

## Course guide

# 310621 - 310621 - Network Design, Observation and Adjustment

Last modified: 19/02/2025

<b>Unit in charge:</b>	Barcelona School of Building Construction	
<b>Teaching unit:</b>	751 - DECA - Department of Civil and Environmental Engineering.	
<b>Degree:</b>	BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016). (Compulsory subject).	
<b>Academic year:</b> 2024	<b>ECTS Credits:</b> 6.0	<b>Languages:</b> Catalan, Spanish

### LECTURER

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**Coordinating lecturer:** MARIA AMPARO NUÑEZ ANDRES

**Others:** Delgado Medina, Saturio  
Nuñez Andres, Maria Amparo

### PRIOR SKILLS

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Have enrolled and passed the subjects of "Surveying instruments and methods" , "Observation adjustment in Geomatics" and "Satellite positioning systems"

### REQUIREMENTS

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Have studied and passed the subjects of "Surveying instruments and methods" and "Observation adjustment in Geomatics"

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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#### Specific:

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CE15EGG. Knowledge about: Security, health and labour risks inside the scope of this engineering and the surroundings of its application and development

CE16EGG. Knowledge and application of methods and geometric techniques inside the scope of the different engineerings

#### General:

CG1EGG. Design and develop geomatic and topographic projects.

CG3EGG. Comprehend and analyze the implantation problems in the field of infrastructures, constructions and buildings projected from the topographic engineering, analyze the same ones and proceed to its implantation.

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

CG6EGG. Reunite and interpret information of the ground and all of this geographic and economically related with the ground.

CG8EGG. Planification, project, direction, execution and management of measurements processes, information systems, image exploitation, positioning and navigation; modeling, representation and visualization of the territorial information in, under and above the ground surface.

CG13EGG. Use of teams and instruments. Using of precision instruments, their characteristics, and also its use, transfer of data, treatment and interpretation of themselves.

#### Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

#### Basic:

CB1EGG. The students have demonstrated possess and comprehend knowledge in a field of study that comes from high school, and is used to a level that, while is supported in advanced textbooks, it also includes some aspects that involve knowledge from the field of study in the vanguard.

CB2EGG. The students must know how to apply their knowledge to the work or vocation in a professional way and possess the competences that are used to be demonstrated by the elaboration and defense of arguments and the resolution of problems inside their own field of study.

## TEACHING METHODOLOGY

The following methodologies will be used:

Expository method in theoretical content topics.

Expository-participatory class for most topics.

Problem solving and exercises.

Field practices.

## LEARNING OBJECTIVES OF THE SUBJECT

The application of the knowledge acquired to real situations such as topographical surveys, in its observational aspect and in the calculation process.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	24,0	16.00
Hours medium group	36,0	24.00
Self study	90,0	60.00

**Total learning time:** 150 h

## CONTENTS

### Planimetric and altimetric networks

#### Description:

Global and European networks

Spanish networks

Regional and local networks

**Full-or-part-time:** 11h 37m

Theory classes: 2h

Guided activities: 2h 30m

Self study : 7h 07m

### Altimetry. Altimetric network

**Description:**

ALTIMETRIC NETWORK

Introduction

Leveling network

Project, signaling and observation

Calculation of the network by least squares

Compound Geometric Leveling: Observation, Calculation, and Least Squares Compensation

Compound trigonometric leveling. Observation, calculation and compensation by least squares

**Related activities:**

Theoretical classes

Kinds of problems

Field practices

Exam

**Full-or-part-time:** 46h 26m

Theory classes: 6h

Practical classes: 10h

Guided activities: 2h

Self study : 28h 26m

### Topographic networks: Triangulation and Trilateration

**Description:**

Introduction

Design of a topographic network

Observation of topographic networks

Calculation and compensation of a network

**Related activities:**

Theoretical classes

Kinds of problems

Field practice

Exam

**Full-or-part-time:** 26h 13m

Theory classes: 4h

Practical classes: 6h

Guided activities: 2h

Self study : 14h 13m

### Intermediate network

**Description:**

Introducción.

Observación, cálculo y compensación de poligonales por mínimos cuadrados

Reducción de distancias a la proyección UTM

Acimutes en la proyección UTM.

**Related activities:**

Theory classes

Kinds of problems

Field practice

Exam

**Full-or-part-time:** 42h 23m

Theory classes: 6h

Practical classes: 8h

Guided activities: 3h 30m

Self study : 24h 53m

## ACTIVITIES

### CONTROL 1

**Related competencies :**

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

CG1EGG. Design and develop geomatic and topographic projects.

**Full-or-part-time:** 2h

Guided activities: 2h

### CONTROL 2

**Related competencies :**

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CG1EGG. Design and develop geomatic and topographic projects.

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

**Full-or-part-time:** 2h

Guided activities: 2h

### Practice 1

#### Related competencies :

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

CG1EGG. Design and develop geomatic and topographic projects.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

**Full-or-part-time:** 2h

Guided activities: 2h

### PRÁCTICA 2

#### Related competencies :

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

CG3EGG. Comprehend and analyze the implantation problems in the field of infrastructures, constructions and buildings projected from the topographic engineering, analyze the same ones and proceed to its implantation.

CG1EGG. Design and develop geomatic and topographic projects.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

**Full-or-part-time:** 2h 30m

Guided activities: 2h 30m

### Practice 3

#### Related competencies :

CE9EGG. (ENG) Coneixement, utilització i aplicació de les tècniques de tractament. Anàlisi de dades espacials. Estudi de models aplicats a l'enginyeria i arquitectura. (Mòdul comú a la branca Topografia)

CE7EGG. Knowledge, using and application of instruments and appropriate topographic methods in order to carry out raisings and surveyings.

CG1EGG. Design and develop geomatic and topographic projects.

CG5EGG. Determine, measure, evaluate and represent the ground, tridimensional objects, points and trajectories.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

**Full-or-part-time:** 1h 30m

Guided activities: 1h 30m



## GRADING SYSTEM

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Control 1 35%

Control 2 35%

Exercise delivered and classroom activities 5%

Field and adjustment practices 25%. Oral assesment

## EXAMINATION RULES.

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practice submission, before the deadline, is mandatory

## BIBLIOGRAPHY

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### Basic:

- Chueca Pazos, Manuel ; Herráez Boquera, José ; Berné Valero, José Luis. Tratado de topografía : 1. Teoría de errores e instrumentación. 2. Métodos topográficos. 3. Redes topográficas y locales. Microgeodesia. Madrid: Paraninfo, 1996. ISBN 8428323089.
- Kuang, Shanlong. Geodetic network analysis and optimal design : concepts and applications. Chelsea: Ann Arbor Press, 1996. ISBN 1575040441.
- Sánchez Ríos, Alonso. Fundamentos teóricos de los métodos topográficos. Madrid: Bellisco, 2000.
- Bannister, A. ; Raymond, S. ; Baker, R. Surveying. 7th. Harlow: Pearson, 1998. ISBN 0582302498.
- Arranz Justel, José Juan; Soler García, Carlos. Métodos topográficos : análisis de los diferentes métodos topográficos planimétricos y altimétricos, abordando diferentes casos, precisiones alcanzadas y su resolución por medio de mínimos cuadrados. Madrid: Universidad Politécnica de Madrid, 2015. ISBN 9788416397068.

### Complementary:

- Ruiz Morales, Mario. Problemas resueltos de geodesia y topografía. Granada: Comares, 1992. ISBN 8487708501.