

66345 - Tools for energy analysis in the industry. Energy intensive industries

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	535 - Master's in Renewable Energies and Energy Efficiency
ECTS	5.0
Course	1
Period	Second semester
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The learning process designed for this course is based on the following main activities: Theory sessions in which basic concepts are explained and related to the technical process characteristics. Short exercises are used that are solved on the board, serving as support to assure understanding of the concepts. In both cases the basic methodology used is master class.

In the practical sessions laboratory experiments are combined with computer sessions in which students work in more complex case studies than those presented in theory sessions.

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In addition the program also includes work activities that includes cost estimation and thermoeconomic analysis.

5.2.Learning activities

The learning process designed for this course is based on the following main activities:

- Theory sessions in which basic concepts are explained and related to the technical process characteristics. Short exercises are used that are solved on the board.
- Computer lab sessions in which students work in more complex case studies than those presented in theory sessions by the use of dedicated software (EES and TAESS).
- Subject work: by conducting a work supervised by the teacher the students apply in a concrete and practical way the concepts presented in class.

5.3.Program

The subject syllabus has the following theoretical lessons:

EXERGY ANALYSIS:

- Exergy and irreversibility
- Exergy efficiency
- Chemical Exergy
- Exergy efficiency in real cases

THERMOECONOMY

- Computation of material and energy flows in complex energy systems.
- Thermoeconomic model of energy systems.
- Exergy Cost. Assessment rules.
- Application of Input-Output analysis to determine exergy cost.
- Thermoeconomic diagnosis of energy systems

INDUSTRIAL SYMBIOSIS

- Introduction to the industrial symbiosis.
- Industrial symbiosis experiences
- Application of thermoeconomic analysis to industrial parks integration.

5.4.Planning and scheduling

Classroom and practical sessions are held according to schedule set by the EINA.

At the beginning of the semester, the lecturer will inform the planning of the educational activities and deadlines.

More information on the EINA website.

5.5.Bibliography and recommended resources

Subject presentations and notes are provided in Moodle

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Reference books:

- A. VALERO, A. VALERO, "Exergy analysis of resources and processes". Serie tecnológica, número 181.
- S. USÓN, A. VALERO, "Thermoeconomic diagnosis of Energy systems". Serie tecnológica, número 190.
- VALERO, S. USÓN, "Ecología industrial: cerrando el ciclo de materiales". Serie tecnológica, número 199.

Other resources:

- EES (Engineering Equation Solver)
- Exergy calculator: www.exergoecology.com
- TAESS (Thermoeconomic Analysis for Energy Systems Software) www.exergoecology.com