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

Unit in charge: Barcelona School of Building Construction
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR’S DEGREE IN GEOPHOREN AND GEOMATICS ENGINEERING (Syllabus 2016).
(Compulsory subject).

Academic year: 2022 ECTS Credits: 6.0 Languages: Spanish

LECTURER

Coordinating lecturer: MARIA AMPARO NUÑEZ ANDRES

Others: Rubio Cerdà, Maria Amparo

PRIOR SKILLS

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 comun 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 engineerings

Generical:
CG1EGG. Design and develope 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 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

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

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

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**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 40%
Control 2 40%
Exercise workshop 10%
Field practices 10%

BIBLIOGRAPHY

Basic:

Complementary: