DEA-GITI-448 Power Electronics Applications

SEMESTER: Spring
CREDITS: 4.5 ECTS (3 hrs. per week 2 Theory + 1 Lab, on average)
LANGUAGE: English or Spanish
DEGREES: GITI

Course overview
This course is an introduction to the use of power electronics in electric power systems (generation, transmission and distribution). It focuses mainly on AC-to-DC and DC-to-AC converters (analysis, design and performance) and their application to power flow control, power quality and renewable energy integration in current and future power grids.

Prerequisites
Elementary theory of DC and AC circuit analysis, basic knowledge on Fourier Series and control systems.

Course contents
Theory:
1. Introduction to energy conversion using power electronics.
2. Definition of the most important electrical magnitudes with electronic power converters including harmonics, power and energy and basic power quality concepts.
3. Fundamentals of electronic power converters: AC-DC, DC-DC and DC-AC.
4. Overview of the applications of electronic power converters in power systems: HVDC, FACTS and distributed generators.
5. Definition and characterization of power quality: power electronics, friends or foes?
6. Auxiliary topics: power grids with high penetration of power electronics.

Laboratory:
There will be five 2-hour sessions.

P1. AC-DC converters
P2. DC-AC converters
P3. Simulation of power electronics applications

This document is a brief outline of the course and does not replace the official program of study

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Textbook


Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the final exam of 4 over 10.

The overall grade is obtained as follows:

- Final exam 50%.
- Quizzes 30%: two or three 50-min quizzes.
- Lab evaluation 20%.