Course guides
820755 - XI - Smart Grids

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree:
- MASTER'S DEGREE IN RENEWABLE ENERGIES (Syllabus 2011). (Optional subject).
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2012). (Optional subject).
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2013). (Optional subject).
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2010). (Compulsory subject).
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2010). (Optional subject).
- MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Optional subject).

Academic year: 2020  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>Self study</td>
<td>80,0</td>
<td>66.67</td>
</tr>
<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>
</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 (Matpower)

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 assignments with 35% each, continuous evaluation of the theory with 20% and the practical part with peer assessment of 10%.
EXAMINATION RULES.

Problem-based learning, Production of reports.

BIBLIOGRAPHY

Basic: