Course guide
310621 - 310621 - Network Design, Observation and Adjustment

Last modified: 16/11/2023

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). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: MARIA AMPARO NUÑEZ ANDRES

Others: Delgado Medina, Saturio

PRIOR SKILLS

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

REQUIREMENTS

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

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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 común a la branca Topografia)
CE7EGG. Knowledge, using and application of instruments and appropiate 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 sorroundings of its application and developement
CE16EGG. Knowledge and application of methods and geometric techniques inside the scope of the different engineerings

Generical:
CG1EGG. Design and develope geomatic and topographic projects.
CG3EGG. Comprehend and analize the implantation problems in the field of infrastructures, constructions and buildings projected from the topographic engineering, analize 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 exploitaiton, positioning and navegation; 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:
CLASSIC NETWORKS
1. Planimetric networks
Geodesic network
Topographic network
Intermediate network
Filler net
2. Altimetry networks
MODERN NETWORKS: 3D

Full-or-part-time: 13h 37m
Theory classes: 2h
Practical classes: 2h
Guided activities: 2h 30m
Self study : 7h 07m

Topographic networks: Triangulation and Trilateration

Description:
Introduction
Design of a topographic network
Classification of triangulation methods
Trilateration
Multiple direct intersection. Observation, calculation and compensation by least squares
Multiple inverse intersection. Observation, calculation and compensation by least squares
Mixed intersection
Calculation and compensation of a network
Design and observation of topographic networks

Related activities:
Theoretical classes
Kinds of problems
Field practice
Exam

Full-or-part-time: 24h 13m
Theory classes: 4h
Practical classes: 4h
Guided activities: 2h
Self study : 14h 13m

Intermediate network

Description:
Introducción.
Obervación, 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

Filler net

Description:
Introduction
Observation and calculation
Cross error. Longitudinal error. Maximum error
Maximum radiation distance
Choice of methods and instruments according to precision, scale and extent
Choice of the reference system.
Selection of equipment and methods
A priori error analysis

Related activities:
Theoretical classes
Kinds of problems
Field practice

Full-or-part-time: 13h 37m
Theory classes: 2h
Practical classes: 2h
Guided activities: 2h 30m
Self study : 7h 07m

Altimetry. Altimetric network

Description:
ALTIMETRY
Level surfaces
Real and apparent slope
Sphericity correction
Refraction correction
Determination of the coefficient of refraction
Visual reduction to the terrain
Joint correction for sphericity and refraction
Classification of altimetry methods
ALTIMETRIC NETWORK
Introduction
Leveling mesh
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

GRADING SYSTEM

Control 1 35%
Control 2 35%
Exercise delivered 5%
Field practices 25%

EXAMINATION RULES.

practice submission is mandatory

BIBLIOGRAPHY

Basic:
- 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.
- Sánchez Ríos, Alonso. Fundamentos teóricos de los métodos topográficos. Madrid: Bellisco, 2000.
- 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.
- Bannister, A. ; Raymond, S. ; Baker, R. Surveying. 7th. Harlow: Pearson, 1998. ISBN 0582302498.
- Kuang, Shanlong. Geodetic network analysis and optimal design : concepts and applications. Chelsea: Ann Arbor Press, 1996. ISBN 1575040441.

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