

DIE-GITI-323 Electric Power Systems

SEMESTER: Spring
CREDITS: 6 ECTS (4 hrs. per week, 48h Theory + 12h Lab)
LANGUAGE: Spanish
DEGREES: GITI

Course overview

A description of electric power systems, including an introduction to exploitation and control of power systems is given. Analysis of the frequency-power control (F-P) and voltage-reactive (V-Q) power control in a power system is made. Power flow techniques, security issues and state estimation in power systems are studied to support F-P and V-Q control concepts.

Prerequisites

- Circuit theory and resolution knowledge
- Electric Machines

Course contents

Theory:

1. Description of electric power systems. Introduction to exploitation of electric power systems. Introduction to control of electric power systems.
2. Review of elements of Power Systems (Lines, Transformers, Generators, Loads)
3. Power Flow Computation
4. Voltage Control of Power Systems (V/Q Control)
5. State Estimation
6. Load-Frequency Control of Power Systems (f/P Control)

Laboratory:

- P1. Power flow analysis I (with PSS/E) - 2 h (after completion of theory unit 3)
- P2. Power flow analysis II (with PSS/E) - 2h (after completion of theory unit 4)
- P3. State Estimation (with Excel) -2h- (after completion of theory unit 5)
- P4. Single Area Load-Frequency simulation (with Matlab-Simulink) – 2h (after completion of theory unit 6)

- P5. MultiArea Load Frequency simulation (with Matlab-Simulink) – 2h (after completion of theory unit 6)
- P6. Lab Exam – 2h

Textbooks

- “Análisis y Operación de Sistemas de Energía Eléctrica”. Coordinador A. Gómez Expósito. Ed. McGraw-Hill.
- “Power Generation Operation & Control”. Wood, A.J. - Wollenberg, B.C. John Wiley.
- “Electric Energy Systems Theory. An introduction”. O.I. Elgerd. Ed. McGraw-Hill

Grading

The overall grade is obtained as follows:

- Theory (75%)+Lab 25%
- Theory
 - Mid-term exam accounts for 30 %
 - Final Exam accounts for 70 %
- Lab
 - 50 % lab reports
 - 50 % lab exam