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: 2018
Degree: BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016).
( Teaching unit Compulsory)
ECTS credits: 6  Teaching languages: Spanish

Teaching staff
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 adecuated 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 interdisiplinary teams, knowledge of hidraulics.

General:
15. Use of teams and instrumental: Capacity to select the necessary ressources to the achievement of the planned goals according to the quality requirements. Use of the teams, in adecuated 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
310634 - Non-Conventional Surveys

individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

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.

Is used support material by ATENEA: goals of learning by contents, concepts, examples, progragation 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 adequated 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 enviroment of topo-geodesic observations, photogrametrics and cartographics

Study load

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

#### NON CONVENTIONAL SURVEYINGS

<table>
<thead>
<tr>
<th>Description:</th>
</tr>
</thead>
</table>
| [ENG]
| Introducción |
| Cubicaciones |
| Levantamientos arquitectónicos |
| Levantamientos arqueológicos |
| Levantamientos industriales |
| Levantamientos batimétricos |
| Metrología topográfica. Auscultación |
| Prospección del subsuelo |
| Otros levantamientos |

<table>
<thead>
<tr>
<th>Specific objectives:</th>
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</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

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

#### METHODS AND INSTRUMENTS

<table>
<thead>
<tr>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metrology concepts</td>
</tr>
<tr>
<td>Discrete capture systems</td>
</tr>
<tr>
<td>Massive capture system of data</td>
</tr>
<tr>
<td>Total stations</td>
</tr>
<tr>
<td>Photogrametry</td>
</tr>
<tr>
<td>TLS</td>
</tr>
<tr>
<td>Frame grabber 3D</td>
</tr>
<tr>
<td>Other systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the metrology systems necessary for the obtaining and treatment of one of the special data obtained with the massive capture systems</td>
</tr>
<tr>
<td>Description of: systems of discrete capture, massive data capturing systems, total stations, digital photogrametry, TLS, frame grabber 3D, and other systems.</td>
</tr>
</tbody>
</table>

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

### PATRIMONY. ARCHITECTONIC AND ARCHEOLOGICAL SURVEYING

**Description:**
- Introduction
- Methodologic bases for the geometric documentation of the patrimony
- The project of geometric documentation of the patrimony
- Architectonic and archeological surveying

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

**Learning time:** 46h
- Theory classes: 6h
- Practical classes: 10h
- Self study: 30h

### SPECIAL SURVEYINGS. SPECIAL METHODS AND INSTRUMENTS

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

**Learning time:** 36h
- Theory classes: 5h
- Practical classes: 10h
- Self study: 21h

### BATIMETRIC SURVEYING

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

**Learning time:** 14h
- Theory classes: 4h
- Self study: 10h
## SPECIAL PROJECT

| **Learning time:** | 1h  
| Theory classes: | 1h |

### Description:
Defense of a project about one of the developed aspects in class. Evaluated 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>
</tbody>
</table>

**Description:**
Practices with total station and terrestrial laser scanner

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

**Descriptions of the assignments due and their relation to the assessment:**
Memory of the practice

**Specific objectives:**
- Know the limitations of the technique and its most usual applications
- Effectuate the topographic take necessary for a surveying with a laser scanner
- Take in an adequate way the control points and the measurements necessary to orientate

<table>
<thead>
<tr>
<th>2 TOPOGRAPHIC METROLOGY</th>
<th>Hours: 5h</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Practical classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
</tbody>
</table>

**Description:**
Obtaining the field data with topographic and photogrametric instruments.

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

**Descriptions of the assignments due and their relation to the assessment:**
Memory of the practice

**Specific objectives:**
Show the different mathematic and instrumental tools that can be used in obtaining spatial data for its modelling and representation.

<table>
<thead>
<tr>
<th>3 PHOTOGRAPHIC COVERAGE</th>
<th>Hours: 2h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
</tbody>
</table>

**Description:**
Carrying out photographies in a study case

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

**Descriptions of the assignments due and their relation to the assessment:**
Memory of the practice

**Specific objectives:**
- Know the technique limitations and the more usual applications.
- Do the necessary photographic taking to obtain a surveying of an architectonic elevation and a 3D model.
### 4 PHOTOGRAMETRIC ELEVATION 1

**Hours:** 5h  
Laboratory classes: 3h  
Practical classes: 2h

**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.

### 5 PHOTOGRAMETRIC SURVEYING 2

**Hours:** 5h  
Laboratory classes: 3h  
Practical classes: 2h

**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.

### 6 SPECIAL PROJECT

**Hours:** 6h  
Theory classes: 1h  
Self study: 5h

**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
310634 - Non-Conventional Surveys

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