Course guides
2500010 - GECGEOMATI - Geomatics

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR’S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Compulsory subject).
Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: JOSE ANTONIO GILI RIPOLL
Others: JOSE ANTONIO GILI RIPOLL, ROGELIO LOPEZ BRAVO, FRANCISCO JAVIER MUÑOZ CAPILLA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
14393. Capacity for spatial vision and knowledge of graphic representation techniques, both by traditional methods of metric geometry and descriptive geometry, as well as by computer-aided design applications. (Basic training module)
14394. Basic knowledge about the use and programming of computers, operating systems, databases and computer programs with engineering application. (Basic training module)

Generical:
14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.

TEACHING METHODOLOGY

The course consists of 2 hours per week of classroom activity (large size group) and 1.6 hours weekly with half the students (medium size group).

The 2 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 1.6 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.
LEARNING OBJECTIVES OF THE SUBJECT


1 Ability to conduct a topographic survey in the field.
2 Ability to interpret material from aerial photogrammetry.
3 Ability to interrelate topographic information, for example, starting from a survey until reaching an analysis through geographic information systems in the field of a Civil Engineering work.

Knowledge of the topographical / geomatic techniques essential to obtain measurements, drawing up plans, establish layouts, take defined geometries to the ground or control movements of structures or earthworks. Basic skills for the management and programming in computers of Geographic Information Systems. Knowledge of topography to carry out surveys and stakeouts. Knowledge of the appropriate geomatic techniques for obtaining and processing Geographical Information: for large areas, remote sensing techniques and earth observation sensors that allow acquiring territorial and environmental information based on the correct intervention and management of the environment; for minor extensions and work, the topographic techniques used to obtain measurements, to develop drawings, to establish layouts, to take projected geometries to the ground and to control movements of structures or the terrain itself.

Shape of the Earth and the oceans. Spatial reference systems. Cartographic projection systems. Geomatic techniques for capturing Geographic Information (GI). Processing and visualization of Geographic Information (GI). Introduction to GIS for the management of Geographic Information (GI). 1 Ability to carry out a topographic survey in the field and on site. 2 Ability to interpret material from photogrammetry and Remote Sensing. 3 Ability to work on Geographic Information and draw measurements of interest for the public works project, and / or for the management of the territory. Knowledge of the appropriate geomatic techniques for obtaining and processing Geographic Information: for large areas, remote sensing techniques and earth observation sensors that allow the acquisition of basic territorial and environmental information for the correct intervention and environmental management; for smaller extensions, the surveying techniques that serve to obtain measurements, to form maps, to stake out any projected geometry; and to monitor movements of structures or the terrain.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>24,0</td>
<td>16.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>6,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. Introduction

Description:
Introduction to the subject and to Geomatics and Topography

Full-or-part-time: 4h 48m
Theory classes: 2h
Self study : 2h 48m
2. Geodesy and Map Projections

Description:
Geodesy (geoid, ellipsoid). Geographic coordinates. Topographic representation in maps and plans. Cartographic projections. Geographic changes to projected coordinates. Types of maps; map formats

Practices of the subject

Full-or-part-time: 16h 48m
Theory classes: 4h
Laboratory classes: 3h
Self study: 9h 48m

3. Classical surveying

Description:
How an uprising is done. Topographic devices (Total Stations, Levels...). Main topographic methods: Planimetric (Intersection, Itinerary and Radiation); Altimetric (geometric and trigonometric leveling)

Practices of the subject

Full-or-part-time: 45h 36m
Theory classes: 7h
Laboratory classes: 12h
Self study: 26h 36m

4. Satellite positioning systems (GNSS / GPS)

Description:
Fundamentals of satellite navigation and positioning systems. Appliances. Working methods. Observation of points with GPS

Practices of the subject

Full-or-part-time: 21h 36m
Theory classes: 3h
Laboratory classes: 6h
Self study: 12h 36m

5. Introduction to Earth Observation (Remote Sensing)

Description:
Introduction to Aerial Photogrammetry. Earth Observation Satellites; Active or Passive Remote Sensing.

Practices of the subject

Full-or-part-time: 16h 48m
Theory classes: 3h
Laboratory classes: 4h
Self study: 9h 48m
6. Work with Geographic Information on maps

Description:

Full-or-part-time: 38h 24m
Theory classes: 5h 
Laboratory classes: 11h 
Self study : 22h 24m

GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

EXAMINATION RULES.

If one activity is not carried out in the scheduled period, the corresponding score will be zero.

# Extraordinary assessment:
See last paragraph in the 'Qualification method' section.

BIBLIOGRAPHY

Basic:

Complementary: