820755 - XI - Smart Grids

**Coordinating unit:** 240 - ETSEIB - Barcelona School of Industrial Engineering

**Teaching unit:** 709 - EE - Department of Electrical Engineering

**Academic year:** 2018

**Degree:**
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONOMICAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2010). (Teaching unit Compulsory)
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONOMICAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2012). (Teaching unit Optional)
- MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Optional)
- ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONOMICAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2010). (Teaching unit Optional)
- MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Optional)

**ECTS credits:** 5  
**Teaching languages:** English

**Teaching staff**

**Coordinator:** Sumper, Andreas

**Others:** Sumper, Andreas

**Opening hours**

**Timetable:** To be fixed at the beginning of the course

**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.
820755 - XI - Smart Grids

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>0h</th>
<th>0.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>24.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>10h</td>
<td>8.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>85h</td>
<td>68.00%</td>
</tr>
</tbody>
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Content

**Equipment of transmission & distribution systems**

- **Learning time:** 22h 30m
  - Practical classes: 15h
  - Guided activities: 7h 30m

**Description:**

- Introduction
- Classical Grids & Smart Grids
- Modeling and Calculus

**Related activities:**

- A1: Power Flow Calculation (Matpower)

**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).

**Smart Grid Technical systems**

- **Learning time:** 22h 30m
  - Theory classes: 7h 30m
  - Practical classes: 15h

**Description:**

- Smart Grid architecture
- Communications and Information
- Novel technologies

**Related activities:**

- A2: Smart Grid Architecture Modeling (SGAM)

**Specific objectives:**

Understand classical and current regulatory devices for networks. Apply to specific use cases.
Qualification system

The end grade will be calculated as a weighted sum of the two assignments with 30% each, the theory exam with 30% and the practical part of the exam with 10%.

Regulations for carrying out activities

Multiple choice test, calculations

Bibliography

Basic:

