310634 - Non-Conventional Surveys

Coordinating unit: 310 - EPSEB - Barcelona School of Building Construction
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016).
(Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Spanish

Coordinator: FELIPE BUILL POZUELO

Degree competences to which the subject contributes

Specific:
1. (ENG) Comprendre i analitzar els problemes de implantació en el terreny de les infraestructures, construccions i edificacions projectades des de l'enginyeria en topografia, analitzar els mateixos i procedir a la seva implantació.
2. (ENG) Determinar, mesurar, avaluar i representar el terreny, objectes tridimensionals, punts i trajectòries.
3. Design and develope geomatic and topographic projects.
4. (ENG) Gestió i execució de projectes d'investigació, de desenvolupament i d'innovació dins l'àmbit d'aquesta enginyeria.
5. (ENG) Planificació, projecte, direcció, execució i gestió de processos de mesura, sistemes d’informació, explotació d’imatges, posicionament i navegació; modelització, representació i visualització de la informació territorial en, sota i sobre la superfície terrestre.
6. (ENG) Planificació, projecte, direcció, execució i gestió de processos i productes d'aplicació a l'obra civil i l'edificació, dins l’àmbit geomàtic.
7. Capacity of spatial vision and knowlege of the graphic representation techniques, for traditional methods of metric and geometric geometry but also for applications of assisted design by a computer.
8. Knowledge, application and analysis of the processes of treatment of digital images and special information, proceding from airborne and satellite sensors.
9. Knowledge, use and application of the treatment techniques. Analysis of special data. Study of models applied to the engineering and architecture.
10. Knowledge, use and application of instruments and fotogrametric methods and topographic adequate to the realization of non-cartographic raisings.
11. Knowledge, use and application of instruments and topographic methods appropiate for the fullfilment of raisings and surveyings.
12. Knowledge and application of methods of minimum adjust quadratic in the scope of topo-geodesic observations, photogrametric and cartographic.
13. Knowledge about application of the geomatic methods and techniques in the the scope of the different engineries.
14. Knowledge about construction methods; analysis of structures; design, execution and contol of infrastrutures in the work with interdisciplinary teams, knowledge of hidraulics.

Generical:
15. 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 adequated conditions, with professional efficiency and taking into account the limitations of the instruments and its context of use, in relation with the required precisions.

Transversal:
16. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and
Teaching methodology

The hours of guided learning consist in, doing theoretical classes (big group) in which the teacher does a brief exposition to introduce the general goals of learning related with the basic concepts of the subject. Afterwards and by practical exercises, he tries to motivate and involve the students in order to participate actively in their learning.

It is used support material by ATENEA: goals of learning by contents, concepts, examples, programation of evaluating activities, guided learning and bibliography. It also consists in problem classes in which is work, by the resolution of exercises or problems, related with the specific goals of learning of each one of the contents of the subject.

In this problems sessions is pretended to incorporate some of the generic competences.

After each session tasks are proposed for outside of class, that must be worked individually.

It also has to be considered other hours of autonomous learning, like the ones that are dedicated to oriented lectures and to the resolution of the problems proposed about the different contents, by the virtual campus ATENEA.

Learning objectives of the subject

At the end of the subject the student must be capable of:
- Know, use and apply the treatment techniques and analysis of spatial data
- Know, use and apply instruments and topographic and photogrametric methods adequate for the realization of non cartographic surveying.
- Know, use and apply the treatment processes of digital image and spatial information, proceding from aerotransported sensors and satellites.
- Knowledge and application of minimum quadratic adjustment methods in the environment of topo-geodesic observations, photogrametrics and cartographics

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 24h</th>
<th>16.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 36h</td>
<td>24.00%</td>
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<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
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</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>NON CONVENTIONAL SURVEYINGS</th>
<th>Learning time: 9h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Self study : 6h</td>
</tr>
</tbody>
</table>

**Description:**
[ENG]
Introducción
Cubicaciones
Levantamientos arquitectónicos
Levantamientos arqueológicos
Levantamientos industriales
Levantamientos batimétricos
Metrología topográfica. Auscultación
Prospección del subsuelo
Otros levantamientos

**Related activities:**
Activity 1

**Specific objectives:**
Introduce the student in the different types of non cartographic surveying, in special the ones that are focused on patrimony, the industrial topography, the topographic auscultation, the batimetric surveyings, the prospecting and other non conventional surveyings.

<table>
<thead>
<tr>
<th>METHODS AND INSTRUMENTS</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 4h</td>
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<tr>
<td></td>
<td>Self study : 8h</td>
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</tbody>
</table>

**Description:**
Metrology concepts
Discrete capture systems
Massive capture system of data
Total stations
Photogrametry
TLS
Frame grabber 3D
Other systems

**Related activities:**
Activity 2

**Specific objectives:**
Description of the metrology systems necessary for the obtaining and treatment of one of the special data obtained with the massive capture systems
Description of: systems of discrete capture, massive data capturing systems, total stations, digital photogrametria, TLS, frame grabber 3D, and other systems.
### PATRIMONY. ARCHITECTONIC AND ARCHEOLOGICAL SURVEYING

<table>
<thead>
<tr>
<th>Learning time: 46h</th>
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<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 10h</td>
</tr>
<tr>
<td>Self study: 30h</td>
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</tbody>
</table>

**Description:**
- Introduction
- Methodological bases for the geometric documentation of the patrimony
- Project of geometric documentation of the patrimony
- Architectonic and archeological surveying

**Related activities:**
- Activities 3, 4 and 5

### SPECIAL SURVEYINGS. SPECIAL METHODS AND INSTRUMENTS

<table>
<thead>
<tr>
<th>Learning time: 36h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 5h</td>
</tr>
<tr>
<td>Practical classes: 10h</td>
</tr>
<tr>
<td>Self study: 21h</td>
</tr>
</tbody>
</table>

**Description:**
- Radargrammetry and interferometry SAR (DInSAR, GB-SAR, SAR)
- Documentation of construction.
- Geometric analysis of structures.
- Accident analysis.
- Other systems.

### BATIMETRIC SURVEYING

<table>
<thead>
<tr>
<th>Learning time: 14h</th>
</tr>
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<tbody>
<tr>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>Self study: 10h</td>
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</table>

**Description:**
- Description of the topographic methods in batimetry.
- Other methods to obtain batimetric cartography.
- Official batimetry in Spain.
### SPECIAL PROJECT

<table>
<thead>
<tr>
<th><strong>Learning time:</strong> 1h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 1h</td>
</tr>
</tbody>
</table>

**Description:**
Defensión de un proyecto sobre uno de los aspectos desarrollados en clase. Evaluado test (50%)  

**Related activities:**
Activity 6
### Planning of activities

<table>
<thead>
<tr>
<th>1 TOPOGRAPHIC SURVEYING</th>
<th>Hours: 5h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Practices with total station and terrestrial laser scanner</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>File with information on the virtual campus (ATENEA)</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Memory of the practice</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>· Know the limitations of the technique and its most usual applications</td>
</tr>
<tr>
<td></td>
<td>· Effectuate the topographic take necessary for a surveying with a laser scanner</td>
</tr>
<tr>
<td></td>
<td>· Take in an adequate way the control points and the measurements necessaries to orientate</td>
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<table>
<thead>
<tr>
<th>2 TOPOGRAPHIC METROLOGY</th>
<th>Hours: 5h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Obtaining the field data with topographic and photogrammetric instruments.</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>File with information in the virtual campus (ATENEA)</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Memory of the practice</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Show the different mathematic and instrumental tools that can be used in obtaining spatial data for its modelling and representation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 PHOTOGRAPHIC COVERAGE</th>
<th>Hours: 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Carrying out photographies in a study case</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>File with information in the virtual campus (ATENEA)</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Memory of the practice</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>· Know the technique limitations and the more usual applications.</td>
</tr>
<tr>
<td></td>
<td>· Do the necessary photographic taking to obtain a surveying of an architectonic elevation and a 3D model.</td>
</tr>
</tbody>
</table>
### 4 PHOTOGRAMMETRIC ELEVATION 1

**Description:**
Adjustment of the photogrammetric block. Orientation

**Support materials:**
File with information in the virtual campus (ATENEA)

**Specific objectives:**
- Know the technique limitations and the more usual applications.
- Do the necessary photographic taking, control points and measurements to orientate and obtain a 3D model.

**Hours:**
- Laboratory classes: 3h
- Practical classes: 2h

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### 5 PHOTOGRAMMETRIC SURVEYING 2

**Description:**
Obtention of the graphic documentation. Elaboration of elevation drawings, floor plans, sections and architectonic models in 3D from spatial data with photogrammetric techniques.

**Support materials:**
File with information in the virtual campus (ATENEA)

**Specific objectives:**
- Know the most usual applications
- Obtaining the graphic documentation: making elevation drawings, floor plans, sections and 3D models.

**Hours:**
- Laboratory classes: 3h
- Practical classes: 2h

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### 6 SPECIAL PROJECT

**Description:**
Carry out a memory about one of the aspects developed in class

**Support materials:**
File with information in the virtual campus (ATENEA)

**Specific objectives:**
Carrying out a memory and a defense of one of the aspects developed in class

**Hours:**
- Theory classes: 1h
- Self study: 5h
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**Qualification system**

The final qualification is addition of the following partial qualifications:

Activities in class: 50%

Final exam 50%

**Regulations for carrying out activities**

It is mandatory to have done all the practices in order to get an average mark

**Bibliography**

**Basic:**


**Others resources:**

**Hyperlink**


- INTBAU