Universidad Zaragoza

Year : 2019/20

66226 - Energy Optimization

Syllabus Information

Academic Year: 2019/20
Subject: 66226 - Energy Optimization
Faculty / School: 110 -

Degree: 531 - Master's in Chemical Engineering

ECTS: 6.0
Year: 1
Semester: Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

The course includes the following learning tasks:

- **Lectures** (30 hours, two hours per week). Explanation of the theory of the syllabus and solving of "model" problems.
- **Practice sessions** (15 hours, 1 hour per week). In these classes, students solve problems supervised by the teacher. Problems or case studies will be related to the theoretical part explained in lectures.

- **Laboratory sessions** (15 hours). 5 sessions of 3 hours each, where the student applies the contents studied in lectures and problem sessions. These will be made individually or in pairs and will be supervised by teachers. The assessment of the work informs of the student's level of achievement of the programmed learning objectives.
- **Guided assignment** (20 hours). 1 or 2 activities will be proposed during the course, which will be supervised and done individually. The proposed activities should be developed, expanded, documented, and solved based on the concepts seen in the classroom cases. A report will be made and assessed.
- **Study** (60 hours). It is recommended to study continuously throughout the semester.
- **Assessment tests** (10 hours). A final exam will be conducted to evaluate the theoretical and practical knowledge gained by the student.

4.3.Syllabus

The course will address the following topics:

1. Physical fundamentals. Modeling and simulation of energy systems.
2. Exergy analysis. Diagnosis of the operation of equipment and plants.
3. Economic fundamentals. Principles and criteria for economic evaluation.
4. Mathematical programming. Optimality conditions and their economic significance. Techniques and optimization programs. Optimal design of equipment and plants.
5. Synthesis process. Polygeneration systems.
6. Energy integration. Heat exchange networks. Cogeneration and optimum heat recovery. Heat pumps and refrigerating machines. Thermal energy storage (heat and cold). Use of renewable energy.
7. Introduction to Thermoeconomics. Thermoeconomic and life cycle analysis of energy systems.

4.4.Course planning and calendar

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

The laboratory sessions will be scheduled depending on the number of students and will be previously announced. The laboratory sessions sessions will focus on practical cases of energy optimization.

The report of the laboratory work must be submitted in the next lab session, except the last one before Christmas.

The students prepare a supervised assignment at the end of the course by applying the acquired knowledge.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=66226&year=2019