

## Course Unit Description - (PDMEN)

(Distributed Generation and Energy Markets)

(Mestrado em Engenharia Electrotécnica - Sistemas Eléctricos de Energia)

Academic year: 2009/2010

### Subject group: Sistemas de Energia

	Semestral	Compulsory
<b>Mode of study</b>	Diurno	<b>Hours/Week</b> T-Teórica
<b>Year</b>	1 <sup>o</sup>	PL-Prática-Laboratorial
<b>Semester</b>	1 <sup>o</sup>	OT-Orientação Tutorial
<b>ECTS</b>	7.5	

### Objectives

It is envisaged that students gain knowledge and competence in the area of Distributed Generation (DG) of energy, namely in what concerns its impact or operation of electrical networks. The course also aims at studying Energy Markets (EM), focussing mainly on Electricity Markets, considering their goals and models.

The course has as important goal that students understand the impact of DG and EM on societies and on Power System planning and operation methodology.

### Course Contents

Distributed Generation (DG) of electrical energy: production technologies  
Impact of DG on electrical networks  
Legislation concerning DG  
Energy Markets: Overview, historic and future perspective  
Electricity Markets: regulation, de-regulation and recent changes  
Models and agents in Electricity Markets  
Case-study  
Economic issues: Costs, tariffs and prices; Price forecasting; Contract  
Technical issues: Quality and reliability; Power System operation

### Recommended reading

- Frank Kreith and D. Yogi Goswami, Handbook of Energy Efficiency and Renewable Energy, CRC, 2007
- H. Lee Willis, Distributed Power Generation: Planning and Evaluation, CRC, 2000
- Anne-Marie Borbely and Jan F. Kreider, Distributed Generation: The Power Paradigm for the New Millennium, CRC, 2001
- Gerald B. Sheblé, Computational Auction Mechanisms for Restructured Power Industry Operation, Springer, 1999
- Alexander Eydeland and Krzysztof Wolyniec, Energy and Power Risk Management: New Developments in Modeling, Pricing, and Hedging, Wiley, 2002
- Lorrin Philipson and H. Lee Willis, Understanding Electric Utilities and De-Regulation, CRC, 2005
- Steven Stoft, Power System Economics: Designing Markets for Electricity, Wiley – IEEE Press, 2002

Some journals:

- . IEEE Computer Applications in Power (1988 to 2002)
- . IEEE Power & Energy Magazine (from January 2003)
- . IEEE Transactions in Power Systems
- . IEEE Transactions in Power Delivery
- . Other available references, namely in the electronic library b-on

### Teaching Methods

Case presentation and solving

Discussion

Autonomous Work Development

Use and development of computer applications and software packages used to address power system problems

Several activities, such as: reading, analysis and commentary of references concerning the course contents; presentation of cases and computer applications; participation in talks and demonstration sessions.

### Assessment methods

C1 – assessment of students' performance in the course activities: class activities performance, autonomous and group work, 80% (C1 at least equal to 10 in 20)  
C2 - 1 written test, 20% (C2 at least equal to 10 in 20)

Students with C1 or C2 lower than 10 (in 20) do not obtain approval in this course.

Name

Teacher responsible:

Zita Maria Almeida do Vale (ZAV)

**Lecturer:**

Zita Maria Almeida do Vale (ZAV)  
Filipe Miguel Tavares de Azevedo (FTA)  
Maria Judite Madureira da Silva Ferreira (MJU)  
Luis Filipe Caeiro Castanheira (LCC)

ISEP-NOG-MOD001v.02