

Materia 4_25: Energy management and Environment

Materia:	Energy management and environment	ECTS:	15
Descriptores	<ul style="list-style-type: none"> • Water pollution. Wastewater treatment (physical, chemical and biological processes). Wastewater reclamation. Atmospheric pollution. Challenges in atmospheric pollution control. Treatment of gaseous effluents from industry. Management of municipal wastes. Management of hazardous wastes. • Structure and elements of power systems. Generation and demand modeling. Operation of power systems in steady state. Economic operation strategies in power systems. Power systems in transient-state. Frequency and voltage control in power systems. • Technology and materials for thermal storage. Production and storage of hydrogen, biogas. Electrochemical storage (batteries). Management of systems with storage. Thermal storage applications. Fuel cells and applications. 		
Objetivos generales	<p>This subject has the objective of introducing the student to the problems associated with the coverage of electricity demand through the different generation technologies available and the technical, economic and regulatory aspects that appear when integrating these technologies into an electrical power system.</p> <p>In the current energy context, in which the transition towards an energy system that respects the environment, based mainly on the generation of energy with renewable sources, it will be necessary to adapt the demand to the production and vice-versa. In this context, storage can bring the needed flexibility to the system, where it will be important to analyse and understand the interconnection between different forms of energy, the conversion of energy and the different ways in which energy can be stored. To acquire, in an applied way, the knowledge about environmental technologies and sustainability necessary for future professional practice.</p>		
Competencia específica	CE [4-23] - Design sustainable scenarios of energy solutions for conversion and storage of electricity and to manage it properly.		
Resultados de aprendizaje	<ul style="list-style-type: none"> • Apply knowledge about environmental technologies and sustainability to activities related to energy generation and management. Discuss the existing tools such as environmental management systems and legal initiatives on integrated pollution prevention and control. • Build the mathematical model of different elements in the power system. Apply different tools for the analysis of power systems in steady state (Power flow calculation, State estimation). Evaluation of power transactions in competitive and regulated markets. Calculate the stability of a system in transient state. Calculate the primary and secondary control of frequency and voltage in power systems. • Summarize the reasons for storing energy and the options available for energy storage over different time frames. Assess energy conversion efficiency and understand efficiency limitations during conversion due to thermodynamic or device limitations. Evaluate different sources of energy and quantify their energy potential. 		
Métodos de evaluación	<ul style="list-style-type: none"> • Evaluation: Written open-ended test and Problems • Assessment instruments: Checklists and Rating Scales • Project-based activities in groups of 3-4 		