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Abstract

“Smart technologies for microgrids and energy communities”

Nowadays, one of the most exciting challenges is the aggregation of users in energy communities which allow power and energy usage to be optimized. The course discusses innovative power-system architecture and models for aggregation of users able to share and optimize the power produced by common generators and energy services.

The course consists in the studies of the new technologies applied to electrical power systems for energy communities. Innovative models and architectures for smart microgrids and smart buildings will be presented. Building automation and supervisory/monitoring systems will be discussed with a practical character. Many case studies will be shown.

The objectives of the course are to introduce new technologies such as digital and building automation for smart microgrids with the main goal to activate the new models of energy communities. The aggregation of the users and its optimization in the management are the main objectives. The use of new architecture with DC components and parts of schemes, and the use of storage are considered in the course.

The course is organized with presentation of case studies and practical workshops about new technologies and programming of smart devices for microgrids.

The course is organized in five lectures:

- 1) Energy communities for residential/tertiary multi unit buildings (MURBs): models and architectures
- 2) Building automation and monitoring systems in smart microgrids
- 3) An innovative power sharing model for AC/DC smart microgrids
- 4) Distributed metering and monitoring systems: level of coverage
- 5) High efficiency lighting systems with advanced controls

The classes can be conducted both in presence and in remote, in hybrid mode with the use of multimedia material and an interactive whiteboard. During the course they will be using interactive technologies (smart switchboards, sensors, actuators, meters, etc,) located in the “Remote Laboratory of Power System ” of Sapienza University. In this lab of which prof. Martirano is the responsible, there is a smart microgrid that can be operated in remote sessions.