Joint undergrAduate coUrses for smart eNergy managemenT sYstems

Events: C3: SP-HE-IST & C4: SP-HE-IPL

2nd pilot lecture on "Smart Energy Management Systems"

Monday, September 26th 2022 – Friday, September 30th 2022

ROOM: **LRC014 - University Library building,**

University of Cyprus (NEW CAMPUS),

Panepistimiou ave 1, Nicosia, Cyprus

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Monday, 26 September 2022		
Time (Cy)	**Lecture**	**Responsible person**
9:00-9:15	**Welcome participants**	Charalambos Anastasiou (UCY)
9:15-13:00	**Jaunty's 3rd Transnational meeting**	All partners
13:00-14:00	**Break**	
14:00-14:45	**1. Introduction to Smart Energy Management Systems** *1.1 Objectives and outcomes of this module* *1.2 Smart Energy Management Systems* *1.3 Smart Grid (SG) definition* *1.4 Representative architecture*	Nikolay Palov (Software Company)
14:45-15:00	**Break**	
15:00-15:45	**1. Introduction to Smart Energy Management Systems** *1.1 Functions of SG components* *1.2 Basic concepts of a Smart Power Grid* *1.3 The load factor* *1.4 A Cyber-controlled Smart Grid* *1.5 Smart Grid development* *1.6 Smart Micro Grid Renewable energy systems*	Nikolay Palov (Software Company)
15:45-16:00	**Discussion and closing**	

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Tuesday, 27 September 2022		
Time (Cy)	**Lecture**	**Responsible person**
10:00-10:45	**1. Smart Grid Communications and measurement technology** *2.1 Communication and measurement* *2.2 Monitoring, PMU, Smart Meters and measurements technologies*	Marios Siganos (K3Y)
10:45-11:00	**Break**	
11:00-11:45	**2. Performance analysis tools for Smart Grid design** *3.1 Introduction to load flow studies* *3.2 Challenges to Load Flow in Smart Grid and Weaknesses of the Present Load Flow Methods* *3.3 Load Flow State of the Art: Classical, Extended Formulations, and Algorithm* *3.4 Load Flow for Smart Grid Design* *3.5 Voltage calculation in Power Grid analysis* *3.6 Power flow analysis in power grid analysis* *3.7 The bus admittance model*	Nikolay Palov (Software Company)
11:45-12:00	**Break**	
12:00-12:45	**4. Stability analysis tools for Smart Grid** *4.1 Power grid operations control* *4.2 Load frequency control* *4.3 Automatic Generation Control* *4.4 Operating Reserve Calculation* *4.5 Microgrid fault analysis*	Nikolay Palov (Software Company)
12:45-13:00	**Discussion and closing**	

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Wednesday, 28 September 2022		
Time (Cy)	**Lecture**	**Responsible person**
09:00-13:00	*Field Trip to Dhekelia power station in order to Organized by the University of Cyprus. Me*	Hosted by the University of Cyprus
13:00-13:45	**5. Microgrid Solar Energy and storage** *5.1 Photovoltaic power conversion* *5.2 Photovoltaic materials* *5.3 Photovoltaic efficiency* *5.4 The design of Photovoltaic systems*	Nikolay Palov (Software Company)
13:45-14:00	**Break**	
14:00-14:45	**5. Microgrid Solar Energy and storage** *5.5 The maximum power point of a photovoltaic array* *5..6 A battery storage system* *5.7 A storage system based on a single cell battery* *5.8 The estimation of Photovoltaic module model parameters*	Nikolay Palov (Software Company)
14:45-15:00	**Break**	
15:00-15:45	**6. Interoperability, standards and cyber security** *6.1 Introduction* *6.2 Interoperability* *6.3 Interoperability today* *6.4 Benefits and challenges of interoperability* *6.5 Model for Interoperability in the Smart Grid Environment* *6.6 Smart Grid Network Interoperability* *6.7 Standards* *6.8 Smart Grid cyber security* *6.9 Cyber security risks*	Marios Siganos (K3Y)
15:45-16:00	**Discussion and closing**	

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Thursday, 29 September 2022		
Time (Cy)	**Lecture**	**Responsible person**
10:00-10:45	**7. Modeling of Smart Power Grids and power systems** 7.1 Transformer modeling 7.2 Modeling a microgrid system 7.3 The per unit methodology 7.4 Single-phase DC-AC inverters with two switches	Charalambos Anastasiou (UCY)
10:45-11:00	**Break**	
11:00-11:45	**7. Modeling of Smart Power Grids and power systems** 7.5 Single – phase DC/AC inverters with a four – switch bipolar switching method 7.6 Pulse Width Modulation with Unipolar Voltage Switching for a Single - Phase Full - Bridge Inverter 7.7 Three-phase DC/AC Inverters	Charalambos Anastasiou (UCY)
11:45-12:00	**Break**	
12:00-12:45	**8. SCADA and Smart Energy Grid Control Automation (Smart Energy Grid Engineering)** *8.1 Introduction* *8.2 The Smart Grid concept* *8.3 Smart grid/SCADA integration* *8.4 SCADA applications in power system* *8.5 SCADA in solar PV plants* *8.5 Using SCADA in hybrid power systems* *8.6 SCADA system elements* *8.7 Using SCADA in Hybrid Power Systems* *8.8 SCADA System Elements* *8.8.1 Host Computer system*	Charalambos Anastasiou (UCY)
12:45-13:00	**Discussion and closing**	

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Friday, 30 September 2022		
Time (Cy)	**Lecture**	**Responsible person**
10:00-10:45	**9. Advanced Topic in Short term and Long term residential forecasting** *9.1 Introduction* *9.2 Important factors for forecasts* *9.3 Forecasting methods* *9.4 Medium- and long- term load forecasting methods* *9.5 Short-term load forecasting methods* *9.6 Summary*	Alexios Lekidis (PPC)
10:45-11:00	**Break**	
11:00-11:45	**10. Advanced Topic in the internet of things (IoT)** *10.1 The integrated Smart Grid in an internet of things environment IOT* *10.2 Problems in Power Grid and a Smart Grid conceptual model* *10.3 Example of applying the basic principles of Smart Grid* *10.4 Internet of things (IOT)* *10.5 Applying the IOT in Smart Grid* *10.6 Paradigm of the Internet of Things* *10.7 An example to use of IoT in Smart Grid*	Alexios Lekidis (PPC)
11:45-12:00	**Break**	
12:00-12:45	**11. Smart Grids Worldwide (an overview)** *11.1 Ambitious power system development strategy in China* *11.2 Development targets for interconnections in the USA* *11.3 Overview of Smart Grid projects in Europe* *11.3.1 Low voltage experimental microgrid laboratory (University of Cyprus)*	Alexios Lekidis (PPC)
12:45-13:00	**Discussion and closing**	