

Minicourse: Basics on Electric Power System Analysis



CHAIR OF
COMPUTATIONAL
MATHEMATICS
DeustoTech

*Chair of Computational Mathematics
DeustoTech - Universidad de Deusto
Bilbao, Basque Country - Spain*

Speakers:

**Jon A. Barrena & Eneko Unamuno
(Mondragon Unibertsitatea)**

**Friday, June 1st, 2018
9:30-13:00, 14:30-17:00
Lidón room at
University of Deusto**

Description:

This is a two-day course oriented to introduce the basics on electric power system analysis and control to an audience that is not familiar with the electric systems. This first session will enable attendees to learn and understand basic analysis and calculations employed on electric systems, and how these electric power systems are controlled and operated.

The session will start with the most basic electricity concepts and calculations. The course will include as well the formulation of the model of the system, per unit single-phase equivalent circuit; admittance model of the system, methods for formulating the bus admittance matrix Y_{bus} ; solution of the nodal equations; Load flow analysis, definition of the load flow problem, formulation of the static load flow equations, types of buses, solution of the load flow equations by the Newton-Raphson iterative method.

The attendees must have basic knowledge on operations with complex numbers, differential equations, matrix calculations, iterative numerical methods for solving non-linear equations (Newton-Raphson).

Contents:

- Basic concepts:
 - Voltage, current, power, Kirchhoff's circuit laws, voltage source, current source.
 - Passive elements: Instantaneous voltage, current, power, energy equations (ohm's law)
- Direct Current and Alternating Current: definitions
 - Analysis of single-phase ac systems
 - Analysis of three phase ac systems
- Electric Power systems:
 - Single-line or one-line representation of power systems
 - Impedance and reactance diagrams
 - Per-unit quantities
 - Node equations: Admittance and impedance model and network calculations.
 - Power-Flow solutions: The Newton-Raphson method
- Operation and control of electric power systems
 - Description of the hierarchical control in power systems
 - Inertial response and primary frequency regulation

Contact: miren.arretxe@deusto.es