Course guide
250225 - GEOMTOP - Geomatics and Surveying

Last modified: 21/11/2022

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2022 **ECTS Credits:** 7.5 **Languages:** Catalan

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:
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 INFORMATI0N 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.

TEACHING METHODOLOGY

This subject, until its extinction, will be taught fully adapted and in common with "Geomatics" (25000010) of GEC2020. If you have any questions about timetables or content, contact the responsible of the subject.

The subject in a typical week consists of 3 hours of face-to-face class in the classroom (large group) plus 2 hours of laboratory practice (field or computers).

In the theoretical class hours, the teachers explain the basic concepts and materials of the subject, present examples and do exercises and problems; it also guides guided activities and autonomous learning.

The rest of the weekly hours are devoted to laboratory practices.

Support material available through the ATENEA virtual campus is used: contents, programming of assessment and directed learning activities and bibliography.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

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

Type	Hours	Percentage
Self study	105,0	55.97
Hours large group	30,0	15.99
Hours medium group	3,8	2.03
Guided activities	7,5	4.00
Hours small group	41,3	22.01

Total learning time: 187.6 h

CONTENTS

1. Introduction

Description:
introduction to etc.

Full-or-part-time: 4h 48m
Theory classes: 2h
Self study : 2h 48m

2. Geodesy and Cartographic Projections

Description:
Geodesy (geoid, ellipsoid). Geographic coordinates. Representation on topographic maps and plans. Cartographic projections. Projected Changes in geographic coordinates. Type maps, maps formats
Practice item

Full-or-part-time: 24h
Theory classes: 5h
Laboratory classes: 5h
Self study : 14h

3. Classical Surveying

Description:
How to develop a survey. Surveying instruments (Total Stations, Levels ...). Main methods: Planimetric (Intersection, Traverse and Radiation), altimetric (geometric and trigonometric leveling)
Practice item

Full-or-part-time: 55h 12m
Theory classes: 9h
Laboratory classes: 14h
Self study : 32h 12m

4. Global Positioning Systems (GNSS / GPS)

Description:
Fundamentals of navigation and positioning satellite systems. Devices. Working methods. Point observation with GPS
Practice item

Full-or-part-time: 28h 47m
Theory classes: 4h
Laboratory classes: 8h
Self study : 16h 47m

5. Introduction to Earth Observation techniques (Remote Sensing)

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

Full-or-part-time: 21h 36m
Theory classes: 4h
Laboratory classes: 5h
Self study : 12h 36m

6. Working with Geographical Information on maps and plans

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

Full-or-part-time: 45h 36m
Theory classes: 6h
Laboratory classes: 13h
Self study : 26h 36m

GRADING SYSTEM

This subject, until its extinction, will be taught fully adapted and in common with "Geomatics" (25000010) of GEC2020. If you have any questions about timetables or content, contact the teacher in charge.

This course is assessed by Continuing Learning and Assessment (AAC in Catalan). The following summarizes the rating method. Additional details of the method will be given the day of the first lecture.
The ordinary course mark is obtained from the continuous assessment marks Ne and Np:
1) Ne, the Exams mark: there will be two continuous assessment tests (PAC's) qualified with marks Ne1 and Ne2, respectively. These are 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 question to check the 'exchange of units' skills; to demonstrate a high level of development in this matter (> 80%) is mandatory to reach a mark higher than unity.
The final mark of the exams, Ne, will be:
Ne = [((Ne1 + 5) * (Ne2 + 5)) ^ (1/2)] - 5
2) Np, the Practical activities mark: problems, questionnaires, deliveries and work practices as group and individual, of additive training, carried out during the academic year, both inside and outside the classroom. Np mark integrates the classroom or at home exercises, practice reports, questionnaires made by ATENEA, the work carried out during the field and laboratory work (including the attendance) and the final deliveries.
NF, final mark: 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, it is 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 the lowest of the two.
Qualifications and criteria for admission to the Reassessment: Students suspended in the regular (ordinary) assessment who attended regularly to the evaluation tests of the subject (in particular PAC1 and PAC2) will be eligible for the Reassessment Test, to be carried out in the period established in the academic calendar. Students who already have passed or students classified as not submitted are not eligible for the Reassessment Test. The maximum grade after the Reassessment Test shall be five (5.0). The non-attendance of a student to the reassessment test cannot result in the realization of another test in a later date.
Admission to the Special Assessment: There will be Special or 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 Special test must be authorized by the Academic vice-dean, case by case. The student, as soon as possible after the 'force majeure', must apply for the Special exam to the Academic vice-dean, providing original documentation. The special assessment will be made in the period established in the academic calendar.

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 'Mètode de qüalificació' section.

BIBLIOGRAPHY

Basic:
- Martín-Morejón, L. Topografía y replanteos. Barcelona: L'autor, 1987-1988. ISBN 8440417748.
- Chueca Pazos, M.; Boquera Herráez, J.; Berné Valero, J.L. Tratado de topografía: vol. 2: métodos topográficos. Madrid: Paraninfo, 1996. ISBN 8428323097 (V.2).
- Núñez-García, A.; Valbuena, J.L.; Velasco, J. GPS: la nueva era de la topografía. Madrid: Ciencias Sociales, 1992. ISBN 8487510310.
- Corral Manuel de Villena, I. de. Topografía de obras [on line]. Barcelona: Edicions UPC, 2001 [Consultation: 29/04/2020]. Available on: http://hdl.handle.net/2117/105482. ISBN 8483015439.

Complementary:
- Estruch, M. Cartografía minera [on line]. Edicions UPC, 2001 [Consultation: 02/02/2021]. Available on: http://hdl.handle.net/2099.3/36231. ISBN 8489636028.
- Gili, J.; Puig, C. Materials Docents de l'assignatura Topografia. Atenea,
- Lantada Zarzosa, N.; Núñez Andrés, M. A. Sistemas de información geográfica [on line]. Barcelona: Edicions UPC, 2002 [Consultation: 29/04/2020]. Available on: http://hdl.handle.net/2099.3/36816. ISBN 8483016125.