Meeting the Professional Component:

This course contributes to the engineering topics component of the curriculum, primarily in engineering science and design. Students learn fundamental electric power engineering concepts and develop technical expertise in this specialized field.

Relationship to Program Objectives:

Program Outcome	Explanation
iii.	Students will learn how to perform per-unit calculation, how to analysis load flow study, how to analysis various fault conditions.
vii.	Students will use Pfactor, V-flow and V-net developed by Cooper Power Systems to carry out preliminary design and analysis of the different aspects in power systems.
ix.	Students will need to consider the economical factors in their optimal power system design project.
xiii.	Students will be able to design complex electric power systems through their design project.

Prepared by: David C. Yu, September 16, 2001.

Methods of Assessment:

- Prerequisite exam
- Graded homework
- Graded examinations
- Graded project
- Course evaluation by students
- Instructor judgment

Resources Commonly Available:

- Instructor
- V-flow, V-Net, Pfactor, SNW software

Desirable Student Competencies:

- Single-phase and three-phase a.c. circuit analysis
- Three-phase power analysis