Course guides
820755 - XI - Smart Grids

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.
Degree: ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN ELECTRIC POWER SYSTEMS AND DRIVES (Syllabus 2021). (Optional subject).

Academic year: 2021   ECTS Credits: 5.0   Languages: English

LECTURER
Coordinating lecturer: Sumper, Andreas
Others: Sumper, Andreas

PRIOR SKILLS
Basics on Electric Equipments

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
CEMT-3. Assess the economic, social and environmental impact of the production, use and management of energy, with a holistic view of the life cycle of the different systems, and recognise and value the most remarkable developments in the fields of energy efficiency and the rational use of energy.

TEACHING METHODOLOGY
Slides-based lecturing. Invited lectures from the industry.
Some problems will be proposed as assignment.

LEARNING OBJECTIVES OF THE SUBJECT
Knowing the basics of power system operation. Knowing the basic properties and components of the Smart Grid. Being able to apply novel techniques and technologies to the power system.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>10,0</td>
<td>8.33</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>25.00</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>66.67</td>
</tr>
</tbody>
</table>

Total learning time: 120 h
## CONTENTS

### Equipment of transmission & distribution systems

**Description:**
- Introduction
- Classical Grids & Smart Grids
- Modeling and Calculus

**Specific objectives:**
Understand and apply the models of the elements of the network, both classic and modern. Integrate the models into a general calculation methodology. Use Matlab-based calculation tools (Matpower).

**Related activities:**
- A1: Power Flow Calculation (PandaPower)

**Full-or-part-time:** 22h 30m
- Practical classes: 15h
- Guided activities: 7h 30m

### Smart Grid Technical systems

**Description:**
- Smart Grid architecture
- Communications and Information
- Novel technologies

**Specific objectives:**
Understand classical and current regulatory devices for networks. Apply to specific use cases.

**Related activities:**
- A2: Smart Grid Architecture Modeling (SGAM)

**Full-or-part-time:** 22h 30m
- Theory classes: 7h 30m
- Practical classes: 15h

## GRADING SYSTEM

The final grade will be calculated as a weighted sum of the two project assignments with 30% each, continuous evaluation of the theory with 30% and the practical part with peer assessment of 10%.

## EXAMINATION RULES

- Problem-based learning, Production of reports.

## BIBLIOGRAPHY

**Basic:**