Smart grids management

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Magnetic Circuits and Transformers
High Voltage Switchgear and Power Lines
Electrical installations
Electric Power Systems
Digital Systems Applied to Electrical Power Engineering
Electricity Markets

SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
COCIN4. Ability to resolve problems with initiative, decision-making, creativity, and critical reasoning skills and to communicate and transmit knowledge, skills and abilities in the Industrial Engineering field.
CEP1. Capacity to design a system, component or process in the area of electrical engineering in compliance with required specifications.
CEP2. Knowledge and ability to apply computational and experimental tools for analysis and quantification of electrical engineering problems.
ECRT6. Knowledge of electrical power systems and applications.

By the end of this content area, students will be able to have:
RA1.3. Coherent knowledge of the branch of electrical engineering including some at the forefront of their branch in electric power systems.
RA2.3. The ability to select and apply relevant analytic and modelling methods in electric power systems.
RA3.2. An understanding of design methodologies for electric power systems, and an ability to use them.
RA4.1. The ability to conduct searches of literature, and to use data bases and other sources of information.
RA4.3. Workshop and laboratory skills.
RA5.1. The ability to select and use appropriate equipment, tools and methods in electric power systems.

OBJECTIVES

The aim of this course is to focus in the advanced operation of smart grids . To achieve this goal , students must acquire a body of knowledge , and capabilities.

 -knowledge about smart grids , its application and development in the electricity networks of the future.
- knowledge about the mechanisms of energy storage management and integration of renewable energies.
- knowledge about the automatic meter reading in smart grids.
 -knowledge about energy data management commonly used in smart grids .

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Smart Grids.
2. Electric networks: state of the art
3. Smart metering at Smart Grids: Energy measurement by digital energy meters, big data, security and privacy
4. Distributed energy resources: Distributed generation and storage systems.
5. Electric vehicles.
6. Demand management and consumer rol.
7. Smart Grids (National and International) implementation projects, Regulation and practical examples

LEARNING ACTIVITIES AND METHODOLOGY

Training activities include:

- Lectures, doubt-solving classes in small groups, individual tutorials and personal work by the student, including study, tests and exams; oriented to the acquisition of theoretical knowledge.
- Problem solving classes in small groups, individual tutorials and resolution of exercises by the student aimed at the acquisition of practical skills related to the program of each subject.
- Laboratory tests and exams.

ASSESSMENT SYSTEM

The assessment system will be composed of assignments about smart grids projects and laboratory sessions

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

 - Antonio Colmenar Santos Generación distribuida, autoconsumo y redes inteligentes , UNED - Universidad Nacional de Educacio¿n a Distancia, 2015

BASIC ELECTRONIC RESOURCES

 - FUTURED - GRUPOS DE TRABAJO . ALMACENAMIENTO: ESTADO DE LAS TECNOLOGÍAS:
https://www.futured.es/grupo-de-almacenamiento/
 - FUTURED - GRUPOS DE TRABAJO . CT INTELIGENTE: ESTANDARIZACIÓN: https://www.futured.es/grupo-trabajo-ct-inteligente/
 - FUTURED - GRUPOS DE TRABAJO . VEHICULO ELECTRICO: IMPACTO EN LAS REDES:
https://www.futured.es/grupo-de-vehiculo-electrico/