Course guide
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 ENVIRONOMICAL 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: 2022  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. Problem-based course project. Lab sessions.

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>
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<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>
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Total learning time: 120 h
CONTENTS

Equipment of transmission & distribution systems

Description:
Introduction
Classical Grids & Smart Grids
Modeling and Calculation

Specific objectives:
Understand and apply the models of the elements of the electrical network, both classic and modern. Integrate the models into a general calculation methodology. Use Python-based calculation tools.

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

In order to be able to have an evaluation of the subject, it is a necessary condition to have attended, carried out and delivered the reports of all the laboratory sessions and of the course project. In case this necessary condition is not met, the grade will be NP (Not Presented). If the necessary condition is met, then the calculation will be as follows:
The final grade will be calculated as a weighted sum of tests (continuous evaluation) of the theory sessions (40%), the report of the lab tutorial (20%) and the course project and presentation (40%)

EXAMINATION RULES.

Individual evaluation of the theory content by tests, problem-based learning, production of reports, presentations
BIBLIOGRAPHY

Basic: