

# AC Microgrids

**Organizers:** Associate Professor Juan C. Vasquez, Professor Josep M. Guerrero

**Lecturers:** Professor Josep M. Guerrero, Associate Professor Juan C. Vasquez, Assistant Professor Qobad Shafiee, Professor Ernane Coelho, Postdoc Yajuan Guan.

**ECTS:** 2

**Date/Time:** April 24<sup>th</sup> -25<sup>th</sup> , 2017

**Max no. of participants:** 20

**Description:** A Microgrid can be defined as a part of the grid with elements of prime energy movers, power electronics converters, distributed energy storage systems and local loads, that can operate autonomously but also interacting with main grid. The functionalities expected for these small grids are: black start operation, frequency and voltage stability, active and reactive power flow control, active power filter capabilities, and storage energy management. This way, the energy can be generated and stored near the consumption points, increasing the reliability and reducing the losses produced by the large power lines.

The course starts giving some examples of Microgrids in the world. The course participants not only will learn modeling, simulation and control of three-phase voltage source inverters operating in grid-connected mode and islanded mode, but also, how these power electronics converters are integrated in AC Microgrids. Relevant concepts like frequency and voltage droop control as well as the virtual impedance concept are explained in detail. Finally, this course also introduces the study of the hierarchical control of Microgrids for AC electrical distribution systems.

**Prerequisites:** Matlab/Simulink knowledge is recommended for the exercises.

Link: <http://www.et.aau.dk/phd/phd-courses/>