250225 - GEOMTOP - Geomatics and Surveying

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2017
Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 7.5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: JOSE ANTONIO GILI RIPOLL
Others: JOSE ANTONIO GILI RIPOLL, ROGELIO LOPEZ BRAVO, FRANCISCO JAVIER MUÑOZ CAPILLA

Opening hours
Timetable: Monday to Friday, hours to be arranged by email or in person. The timetable of the teacher assistants will be available at ATENEA.

Degree competences to which the subject contributes

Specific:
3067. Knowledge of the essential topography techniques for obtaining measurements, drawing up plans, determining layouts, taking defined geometries onto the terrain and controlling the movements of structures and earthworks.
3098. Basic knowledge of computer use and programming, operating systems, databases and software as applied to engineering.

Transversal:
592. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
595. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
599. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.
602. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
584. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
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Teaching methodology

The course consists of 2.5 hours per week of classroom activity (large size group).

The 2.5 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 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

Students will learn to use essential topographical/geomatic techniques for taking measurements, creating maps, drawing up plans, applying defined geometries to the terrain, and monitoring structural movements or earthworks. They will also develop the basic computer skills to handle and program geographic information systems.

Upon completion of the course, students will have acquired the ability to: 1. Carry out a topographical field survey. 2. Interpret material obtained by aerial photogrammetry. 3. Interrelate topographical information, for example from a topographical survey, in order to conduct an analysis using geographic information systems in the context of a construction engineering project.

Topography basics for surveys and on-site layouts; Geomatic techniques for obtaining and processing geographical information, including (for large areas) remote sensing and earth observation sensors, which can acquire information about the terrain and the environment in order to enable correct intervention and environmental management, and (for smaller areas and construction sites) topographical techniques for taking measurements, creating maps, drawing up plans, applying projected geometries to the terrain, and monitoring the movements of structures or of the land itself.

Test

Study load

<table>
<thead>
<tr>
<th>Total learning time: 187h 30m</th>
<th>Hours large group:</th>
<th>30h</th>
<th>16.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>45h</td>
<td></td>
<td>24.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>7h 30m</td>
<td></td>
<td>4.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>105h</td>
<td></td>
<td>56.00%</td>
</tr>
</tbody>
</table>
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## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Introduction</strong></td>
<td>4h 48m</td>
<td><strong>Description:</strong> introduction to etc.</td>
</tr>
<tr>
<td><strong>2. Geodesy and Cartographic Projections</strong></td>
<td>24h</td>
<td><strong>Description:</strong> Geodesy (geoid, ellipsoid). Geographic coordinates. Representation on topographic maps and plans. Cartographic projections. Projected Changes in geographic coordinates. Type maps, maps formats</td>
</tr>
<tr>
<td><strong>3. Classical Surveying</strong></td>
<td>55h 12m</td>
<td><strong>Description:</strong> How to develop a survey. Surveying instruments (Total Stations, Levels ...). Main methods: Planimetric (Intersection, Traverse and Radiation), altimetric (geometric and trigonometric leveling)</td>
</tr>
</tbody>
</table>

**Learning time:**
- Theory classes:
  - 2h
  - 5h
  - 9h
  - 4h
- Laboratory classes:
  - 2h 48m
  - 5h
  - 14h
  - 8h
- Self study:
  - 2h
  - 14h
  - 32h 12m
  - 16h 47m
  - 16h 47m
This course is approved for Continuing Learning and Assessment (AAC). The following summarizes the rating method. Additional details of the method will be the first day of class. The rating

# ordinary course obtained from the continuous assessment marks Ne and Np: 1) Ne Exams Note: there will be two continuous assessment tests (PAC's) and qualified with notes NE1 Ne2. These individual tests for the evaluation of theoretical and applied concepts associated with learning objectives of the course. In these PAC's there will be a small matter comprobatòria theme exchange of units; demonstrate a high level of development in this matter (> 80%) sinequanon condition is to have an exam than unity. The final part of the exam will be: Ne = [[((NE1 + 5) * (Ne2 + 5)) ^ (1/2)] - 5 2) Np, note Practical activities: problems, questionnaires, deliveries and work practices as group and individual, of additive and training, carried out during the year, usually outside the classroom. Note Np integrates the exercises done in class or at home, practice reports, questionnaires made by Athena, the work carried out during the fieldwork and laboratory (including health) and late deliveries. Endnote # NF: Ne is the result of an individual evaluation of the student while Np is largely the result of group work outside the classroom. For this reason requested that both exceed 5. So if the exam grade (NE) and the practices (Np) is> = 5, the final mark (NF) will be the average of the two (and always higher than Ne). If any of the two notes is less than 5, the final mark (NF) will be a minimum of two. # Qualifications and criteria for admission to the Reassessment: Students suspended regular assessment to be submitted regularly to the evaluation tests of the subject (in particular PAC1 and PAC2) will have to make a choice test reassessment in the period established in the academic calendar. There may be submitted to the test subject of a reassessment students who already have passed or students classified as not submitted. The maximum grade in the case submitted to the examination of reassessment shall be five (5.0). The non-attendance of a student called a reassessment test, held in the period set may not result in the realization of another test later date. # Admission to the Special Assessment: There will be extraordinary assessments for students who due to force majeure proven not been able to perform any of the continuous assessment tests, tests PAC1 and PAC2 markedly. These tests must be authorized by any relevant studies, case by case. The student, as soon as possible, you must request the head of studies with providing original documentation. The special assessment will be made in the school period concerned.

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### 5. Introduction to Earth Observation techniques
**Remote Sensing**

<table>
<thead>
<tr>
<th>Learning time:</th>
<th>21h 36m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>4h</td>
</tr>
<tr>
<td>Laboratory classes:</td>
<td>5h</td>
</tr>
<tr>
<td>Self study:</td>
<td>12h 36m</td>
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</tbody>
</table>

**Description:**
Introduction to Aerial Photogrammetry. Satellites for Earth Observation. Active and passive Remote Sensing. Practice item

### 6. Working with Geographical Information on maps and plans

<table>
<thead>
<tr>
<th>Learning time:</th>
<th>45h 36m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Laboratory classes:</td>
<td>13h</td>
</tr>
<tr>
<td>Self study:</td>
<td>26h 36m</td>
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</tbody>
</table>

**Description:**
Contour lines. Digital Terrain Models. Area and volume computations on cartographic / topographic maps. Stake out methods; isolated points; alignments. Calculation of the coordinates of the points and of the stake out values. Practice item

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**Qualification system**

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**Regulations for carrying out activities**

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

# Extraordinary assessment:
See last paragraph in the 'Mètode de qualificació' section.

**Bibliography**

**Basic:**


**Complementary:**

- Gili, J.; Puig, C. Materials Docents de l'assignatura Topografia. Atenea,