

Name of the course: Advanced Forecasting and Optimization Techniques for Power Systems: An Introduction

Reference Teachers: Matteo Saviozzi (matteo.saviozzi@unige.it), Gabriele Mosaico (gabriele.mosaico@unige.it)

Duration of the course: 12 hours, **Credits:** 3

Language: English.

Aims of the course: The course aims to introduce participants to hybrid forecasting techniques for load and renewable energy sources, as well as to stochastic optimization approaches. It covers the implementation of forecasting techniques based on artificial intelligence in MATLAB environment. Finally, a chance-constrained approach is implemented in MATLAB/GAMS environment.

Teaching programme:

Part 1) Introduction to forecasting

- Basic concepts and tools
- Short term forecasting – state of the art
- Myth of the best technique
- Key performance indicators

Part 2) Load forecasting

- Hybrid and ensemble techniques – case study
- Hands on session (Matlab environment)

Part 3) PV forecasting

- Hybrid and ensemble techniques – Case study
- Hands-on session (Matlab environment)

Part 4) Introduction to stochastic optimization

- Basic concepts
- State of the art of the main techniques

Part 5) Chance constrained optimization

- Uncertainty modeling
- Mathematical formulation

Part 6) Definition and implementation of a chance constrained approach

- Distribution Network/ Microgrid study case
- Hands-on session: implementation in Matlab/GAMS environment

Exam modality:

Oral presentation on the hands-on sessions.

Bibliography:

Slides and papers provided by the teachers