

## Course guide

### 220123 - MT - Engines and Powertrains

Last modified: 05/07/2024

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 724 - MMT - Department of Heat Engines.  
 710 - EEL - Department of Electronic Engineering.

**Degree:** BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).  
 BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2024 **ECTS Credits:** 3.0 **Languages:** Catalan

#### LECTURER

**Coordinating lecturer:** Bermejo Plana, David

**Others:** Bermejo Plana, David

#### TEACHING METHODOLOGY

The teaching of the subject is organized in three methodological blocks:

- Face-to-face sessions in the classroom with theory classes (lectures) and application (examples and problems).

In the face-to-face sessions in the classroom, the teaching staff in charge will present the contents of the course, introducing the theoretical bases of the subject, concepts, methods and resolution procedures and results, illustrating them through convenient examples, visual material and proposing to the students, when considered, exercises and problems to solve.

Additionally, teachers will regularly propose activities to understand and consolidate the concepts worked on in the classroom.

- Practical face-to-face sessions, which may include specific lessons on the use of computer software, conferences and talks, seminars, laboratory and/or workshop practices, presentation of work/projects and visits to companies.

Conferences, talks, seminars, laboratory/workshop practices, presentation of work and visits to companies will be conveniently announced through ATENEA.

- Independent study and group work through carrying out different activities.

In group work, students will have to collaborate together in small groups on a common goal. During the activity, students create knowledge from the interaction between peers, instead of the classic teacher-student transfer, students are responsible for both their classmates' learning and their own, and the role of the teacher is that of a facilitator, that is, That is, it develops the structure, facilitates the context and provides the learning space. Students are expected to interact, discuss, contrast points of view and solve the problem together.

#### LEARNING OBJECTIVES OF THE SUBJECT

Demonstrate knowledge and understanding of the application of different thermodynamic principles and evaluate the effect of different thermodynamic properties on the performance of automotive heat engines during the design phase – satisfying design requirements – and in operating conditions – predicting behavior.

Demonstrate the ability to apply knowledge in thermal engineering in the creation and evaluation of automotive heat engines and the different auxiliary technological components to satisfy design requirements, verify overall performance and propose improvements.

#### STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	40.00
Self study	45,0	60.00

**Total learning time:** 75 h



## CONTENTS

---

### Module 1: Power unit

**Description:**

- 1.- Introduction to the automobile
- 2.- Foundations of internal combustion engines
- 3.- Operational characteristics
- 4.- Design and operation parameters
- 5.- Alternative internal combustion engine technologies

**Full-or-part-time:** 37h 30m

Theory classes: 15h

Self study : 22h 30m

### Module 2: Powertrain

**Description:**

- 1.- Introduction to the powertrain
- 2.- The clutch
- 3.- The gearbox
- 4.- The differential
- 5.- Joints and transmission shafts

**Full-or-part-time:** 37h 30m

Theory classes: 15h

Self study : 22h 30m

## GRADING SYSTEM

---

The subject grading system is structured in the following blocks:

- 1) Final exam (P). Weight 50%
- 2) Group work and laboratory practices (T). Weight 20%
- 3) Conceptualization and resolution of challenges (R). Weight 30%

For students who do not pass the final exam (P), a renewal exam will be held at the end of the semester on a day and time to be agreed upon by the School and the teaching team.

Guidelines for the renewal exam:

- Only students who have failed the final exam ( $P < 5.0$ ) can appear.
- The maximum grade is limited to 6.0 out of 10.0.
- The final mark corresponding to the final exam (P) will be the highest obtained by the student between the two exams (ordinary exam and re-examination).

## BIBLIOGRAPHY

---

**Basic:**

- Heywood, John B. Internal combustion engine fundamentals. New York: McGraw-Hill, 1988. ISBN 007028637X.
- Stone, Richard. Motor vehicle fuel economy. London: McMillan, 1989. ISBN 0333438205.
- Heisler, Heinz. Vehicle and engine technology. London: Edward Arnold, 1985. ISBN 0713135425.