Τίτλος (Ελλ.)	Τίτλος (Αγγλ.)	Υπεύθυνος	Διδάσκοντες
Διαχείριση Κατανεμημένης Παραγωγής Ενέργειας και Έξυπνων Δικτύων	Management of Distributed Energy Production and Smart Grids	Γ. ΠΑΠΑΔΑΚΗΣ (G. Papadakis)	Γ. ΠΑΠΑΔΑΚΗΣ (G. Papadakis) Χ-Σ. ΚΑΡΑΒΑΣ (Ch-S. Karavas) Γ. ΚΥΡΙΑΚΑΡΑΚΟΣ (G. Kyriakarakos)

Περιγραφή - Description

The course is dedicated to communicating the fundamentals of distributed energy generation and storage technologies towards the realization of a smart grid and allow a larger share of intermittent renewables interconnection. The course provides an understanding to analysing the safety, reliability, capability, and flexibility of smart grid energy systems and will also provide entry level understanding of the concepts of EU Strategic Energy Technology Plan and EU Energy Market.

Learning objectives

The course will be focused on academic achievement, acquisition of knowledge and enhancement of comprehension of information regarding the distributed energy resources. Advanced technology applications, economic analyses of energy industry and technical basic knowledge and methods are analysed by using Smart Grid approaches. Students will practice knowledge-based critical thinking about the basic principles of energy policy at European level and the key issues of European energy market. After successful completion of the course the students should be able to:

- Understand the existing structures and technical basis of energy systems to produce, transfer and distribute electricity and their interaction and inter-dependency;
- Have an understanding of distributed power generation;
- Create a demand/supply matching system;
- Gain knowledge and skills in composing and designing energy management systems;
- Be familiar with the architecture and operation of energy management systems;
- Gain knowledge and skills in the application of computer tools for the integrated design of energy management systems;
- Design and modelling a smart grid;
- Have an understanding of the EU energy market (regulatory framework, policy).

WEEK	Lectures
1ST	Introduction: From centralized generation towards a smart grid - (Kyriakarakos)
2ND	Centralized generation, transmission and distribution grid fundamentals (Karavas)
3RD	Distributed power generation (PVs, Wind Turbines, etc.) - (Kyriakarakos)
4TH	Distributed storage - (Kyriakarakos/Karavas)
5TH	Microgrids – Technical and Regulatory perspective (Karavas)
6TH	Microgrid Control and Ancillary Services (Karavas/Kyriakarakos)
7TH	Hydrogen (Kyriakarakos)
8TH	Modelling Smart Grids – Optimal Power Flow (Kyriakarakos/Karavas)
9TH	Energy Management in Microgrids (Kyriakarakos/Karavas)
10TH	Intelligent techniques for Energy Management in Smart Grids (Karavas/Kyriakarakos)
11TH	Smart grid planning – a stepped approach (Kyriakarakos/Karavas)
12TH	EU Smartgrid vision: Policy, Legal, Regulatory and Technical frameworks – (Kyriakarakos)
13TH	The EU Electricity Market and the status of distributed generation and storage (Karavas)

Assignments (indicative)

1. Perform a static power flow simulation of an AC and a DC microgrid (Karavas)

2. Modeling of a Renewable Energy Smart system connected with the distribution network (Kyriakarakos)

Exams, marking and student assessment

Assignments: 60%, Written exam(s): 40%