Course guide
310608 - 310608 - Surveying Instruments and Methods

Unit in charge: Barcelona School of Building Construction
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR'S DEGREE IN GEOPHYSICS AND GEOMATICS ENGINEERING (Syllabus 2016).
(Compulsory subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Spanish

LECTURER

Coordinating lecturer: MARIA AMPARO NUÑEZ ANDRES

Others: Felipe Buill Pozuelo
Rogelio López Bravo
Amparo Rubio Cerdá

PRIOR SKILLS

The student must have consolidated his knowledge in trigonometry that he worked in previous courses.
In addition will be helpful if the student has high capacity of vision.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. Knowledge, use and application of instruments and topographic methods appropriate for the fulfillment of raisings and surveyings.

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

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

Exhustive comprehension of the foundation from work of the different instruments of distance measuring, angles and slopes, its using 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 to this data.
Command in the practical manipulation of the different instruments in a quick and efficient way.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<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>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
</tbody>
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Total learning time: 150 h

CONTENTS

C1. Fundamental principles

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: Apparatus 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
Electronic distance measurement
Causes of error in total stations
Planimetric method of radiation.
Planimetric itinerary method
Intersection planimetric methods
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

Midterm exams: 20%
Individual memory of practices: 20%
Individual and team projects: 20%
Final exam: 40%
The attendance and work in class will be valued.

EXAMINATION RULES.

The attendance to the practices and the delivery of the memories and projects is mandatory and, therefore, necessary condition to be evaluated.

BIBLIOGRAPHY

Basic:
- Gim : international for geomatics. Lemmer: GITC,
- Professional surveyor. Arlington: American Surveyors,

Complementary: