66346 - Advanced thermoelectric generation. Zero emissions plants. Emissions trading

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. A wide range of teaching and learning tasks are implemented, such as:

- **Lectures**: Professor's presentations of the most relevant topics of the course, supported by Power-Point files. They will be complemented with the solving of short examples and cases.
- **Case studies**: several problems will be solved by the students, using the computer and simulation tools. They will

consist on multidisciplinary questions related to the course contents, addressing energy efficiency and/or emissions issues.
- **Assignment**: students will prepare an assignment, working as a first approach to a research topic. The scope and methodology will be suggested or approved by the professors. The students will defend and discuss it with the professors and the rest of the class.

5.2.Learning tasks

The course includes the following learning tasks:

- A01 Lectures (25 hours). Presentation of theoretical contents by a faculty or by external experts to all students enrolled in the course. Although it is not a mandatory activity, regular attendance is highly recommended.
- A02 Problem and case solving (13 hours). Solve practical problems and exercises with all the students. Although it is not a mandatory activity, regular attendance is highly recommended.
- A03 Laboratory sessions (12 hours). Students will work actively in groups to solve practical exercises.
- A06 Guided assignments (20 hours). Students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures.
- A07 Autonomous work (50 hours). Students are expected to spend about 50 hours to study theory, solve problems and prepare lab sessions.
- A08 Assessment (5 hours).

The indicated hours are for guidance and will be adjusted depending on the academic calendar.

At the beginning of the course, lecturers will communicate the schedule of practice sessions, which will be set according to the syllabus and the availability of laboratories and computer rooms.

The professors will monitor the development of the **assignment** in tutorial time (3.5 hours).

5.3.Syllabus

The course will address the following topics:

Topic 1. Thermoelectric generation in conventional power stations

Topic 2. Thermoelectric generation in combined-cycle power stations

Topic 3. Thermoelectric generation in advanced power stations

Topic 4. Control of emissions in power stations: primary and secondary techniques

Topic 5. Global warming: international agreements

Topic 6. CO_2 capture technologies

6.1. Oxy-fuel combustion

6.2. Post-combustion

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6.3. Pre-combustion

Topic 7. CO2 Storage and uses

5.4.Course planning and calendar

Provisional course planning

- February 2018 - Start of the course
- March 2018 - First Case-Study
- April 2018 - Second Case-Study
- May 2018 - Assignment Discussion
- June 2018 - Final Exam, first call
- September 2018 - Final Exam, second call

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

5.5.Bibliography and recommended resources

- Centrales térmicas de carbón pulverizado / Cristóbal Cortés Gracia ... [et al.] Zaragoza : Prensas Universitarias de Zaragoza, 2009.
- Captura y almacenamiento de CO2 / Luis Miguel Romeo... [et al.] Zaragoza : Prensas Universitarias de Zaragoza, 2010.
- Waste Heat Boilers Deskbook. V. Ganapathy. Prentice Hall.
- Thermal Environmental Engineering. Kuehn H., Ramsey, J. W., Threlkekd. Prentice Hall.
- Combined-Cycle Gas & Steam Turbine Power Plants. Kehlhofer, R.H., Warner, J., Nielse, H., Bachmann, R. 1999. Pennwell.