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

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	535 - Master's in Renewable Energies and Energy Efficiency
ECTS	5.0
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. In **lectures** the basic concepts are explained and related to the technical process characteristics. Short exercises are solved on the board, working as support to assure understanding of the concepts. In the **practice sessions**, laboratory experiments are combined with computer sessions in which students work in more complex case studies than those presented in lectures. **Other activities** include cost estimation and thermoeconomic analysis.

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5.2.Learning tasks

The course includes the following learning tasks:

- Lectures in which the basic concepts are explained and related to the technical process characteristics. Short exercises are solved on the board.
- Computer lab sessions in which students work in complex case studies using specialized software (EES and TAESS).
- Assignment: Students prepare a supervised assignment to apply in a concrete and practical way the concepts presented in class.

5.3.Syllabus

The course will address the following topics:

TOPIC 1. EXERGY ANALYSIS:

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

TOPIC 2. 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

TOPIC 3. INDUSTRIAL SYMBIOSIS

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

5.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

5.5.Bibliography and recommended resources

Course presentations and notes are available at Moodle.

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:

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