ENERGY EFFICIENCY

1.1. Identification

University:	Universidad Politécnica de Valencia													
School:	Escuela Técnica Superior de Ingeniería del Diseño													
Course:	Energy efficiency													
ECTS:	4													
Semester:	*Winter*					X	*Summer*							
Category	*Fundamental course*						*Specialisation course*							X
Module	*MFI*		*MFII*		*MFIII*		*MSI*	X	*MSII*		*MSIII*			
Teachers:	Laura Contat, Amparo Ribes													
Language:	*English*	X	*Italian*		*Swedish*		*Spanish*							

1.2. Learning-outcomes

- Analysis of the energy efficiency of industrial processes
- knowledge about integration of industrial processes

1.3. Competencies

- **General**
  - to have critical understanding of technical and scientific tools
  - to work and manage teams
  - communication skills (both written and oral)
  - to work in an international context

- **Specific**
  - to determine the exergy of pure substances and multicomponent systems (both reactive and non-reactive)
  - to perform exergy balances of industrial processes
  - to identify and quantify the exergy losses and exergy destructions of thermal systems and processes
  - to analyse the exergy efficiency of thermal processes for their efficient design and optimization

1.4. Contents

Mechanical work ability. Dead state. Thermomechanical exergy. Thermomechanical exergy balance. Lost exergy. Exergy associated to work and heat. Thermomechanical exergy balance in a control volume. Exergy of a fluid stream. Exergy efficiency. Applications of thermomecanical exergy. Exergy analysis in heat exchangers. Turbines and adiabatic compressors. Power cycles. Refrigeration and cryogenic cycles.

The ability to produce work in multicomponent systems. Definition of the dead state. Chemical exergy. Exergy of a non-reactive system. Exergy of a reactive system. Exergy analysis of multicomponent systems: combustion chambers, steam boilers, refrigeration towers.

1.5. Teaching Methodology

- Lecture sessions
- Practical sessions: “cooperative work” for solving problems

1.6. Evaluation

- written exams
- oral evaluation of the problems solved by “cooperative work”

1.7. Bibliography

- A. Bejan. Advanced Engineering Thermodynamics. Wiley-Interscience
- R.W. Haywood. Equilibrium Thermodynamics for Engineers and Scientists. Wiley
- J.M. Moran. Availablility Analysis: A Guide to efficient energy use. Prentice-Hall
- J.E. Ahern. The Exergy Method of Energy Systems Analysis
- J. Szargut, D.R. Morris, F.R. Steward. Exergy Analysis of Thermal, Chemical and Metallurgical Processes. Hemisphere
- R.W. Haywood “Analysis of engineering Cycles”. Pergamon Press. Oxford