

Course guide 310608 - 310608 - Surveying Instruments and Methods

Last modified: 04/04/2025

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

LECTURER	
Coordinating lecturer:	Rogelio López Bravo
Others:	Felipe Buill Pozuelo Rogelio López Bravo

PRIOR SKILLS

The student must have consolidated his knowledge in trigonometry that has been worked on in previous courses. It will also be helpful to have a high spatial vision ability.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

2. Knowledge, use and application of instruments and topographic methods appropiate for the fullfilment of raisings and surveyings.

Generical:

1. Use of teams and instrumental: Capacity to select the necessary ressources to the achievement of the planned goals according to the quality requirements. Use of the teams, in adequated conditions, with professional efficiency and taking into account the limitations of the instruments and its context of use, in relation with the required precissions.

TEACHING METHODOLOGY

Expository method in theoretical content topics. Expository-participatory class for most topics. Calculation and problem solving workshops and exercises. Field practices.

The teaching methodology is based on the participatory expository class, which includes the exposition of theoretical foundations and the resolution of practical examples, in the realization of instrumental practices in the field with small groups and in the autonomous work of assimilation of the subject.

LEARNING OBJECTIVES OF THE SUBJECT

Exhaustive comprehension of the foundation from work of the different intruments of distance measuring, angles and slopes, its use and optimal conditions of use.

Knowledge of the kind of errors that operate in the measurement of these magnitudes and its transmission according to the different techniques of observation.

Solvency in the determination of the most probable value of a magnitude and of the associated confidence in this data.

Command in the practical manipulation of the different instruments in a quick and efficient way.



STUDY LOAD

Туре	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

C1. Fundamental principles

Description:

Description:

Definition and purpose of topography

- Representation systems and reference systems. Coordinate calculation.
- Process of a topographic survey.
- Topographic magnitudes. Measurement units.

Related activities:

- P1: Basic trigonometric calculations to obtain the coordinates of a point.
- P2: Change of angular units.
- Field practice 1: Instruments that measure angles and distances

Full-or-part-time: 17h

Theory classes: 3h Practical classes: 4h Self study : 10h

C2. Theory of errors

Description:

- Precision and accuracy.
- Systematic and accidental errors.
- Errors that define precision.
- Transmission of errors.

Full-or-part-time: 13h Theory classes: 3h Self study : 10h



C3 The tape measure

Description:

The tape measure. Methods of use of different precision Errors and corrections

Related activities:

Training Practice 2: Measurement of surfaces and transmission of errors

Full-or-part-time: 8h Theory classes: 2h Practical classes: 2h Self study : 4h

C4 The level. Geometric leveling

Description:

- Level
- Geometric leveling. Basis. Methods
- Types of levels. Classification.
- Systematic errors. Verification and correction for the different levels.
- Accidental errors. Estimation of the confidence of a data.
- High precision levels.

Related activities:

Leveling exercises
Practice 4:
Checking a level
Altimetry itinerary

Full-or-part-time: 22h Theory classes: 4h

Practical classes: 4h Self study : 14h



C5 The total station

Description: Definitions Constitution Movements Axes Limbos Horizontal angle measurement Vertical angle measurement Cettronic distance measurement Causes of error in total stations Planimetric method of radiation. Planimetric itinerary method Intersection planimetric methodss Trigonometric leveling

Related activities:

- Training
- Practice 4. Polygonal
- Practice 5. Radiation

Full-or-part-time: 60h Theory classes: 12h Practical classes: 8h Self study : 40h

C6 Introduction to Global Positioning Systems

Description:

Introduction. GNSS constellations System fundamentals Classification of methods Most used methods Planning Accuracies

Related activities: Practice 6: GNNS / GPS. Fast static with post-processing

Full-or-part-time: 10h

Theory classes: 2h Practical classes: 2h Self study : 6h

C7 The laser scanner

Description:

The laser scanner Classification Methods Work process

Full-or-part-time: 10h Theory classes: 2h Practical classes: 2h Self study : 6h



GRADING SYSTEM

Partial tests: 70% Individual and team practices: 30% Attendance and class work will be valued. There will be a re-evaluation exam.

EXAMINATION RULES.

Attendance at practices and delivery of all reports and assignments is mandatory and, therefore, a necessary condition to be evaluated. Failure to deliver all practices results in a NP grade.

BIBLIOGRAPHY

Basic:

- Domínguez García-Tejero, Francisco. Topografía general y aplicada. 13a ed. Madrid: Mundi-Prensa, 1998. ISBN 8471147211.

- Tre García, Fco. Javier. Unidades de medida y su empleo : medición electromagnética de distancias. Barcelona: Universitat Politècnica de Catalunya, 2009. ISBN 9788461297528.

- Ferrer Torío, F.; Piña Patón, B. Instrumentos topográficos. Santander: Universidad de Cantabria, 1991. ISBN 8486928400.

- Gim : international for geomatics. Lemmer: GITC, 1995-.

- Professional surveyor. Arlington: American Surveyors, 1981-.

- Fernández García, Silvino; Gil Docampo, Mª Luz. Topografía y geomática básicas en ingeniería. Madrid: Bellisco, 2012. ISBN 9788492970384.

- 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:

- Escuela de geodesia y topografía, Servicio Geográfico del Ejército. Topografía y lectura de planos. Madrid: Servicio Geográfico del Ejército, 1980. ISBN 8450035678.

- Chueca Pazos, Manuel. Topografía. Madrid: Dossat, 1982. ISBN 8423705897.