

## Course guide

# 310768 - 310768 - Geomatic Techniques for Building Construction

Last modified: 15/05/2023

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

**Degree:** BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).  
(Optional subject).

**Academic year:** 2023    **ECTS Credits:** 3.0    **Languages:** Catalan, Spanish

### LECTURER

**Coordinating lecturer:** Buill Pozuelo, Felipe

**Others:** Delgado Medina, Saturio

### TEACHING METHODOLOGY

The course is organized into two hours of class a week in large group. The classes are devoted to theory sessions (3 topics) (15 h). In the rest of the face-to-face classes, practices and various workshops are held (10 h). There are also participatory classes consisting of theory tests and exams (5 h).

In the theoretical classes learning objectives related to general concepts related to geomatics building techniques are introduced. Subsequently, and through practical exercises, we try to motivate and involve the student to actively participate in their learning.

Support material is used through ATENEA: learning objectives by content, concepts, examples, programming of evaluation and directed learning activities and bibliography.

The specific learning objectives of each of the contents of the subject are worked on, through the resolution of exercises or problems. These problem sessions are intended to incorporate some generic skills.

We must also consider other hours of autonomous learning, such as those dedicated to guided reading and the resolution of the problems proposed on the different contents, through the ATENEA virtual campus.

### LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student must be able to:

- Know the tools and existing geomatic resources for their application in building.
- Know and use appropriate geomatic and photogrammetric instruments and methods for conducting building surveys.

### STUDY LOAD

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

**Total learning time:** 75 h

## CONTENTS

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### Global Navigation Satellite Systems

**Description:**

- General structure of a GNSS system
- Types of observables
- Positioning methods
- Data processing
- GNSS system applications

**Specific objectives:**

Introduce the student to the GNSS technique.

Show the different positioning and navigation possibilities.

GNSS system applications.

**Related activities:**

Practice with GNSS technique

**Full-or-part-time:** 25h

Theory classes: 5h

Guided activities: 5h

Self study : 15h

### Precision geometric controls

**Description:**

- Precision leveling
- Automated instrumentation. Auscultation
- Laser Scanning

**Specific objectives:**

Introduce the student to auscultation techniques

Show the different geometric control techniques

Applications of the laser scanner system

**Related activities:**

Practice surveying

**Full-or-part-time:** 25h

Theory classes: 5h

Guided activities: 5h

Self study : 15h

### Photogrammetry applied to buildings

**Description:**

- Basics
- Instrumentation
- 2D (rectification) and 3D (restitution) methods
- Obtaining 3D models of architectural objects. Plans, elevations, sections
- Application of UAV systems (Unmanned Aerial Vehicle)

**Specific objectives:**

Introduce the student to the photogrammetric technique  
Show the different photogrammetric methods  
Applications of architectural photogrammetry

**Related activities:**

Practice with photogrammetric technique

**Full-or-part-time:** 25h

Theory classes: 5h

Guided activities: 5h

Self study : 15h

## ACTIVITIES

### 1. Practice with GNSS technique

**Description:**

Making a practice of GNSS data collection and processing. Assessment of the results obtained

**Specific objectives:**

Practical application of GNSS data collection

**Full-or-part-time:** 5h

Guided activities: 5h

### 2. Practice with topographic technique

**Description:**

Making a practice with topographic data collection and processing instruments 3D information

**Specific objectives:**

Practical application of data collection with digital surveying instruments

**Full-or-part-time:** 5h

Guided activities: 5h

### 3. Practice with photogrammetric technique

**Description:**

Making a practice of taking data photographic and information processing for 2D and 3D photogrammetric information

**Specific objectives:**

Practical photogrammetric shooting application with a standard digital camera and coverage processing

**Full-or-part-time:** 5h

Guided activities: 5h



## GRADING SYSTEM

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The final grade is the sum of the following partial grades:

- Classroom activities: 50%
- Final work: 30%
- Defense of the final work: 20%

Final work: Search for application examples on a topic related to geomatics applied to the field of building / architecture. There will be an oral presentation of the developed topic.

## EXAMINATION RULES.

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The activities to carry out are obligatory, as well as their presentation in order to be evaluated.

There is no re-evaluation exam.

## BIBLIOGRAPHY

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### Basic:

- Cramer, Johannes. Levantamiento topográfico en la construcción : medición y reconocimiento. Barcelona: Gustavo Gili, 1986. ISBN 8425212804.
- Lerma Garcia, José Luis; Biosca Tarongers, Josep Miquel. 3D Riskmapping : teoría y práctica del escaneado láser terrestre [on line]. Valencia: UPV, 2008 [Consultation: 26/07/2023]. Available on: [http://jllerma.webs.upv.es/pdfs/Leonardo\\_Tutorial\\_Final\\_vers5\\_SPANISH.pdf](http://jllerma.webs.upv.es/pdfs/Leonardo_Tutorial_Final_vers5_SPANISH.pdf).
- Domínguez García-Tejero, Francisco. Topografía general y aplicada. 13ª ed., corr. y act. Madrid [etc.]: Mundi-Prensa, 1998. ISBN 9788471147219.
- Atkinson, K.B. Close range photogrammetry and machine vision. Caithness, UK: Whittles, 2001. ISBN 9781870325738.
- Leick, Alfred; Rapoport, Lev; Tatarnikov, Dmitry. GPS satellite surveying. 4th ed. New York [etc.]: John Wiley & Sons, cop. 2015. ISBN 9781118675571.

### Complementary:

- Digital photogrammetry : an addendum to the Manual of photogrammetry. Bethesda, Maryland: American Society of Photogrammetry and Remote Sensing, 1996. ISBN 1570830371.
- Seeber, Günter. Satellite geodesy. 2nd compl. rev. and ext. ed. Berlin [etc.]: Walter de Gruyter, 2003. ISBN 3110175495.

## RESOURCES

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### Hyperlink:

- GIM. The Netherlands: Geomares Publishing. <http://www.gim-international.com/>. Magazine specialized in geomatics and related sciences