

## 66343 - Advanced biomass energy

### Syllabus Information

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**Academic Year:** 2019/20

**Subject:** 66343 - Advanced biomass energy

**Faculty / School:** 110 -

**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.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. A wide range of teaching and learning tasks are implemented, such as oral presentations, practice sessions with exercises in the blackboard and computer practice sessions with specialized software to solve longer problems and parametric studies.

In practice sessions, different aspects about how to reduce emissions of SO<sub>2</sub>, NO<sub>x</sub> and CO<sub>2</sub> are shown.

#### 4.2.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.

### **4.3.Syllabus**

The course will address the following topics:

1. Description of Biomass combustors.
2. Description of solids gasifier.
3. Thermochemical review.
4. Introduction to chemical kinetics.
5. Theory about elementary reactors.
6. Steam power plants.
7. Gasification plants.
8. Energy of wet waste biomass.
9. Production and use of biofuels.

### **4.4.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

([http://eina.unizar.es/intraneteina/index.php?r=calendarioExtN/index\\_oficial](http://eina.unizar.es/intraneteina/index.php?r=calendarioExtN/index_oficial))

### **4.5.Bibliography and recommended resources**