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

<table>
<thead>
<tr>
<th>Unit in charge:</th>
<th>Barcelona School of Building Construction</th>
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</thead>
<tbody>
<tr>
<td>Teaching unit:</td>
<td>751 - DECA - Department of Civil and Environmental Engineering.</td>
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<tr>
<td>Degree:</td>
<td>BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016). (Compulsory subject).</td>
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<tr>
<td>Academic year:</td>
<td>2023</td>
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<tr>
<td>ECTS Credits:</td>
<td>6.0</td>
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<tr>
<td>Languages:</td>
<td>Catalan, Spanish</td>
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**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 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 sorroundings of its application and development
CE16EGG. Knowledge and application of methods and geometric techniques inside the scope of the different engineering

**Generical:**
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 exploitaion, 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>24,0</td>
<td>16.00</td>
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<tr>
<td>Hours medium group</td>
<td>36,0</td>
<td>24.00</td>
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<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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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.
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

### 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

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### GRADING SYSTEM

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

**EXAMINATION RULES.**

practice submission is mandatory
BIBLIOGRAPHY

Basic:

Complementary: