

## 29736 - Combustion Engines

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 29736 - Combustion Engines

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

**Degree:** 434 - Bachelor's Degree in Mechanical Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** First semester

**Subject type:** Optional

**Module:**

### 1. General information

The subject is part of the optional training block that we could call energetic. It provides the fundamental principles to understand and design combustion engines, as well as their optimized integration in vehicles and thermal and electric power generation plants.

This approach contemplates several of the Sustainable Development Goals, SDGs, and specific targets:

- Goal 7: Targets 7.2 and 7.a.
- Goal 11 Targets 11.2 and 11.6
- Goal 12: Target 12.2.
- Goal 13: Target 13.3.

It is recommended that the student has passed the courses of Technical Thermodynamics and Heat Transfer and Thermal Engineering. It is also desirable to be familiar with the fundamental concepts of fluid mechanics, resistance of materials and machine design.

### 2. Learning results

The student, in order to pass this subject, must demonstrate that:

Knows a wide range of energy production and distribution systems and their applications in the energy industry or as an auxiliary part of other industries.

Identifies the relationship of the knowledge and skills on various industrial technologies acquired in the previous subjects with their application in the specific domain of the thermal power machinery industry.

Applies techniques and methods from various disciplines for the analysis and design of combustion engines. Knows and understands the operation of combustion engines for vehicles

Knows the different electronic and control systems used in motors and understands their operation.

In accordance with the professional competences of this degree, the future graduate must be able to consider the needs of the application of combustion engines, as well as to approach design and optimization projects of these machines.

### 3. Syllabus

The contents to be developed are the following:

- Introduction. Comparison of engines and current trends in design and application.
- Real cycles. Collection and analysis.
- Definition of the fundamental and comparison parameters.
- Performance analysis. Characteristic graphs.
- Similarity in engines.
- Principles of load renewal.

- Exhaust process. Silencers.
- Fuel characteristics.
- Combustion processes. Characteristics and influencing factors.
- Contaminants and purification systems.
- Mechanical and thermal losses. Cooling and lubrication.
- Principles of overfeeding.

#### 4. Academic activities

- Lectures (30 h./ T1). - Theoretical expository sessions and application of combustion engines.
- Problem classes (15 h./ T2). - Problems and cases related to the theoretical contents will be developed.
- Laboratory practices (15 h./ T3). - The student will assimilate the operation of the combustion engines by means of the direct contact with constituent components and systems.
- Tutored work (20 h./ T6). Activity carried out in groups of 2 or 3 students in which real issues will be analyzed.
- Study (64 h./ T7). - Personal study of the student
- Assessment tests (6 h./ T8).

#### 5. Assessment system

In both calls:

I. Mixed system, consisting of:

a) Assessment of activities developed during the term, laboratory practices (minimum 4 out of 10) and tutored work (minimum 4 out of 10).

The overall result of these will be weighted by 30% in the final grade. The grade for these activities is kept until the second call.

Assessment criteria:

- Own realization.
- Correctness and clarity in written communication.
- Delivery on time and in the required format.

b) Final written test, consisting of quick answer theory questions and problems similar to those solved in class the grade will constitute 70 % of the final grade.

Students who do not obtain in this final written test a minimum grade of 5 out of 10 will not pass the subject.

Assessment criteria:

- Correct approach to the procedure for solving questions and problems.
- Accuracy of the result obtained.

II. Simple system, global final test consisting of two parts:

- Final written test equal to that mentioned in the mixed system (minimum 5 out of 10, 70% of the overall grade).
- Questionnaire on the content of practices and assignments (4 out of 10, 30%)