

820324 - EAE - Efficiency and Energy Audits

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: FRANCESC XAVIER ROSET JUAN
Others: Primer quadrimestre:
ANGEL CUADRAS TOMAS - M11, M12
FRANCESC XAVIER ROSET JUAN - M11, M12

Opening hours

Timetable: In desk A10-8

Prior skills

Knowledge of thermal and electrical systems
Knowledge of the different ways to generate electricity, transmission and distribution technologies, and energy markets.
Know how energy is integrated into different sectors.

Requirements

Electronic systems
Electric energy generation
Energy resources

Degree competences to which the subject contributes

Specific:

3. Design an energy saving system using different processes and technologies.

CEENE-09. Assess and compare technologies in economic terms and in terms of their efficiency and environmental impact.

Transversal:

6. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

9. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

10. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

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Teaching methodology

Exhibition classes, participative works, problems, test, working group and external activities

Learning objectives of the subject

Meet the efficiency of energy in all its industrial chain. Know and apply methodologies to improve the energy efficiency in competitive environments.

Know certifications and audits energetics, and another regulations and management energy programs.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

(ENG) 1-Introduction	Learning time: 9h 40m Theory classes: 3h 30m Laboratory classes: 0h 10m Self study : 6h
Description: The energy management. Basic concepts, energy efficiency, market, supply contracts, among others. Specific objectives: Understand what is meant by energy management	
(ENG) 2.The energy sector and their management	Learning time: 13h 40m Theory classes: 5h Laboratory classes: 0h 20m Self study : 8h 20m
Description: The energy sector and its management. The problem of environmental sustainability, the role of energy manager. The standard UNE 21630 and 16000 Specific objectives: Knowing the energy sector from the point of view of management. Meet current standards for energy management.	
(ENG) 3-Power quality	Learning time: 8h 20m Theory classes: 4h Laboratory classes: 0h 20m Self study : 4h
Description: Power Quality. Energy management effects Specific objectives: Understand what is meant by energy management.	

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(ENG) 4-Energy Efficiency in Buildings	Learning time: 22h Theory classes: 7h Laboratory classes: 3h Self study : 12h
Description: Energy efficiency in buildings. Basic Principles. LIDER and CALENER. Specific objectives: Knowledge of methodologies that exist to meet energy efficiency in housing. Labelling of building.	
(ENG) 5-Energy Audit	Learning time: 16h 10m Theory classes: 6h 50m Laboratory classes: 1h Self study : 8h 20m
Description: Energy audit. The plan for energy efficiency Specific objectives: Knowing the tools to identify energy efficiency plan in the industry: energy audit and energy assessment.	
(ENG) 6-Energy Efficiency in Process technology	Learning time: 9h 10m Theory classes: 5h 20m Laboratory classes: 0h 30m Self study : 3h 20m
Description: Energy efficient process technologies, energy efficiency horizontal processes. Examples and Problems. Specific objectives: Identify opportunities for energy efficiency in industry in both horizontal and technologies in process technologies.	

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7-Investment and financial analysis	Learning time: 8h 30m Theory classes: 3h Laboratory classes: 0h 30m Self study : 5h
Description: Investment projects and cash flow Static and dynamic methods Simple and compound interests Examples of application	
8-Technologies available regarding energy consumption motors and drives	Learning time: 10h 40m Theory classes: 3h 30m Laboratory classes: 0h 30m Self study : 6h 40m
Description: Potential savings and pumping losses Losses and efficiency in engines Speed ??control motors and pumps Related activities: Examples and application problems	
(ENG) 9-Energy Service Companies	Learning time: 14h 10m Theory classes: 5h 20m Laboratory classes: 0h 30m Self study : 8h 20m
Description: The energy service companies. Description and types of contracts. Specific objectives: To study the energy service companies and their chance against changes in market players.	
(ENG) 10- Case Work	Learning time: 30h 30m Theory classes: 5h 30m Laboratory classes: 0h 30m Self study : 24h 30m
Description: Monograph	

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<p>11-Maintenance strategy to improve energy management</p>	<p>Learning time: 7h 10m Theory classes: 3h 30m Laboratory classes: 0h 10m Self study : 3h 30m</p>
<p>Description: Maintenance strategies CM TBM, CBM and RCM Maintenance of steam systems, compressed air, lighting, motors and sensors</p>	

Qualification system

Final= 0.2*partial control+ 0.2* final control + 0.2*Software application+ 0.15TEST, Exercises and problems + 0.15 Work + 0,1*Activities and visits

Regulations for carrying out activities

Exams, tours and sessions with guests are mandatory presence.
Without reevaluation process

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Bibliography

Basic:

Sans, Ramón. La Darrera oportunitat. La transició energètica del segle XXI (TE21). 2016. Barcelona: Octaedro, 2016. ISBN 9788499217963.

Sans Rovira, Ramon ; Pulla Escobar, Elisa. El Col·lapse és evitable : la transició energètica del segle XXI (TE21). Barcelona: Octaedro, 2014. ISBN 9788499214535.

Doty, Steve; Turner, Wayne C. Energy management handbook. 8th ed. Lilburn, GA: Taylor & Francis, 2013. ISBN 9781466578289.

Al-Shemmeri, Tarik. Energy audits : a workbook for energy management in buildings. 2011. Chichester: Wiley-Blackwell, 2011. ISBN 9780470656082.

Carretero, Antonio ; García Sánchez, Manuel. Gestión de la eficiencia energética : cálculo del consumo, indicadores y mejora. 2015. Madrid: Aenor, 2015. ISBN 9788481438840.

Complementary:

U.S. Energy Information Administration. International energy outlook [on line]. 2011. Washington: U.S. Energy Information Administration, 2010 [Consultation: 20/03/2012]. Available on: <<http://www.eia.gov/forecasts/ieo/>>.

Kreith, Frank & West, Ronald E. CRC handbook of energy efficiency. Handbook. Florida: CRC press, 1997. ISBN 0849325145.

Asociación Española de Normalización y Certificación. UNE-EN ISO 50001 : sistemas de gestión de la energía : requisitos con orientación para su uso. Madrid: AENOR, 2011.

Asociación Española de Normalización y Certificación. UNE 216501 : auditorías energéticas : requisitos. Madrid: AENOR, DL 2009.

International Energy Agency. Energy technology perspectives 2010 : escenarios & strategies to 2050 [on line]. París: OECD/IEA, cop. 2010 [Consultation: 14/09/2017]. Available on: <<http://www.iea.org/publications/freepublications/>>. ISBN 9789264085978.

Ministerio de Industria, Turismo y Comercio. La Energía en España 2010 [on line]. Madrid: Ministerio de Industria, Turismo y Comercio, 2011 [Consultation: 14/09/2017]. Available on: <http://www.minetur.gob.es/energia/balances/balances/librosenergia/energia_espana_2010_2ed.pdf>. ISBN 978-84-15280-08-8.

Others resources:

Hyperlink

Energy Software
Resource for the Work

Audiovisual material

Transparències de classe
Clasrom documentation

Computer material

Software HULC, CE3X y VERDE
Software

Normes d'energia

Standarts energy efficiency



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Test, Exercicis i Examens anteriors
Resource