

## 30150 - Ballistics

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 30150 - Ballistics

**Faculty / School:** 179 - Centro Universitario de la Defensa - Zaragoza

**Degree:** 563 - Bachelor's Degree in Industrial Organisational Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** First semester

**Subject type:** Optional

**Module:**

### 1. General information

The main objective of the course is for the student to know the processes that take place inside a fire hydrant before the exit of the projectile, to understand the different mathematical models that study the trajectory of a conventional projectile and to be able to apply the necessary corrections to adapt the theoretical trajectory to real conditions.

### 2. Learning results

RA- 1. Analyze the movements of a projectile inside and outside the barrel.

RA-2. Analyze projectile-cannon interactions.

RA-3. Recognize the mechanisms of penetration, destruction, fragmentation and the necessary protection.

RA- 4. Calculate ballistic dispersion.

RA- 5. Predict the effects produced by a projectile.

### 3. Syllabus

Block 1. Interior ballistics.

- Elements of interior ballistics.

- Fuses, artifices and multipliers.

- Interior ballistics in conventional guns.

Block 2. External ballistics.

- Vacuum ballistics.

- General equations of the projectile in the atmosphere.

- Aerodynamic resistance.

- Point mass model.

- Ballistic corrections.

- Rigid solid model.

- Dispersion of the shot.

- Shot tables.

Block 3. Effects ballistics.

- Effects of the breaking projectile.

- Effects of the perforating projectile.

- Effects of special projectiles.

### 4. Academic activities

- Lectures; sessions of development of the content of the subject.

- Practical classroom sessions: completion and progress of the different deliverables and group work under the supervision of the teacher.

- Evaluation test: completion of the theoretical-practical exam.

### 5. Assessment system

FIRST CALL

Continuous evaluation:

1. Theoretical and practical exam (60% final grade). Evaluation of contents and knowledge of the subject.

2. Exercises and theoretical questions proposed (40% final grade). Execution of contents.

Global test:

Students who do not pass the subject by continuous evaluation or who would like to improve their grade, will have the right to take this global test, prevailing in any case, the best of the grades obtained. It will consist of a theoretical-practical exam.

SECOND CALL

Global test:

Students who do not pass the subject in the first call may sit for this test. It will consist of a theoretical and practical exam.

## EVALUATION CRITERIA

They are established based on the learning results of the subject.

In order to pass the course, a grade higher or equal to 5 must be obtained in the final grade.

## INSTRUMENTS vs. LEARNING OUTCOMES.

INSTRUMENTS	WEIGHTING	RA-1	RA-2	RA-3	RA-4	RA-5
Theoretical-practical exam	60 %	x	x	x	x	x
Exercises and proposed theoretical questions	40 %	x	x	x	x	x

## 6. Sustainable Development Goals

4 - Quality Education

8 - Decent Work and Economic Growth

16 - Peace, Justice and Strong Institutions