

Partner University		Universitat Politècnica de Catalunya · BarcelonaTech											
Degree		MSc Energy Engineering											
Code	820737	Name	Energy efficiency and rational use of energy										
ECTS	5	Year	1	Semester	2	Character	Mandatory						
Pre-requisites		none											
Objectives		Introducing energy efficiency as a viable option in the energy sector and the technological options involved in energy efficiency, with particular emphasis on the options of storing energy, energy saving in industry, the sector of real estate and housing, and existing mechanisms for its implementation.											
Learning outcomes		<p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Demonstrate a good knowledge and understanding on the role of energy efficiency in global and regional contexts, and its economical, social and environmental impacts. • Demonstrate a good knowledge and understanding on the relevant international organizations, the main sources of information, and those regulations related to the energy efficiency in different sectors. • Carry out activities related to energy management in various sectors, particularly in energy efficiency related issues. • Propose transferable results - on issues affecting the energy efficiency- through the development of innovative ideas. 											
Course main content		<ol style="list-style-type: none"> 1. Introduction. Basics: Energy efficiency, efficient use of energy, demand management. 2. Assessment and Energy Audit: Energy balance, sample projects, European and local programs for promoting energy efficiency. 3. Energy Storage Techniques: Thermal Energy Storage using underground structures (UTES) phase-change materials, chemical reactions, water tanks, storage of electricity, Case Studies. 4. Energy efficiency in buildings (housing sector): Energy efficiency, solar thermal systems assets and liabilities. 5. Energy efficiency in buildings (commercial and industrial sectors): Application of the methodology of energy audit, Energy Efficiency in Electrical Systems, Energy efficiency in lighting systems, lighting, Examples. 6. Energy efficiency in industry: Demand for electricity and heat to industrial facilities, Cogeneration, parameters of efficiency cogeneration technologies. 7. Energy efficiency in transport: Rail transport and tram; Other modes of transport; 8. Efficient management of energy in different processes: Monitoring, Control. 											
Methodology		Lectures, participative sessions, exercises, assignments and visits to energy facilities and companies.											
Bibliography		<ul style="list-style-type: none"> • World energy outlook 2011; www.iea.org/weo/ • Cibse Guide F.-Energy efficiency in buildings • Asociación para la Investigación y Diagnósis de la Energía. "Manual de Auditorias Energéticas". Cámara de Madrid. 15 de marzo de 2006. • Generalitat de Catalunya. Institut Català d'Energia. "Gestión de la energía en la industria. Programa d'Assessorament Energètic." 6 de mayo 2006. 											
Student assessment		<table> <tr> <td>Exercises:</td> <td>20 %</td> </tr> <tr> <td>Final exam:</td> <td>30 %</td> </tr> <tr> <td>Lab work:</td> <td>20 %</td> </tr> </table>						Exercises:	20 %	Final exam:	30 %	Lab work:	20 %
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	Monographic work: 30%
Contact person	Jordi Cadafalch http://directori.upc.edu/directori/dadesPersona.jsp?id=1003238
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