

## Course guide

# 310642 - 310642 - Hydrographic and Underground Surveying

Last modified: 10/02/2025

**Unit in charge:** Barcelona School of Building Construction  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.

**Degree:** BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016). (Optional subject).

**Academic year:** 2024    **ECTS Credits:** 4.5    **Languages:** Spanish

### LECTURER

**Coordinating lecturer:** ANA MARIA TAPIA GOMEZ

**Others:**

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**

1. (ENG) Comprendre i analitzar els problemes de implantació en el terreny de les infraestructures, construccions i edificacions projectades des de l'enginyeria en topografia, analitzar els mateixos i procedir a la seva implantació.
2. Knowledge, use and application of instruments and topographic methods appropriate for the fulfillment of raisings and surveyings.
3. Knowledge about application of the geomatic methods and techniques in the the scope of the different enginneries.

### TEACHING METHODOLOGY

The classes will be eminently theoretical, the student will have the index of contents and notes prepared by the teacher, this support material will be provided through the ATENEA platform.

### LEARNING OBJECTIVES OF THE SUBJECT

At the end of the first part of the subject (Hydrographic Surveys) the student must be able to:

- . Know the characteristics of the Nautical Charter and the regulations for its realization.
- . Know the topographic instruments necessary to determine the position of a ship and especially the instruments and methodologies for determining depth.
- . To be able to carry out a bathymetric survey at any scale and depth.
- . Be able to do topographic monitoring and control within the construction process of a maritime work.

At the end of the second part of the subject (Underground Lifting) the student must be able to:

- . Know the different tunnel construction systems.
- . Know the topographic instruments of the underground works.
- . Carry out a complete underground topographic survey linked to cartographic reference systems regardless of the type of communication with the outside world.
- . Be able to do topographic monitoring and control within the construction process of an underground work.

### STUDY LOAD

Type	Hours	Percentage
Hours large group	18,0	16.00
Hours medium group	27,0	24.00
Self study	67,5	60.00

Total learning time: 112.5 h

## CONTENTS

### - Hidrographic surveying

**Description:**

In the first part of the course the following topics will be developed:

- The Nautical Chart: Official Document. The electronic nautical chart. Regulations.
- Sea level: The tides (astronomical and meteorological). Tide gauges foundation. Altimetric references in bathymetries.
- Bathymetric surveys: Methodologies and instruments for determining the position of the ship and for measuring depth.
- SONAR technology applied to depth measurement.
- Setting out and guiding machinery in maritime works.

**Related activities:**

- Visit to the hydrographic boat and tide gauges of the Port Authority of the Port of Barcelona.

**Full-or-part-time:** 15h

Theory classes: 15h

### - Underground Surveys

**Description:**

In this second part of the course the following topics will be discussed:

- Tunnel construction systems.
- Characteristics of the different types of tunnels according to their function.
- Work on the outside, in connection with the inside and inside to carry out an Underground Survey. Topographic instruments and accessories suitable for each of the jobs.
- Instruments and methodologies for guiding the excavation of a tunnel and controls in the execution of the complete tunnel.
- Methodologies and instruments for obtaining cross sections of a tunnel.

These topics will be developed during the first five weeks of school.

**Related activities:**

- Visit to an underground work in progress.
- An exam linked to the contents developed will be resolved.

**Full-or-part-time:** 15h

Theory classes: 15h

## ACTIVITIES

### SITE VISIT

**Description:**

An underground work in progress will be visited.  
This activity will take place in the sixth week of study.

**Specific objectives:**

See in situ how some of the works explained in class are carried out.

**Full-or-part-time:** 3h

Practical classes: 3h



### VISIT PORT OF BARCELONA

**Description:**

Visit to the hydrographic boat and the tide gauges of the Port Authority of the Port of Barcelona.

**Specific objectives:**

See in situ some of the contents explained in class.

**Full-or-part-time:** 3h

Practical classes: 3h

## GRADING SYSTEM

---

The final grade will be the sum of the following partial grades:

Final mark =  $0.45 * \text{mark test content 1} + 0.05 * \text{attendance activity 1} + 0.45 * \text{mark test content 2} + 0.05 * \text{attendance activity 2}$

## EXAMINATION RULES.

---

The test on content 1 (Underground surveys) will be carried out in the period established by the Center for conducting partial exams.  
The test on content 2 (Bathymetric surveys) will take place in the thirteenth academic week.

The minimum grade to pass any of the partial tests will be 5 points out of 10.

Students will have the option of recovering any of the two partial tests on the date established by the Center as the Final Exam.