

Academic Year/course: 2022/23

## 66235 - Combustion Science and Technology

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 66235 - Combustion Science and Technology

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 531 - Master's in Chemical Engineering

**ECTS:** 3.0

**Year:**

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

### 1. General information

### 2. Learning goals

### 3. Assessment (1st and 2nd call)

### 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. The course includes theory sessions, of either 1 or 2 hours, and practice sessions of 1 hour. Supervised practical assignments will also be carried out, following the suggestions of the teachers. Students will also prepare an assignment on a specific aspect of combustion and will submit a report and make a presentation of it.

Materials will be provided to students in advance, probably through the virtual platform Moodle.

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

#### 4.2. Learning tasks

The course includes the following learning tasks:

- Theory sessions (18 hours). They will include theoretical contents and examples of practical cases.
- Practice sessions (8 hours). Students will solve practical cases under the supervision of the teacher. Practical cases will be directly related to the theory sessions.
- Supervised assignments (10 hours). 2-3 activities proposed by the teachers done individually or in group.
- Autonomous work and study (26 hours). It is recommended to study since the beginning of the semester.
- Visits (4 hours). Visits are scheduled to facilities of interest.
- Tutorials (6 hours). The teacher solves student's doubts during office hours.
- Assessment (3 hours). Partial and final evaluation will be done along the course of both theory and practice. The course can be passed by means of a continuous assessment system, in which similar activities to those made along the course will be assessed. Anyway, the students will be able to do a final global exam of the course, in agreement with the regulations of the University of Zaragoza.

#### 4.3. Syllabus

The course will address the following topics:

1. Introduction to combustion. Interest on studying combustion.
2. Thermochemistry of combustion: stoichiometry, formation enthalpies and heat of combustion. Adiabatic temperature flame.
3. Homogeneous chemical kinetics: elemental reactions, non-elemental reactions. Reactions of importance in combustion. Important mechanisms.
4. Flame types. Premixed flames. Diffusion flames. Flame theory. Flame stability. Gas turbine combustion. Otto combustion engines. Premixing burners. Diffusion burners.
5. Droplet evaporation. Diesel combustion engines.
6. Solid combustion. Combustion technologies and strategies.
7. Pollutant minimization. Practical case: emission minimization in Diesel engines.

#### **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.

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

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=66235>