

## 340610 - GEEN-R3009 - Energy Management

Coordinating unit:	340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit:	710 - EEL - Department of Electronic Engineering 709 - EE - Department of Electrical Engineering
Academic year:	2017
Degree:	MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Teaching unit Compulsory)
ECTS credits:	5
Teaching languages:	Catalan, Spanish

### Teaching staff

Coordinator: Gomila Gonzalez, Marcos

Others: Gomila Gonzalez, Marcos  
Castilla Fernandez, Miguel

### Degree competences to which the subject contributes

Specific:

1. CB6 - Having the knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, sometimes in a research context
2. CB7 - Students can apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
3. CB9 - Students can communicate their conclusions, knowledge and rationale underpinning these, to skilled and unskilled public in a clear and unambiguous way
4. CC04 - Ability to determine and design the most efficient electric drive for different control applications movement
5. CG02 - Ability to apply the techniques of control and regulation of electric machines for motion control.
6. CEV06 -Ability to analyze and design power electronic converters used in power generation systems distributor energy.
7. CEV07 - Ability to analyze and design power electronic converters used in micro grids and in smart power networks.

### Learning objectives of the subject

The main objective.

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### Study load

Total learning time: 125h	Hours large group:	30h	24.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	12.00%
	Guided activities:	0h	0.00%
	Self study:	80h	64.00%

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### Content

<p>1. Electrical Power Systems Applied to Industry.</p>	<p>Learning time: 10h 25m Theory classes: 3h Self study : 7h 25m</p>
<p>Description: Introduction to electrical energy. This lesson will introduce the description, modelling and analysis of power systems.</p>	
<p>2. Introduction to Energy Management.</p>	<p>Learning time: 10h 25m Theory classes: 3h Self study : 7h 25m</p>
<p>Description: Introduction to the management and operation of electric power systems. Electrical engineering LV,MV and HV. Energy audit (Industry 4.0).</p>	
<p>3. Integration of electrical machines in power systems.</p>	<p>Learning time: 20h 50m Theory classes: 6h Self study : 14h 50m</p>
<p>Description: Electrical machines modelling in power systems. Generation and actuators. Power factor correction. Unbalanced loads and affectation of static converters on the electrical grid.</p>	
<p>4. Management and control of energy storage systems.</p>	<p>Learning time: 20h 50m Theory classes: 6h Self study : 14h 50m</p>
<p>Description: Introduction to management and control of energy storage systems. Batteries (including charging and recharging processes) , super-capacitors, flywheels, superconductivity.</p>	

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<p>5. Power electronics systems for the integration and energy management in power systems.</p>	<p>Learning time: 20h 50m Theory classes: 6h Self study : 14h 50m</p>
<p>Description: Power electronics systems for the integration and energy management in power systems.</p>	
<p>6. Energy management in microgrids.</p>	<p>Learning time: 20h 50m Theory classes: 6h Self study : 14h 50m</p>
<p>Description: This lesson will present both the basic concepts in electrical microgrids and some examples of practical microgrids in operation all around the world. This lesson will also discuss the possibilities, properties and limitations of the energy management systems employed in microgrids.</p>	
<p>7. Energy management in smart grids.</p>	<p>Learning time: 20h 50m Theory classes: 6h Self study : 14h 50m</p>
<p>Description: This lesson will present both the basic concepts of smartgrids and some application examples. Besides the energy management strategies used in this kind of advanced power systems will be discussed.</p>	

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### Bibliography

#### Basic:

Yazdani, Amirnaser; Iravani, Reza. Voltage-sourced converters in power systems [Recurs electrònic] : modeling, control, and applications [on line]. Hoboken [etc.]: Wiley & Sons, 2010 [Consultation: 04/03/2016]. Available on: <<http://onlinelibrary.wiley.com/book/10.1002/9780470551578>>. ISBN 9780470521564.

Power Electronics in Smart Electrical Energy Networks [Recurs electrònic] [on line]. London: Springer London, 2008 [Consultation: 04/03/2016]. Available on: <<http://dx.doi.org/10.1007/978-1-84800-318-7>>. ISBN 9781848003187.

Gellings, Clark W. The Smart grid : enabling energy efficiency and demand response. Lilburn, GA: Fairmont Press, 2009. ISBN 9781439815748.

Willian D. Stevenson. Análisis de Sistemas Eléctricos de Potencia. Segunda. Mexico: Mc Graw-Hill, 1985. ISBN 968-6046-98-4.

Siemens. Manual de Baja Tensión. Segunda. Germany: Marcombo Boixareu Editores, 2000. ISBN 84-267-1242-8.

#### Others resources:

MATLAB-Simulink-Simpower.

Audiovisual material

Canó , Projector

Computer material

Ordinador Personal, 1 per alumne

Programes Informàtics