Last update: 08-05-2019

820755 - XI - Smart Grids

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

Teaching unit: 709 - EE - Department of Electrical Engineering

Academic year: 2019

Degree: ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONOMICAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2010). (Teaching unit Compulsory)
MASTER'S DEGREE IN RENEWABLE ENERGIES (Syllabus 2011). (Teaching unit Optional)
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)
ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONOMICAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2013). (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 beggining 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.

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Study load

Total learning time: 120h	Hours small group:	30h	25.00%
	Guided activities:	10h	8.33%
	Self study:	80h	66.67%

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.

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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:

Faulkenberry, Luces M; Coffer, Walter. Electrical power distribution and transmission. Englewood Cliffs, NJ: Prentice Hall, cop. 1996. ISBN 0132499479.

Acha, Enrique. FACTS : modelling and simulation in power networks. Chichester: John Wiley & Sons, cop. 2004. ISBN 0470852712.

Sen, Kalyan K; Sen, Mey Ling. Introduction to facts controllers : theory, modeling, and applications. New York: John Wiley & Sons, 2009. ISBN 9780470478752.