28914 - Topography, cartography and photogrammetry

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	437 - Degree in Rural and Agri-Food Engineering
ECTS	6.0
Course	2
Period	Half-yearly
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

Classroom activities are those involving teachers and students in person and can develop in different areas of EPS (theory classroom, computer classroom, drawing classroom, teacher's office) or outside the school (field work).

Among the sessions developed in the classroom theory, participatory activities will consist of lectures and resolution of cases and problems. In these sessions students will raise some assignments or exercises to be solved as academically supervised activities.

The practice sessions will take place mainly in the computer room and classroom drawing. They students will perform various mapping exercises that require the use of different tools (software GPS, topographic mapping software design and geographic information systems) and specific map data (aerial photographs, maps and plans etc.).

Fieldwork will learn different management techniques for data collection and stakeout with different surveying instruments: GPS, Total Station and Level, and topographic map.

Tutorials (in this case referred to in programming and attendance, different character of the optional tutorials to which every student is entitled) aim to track orders that students must solve. The tutorials are developed in the teacher's office.

Finally, another classroom activity is examination to be held in the usual classroom and in the computer room.

Non-contact activities consist basically reading and understanding the "Studio" as well as conducting a series of commissions (cases, problems, etc.) directed academically. These activities will be conducted with full freedom time.

5.2.Learning activities

PART 1. FRAMEWORK OF THE MAPPING

At the end of the module the student should be able to identify the basic elements that make up a map and differentiate between basic, applied and thematic maps. To achieve this objective, they are presented in the classroom numerous examples of cartography, both through PowerPoint presentations, access to servers digital mapping and cartographic collection in a varied role. Finally, the student must also be able to find the necessary cartographic sources.

PART 2. FUNDAMENTALS OF GEODESY AND CARTOGRAPHY

Upon completion of the module the student should be able to understand the shape of the land and the issue of its representation. The student must have clear concepts ellipsoid, datum, map projections, ellipsoidal height and orthometric height. Of all the datum should know and differences over the datum ED50, WGS84 and ETRS89 addition to the UTM projection.

At the end of the module the student should be able to read a topographic map and understand the full legend of this. The student will perform a reading of a topographic map. You must also know and skillfully use the UTM projection. The student will make a location of UTM coordinates, and distances, and change Time.

PART 3. SURVEYING INSTRUMENTS

At the end of the module the student should know the use of various topographic devices commonly used. GPS, Total Station and Level. The student must have enough to choose from for each type of job the most suitable for each criterion surveying instrument.

PART 4. MAKING MAPS AND PROJECTS TOPOGRAPHICAL

With the data collected by surveying methods the student should be able to make a digital terrain model, a flat contour

and make the planes defining a basic linear work of a rural road, with its design elements in plan, elevation , transverse and earthmovers as well as to generate listings stakeout. For this purpose a computer application surveying and design of linear works were used.

PART 5. LAYOUT OF WORKS

The student must be able to perform stakeout works. For this, data have been previously obtained in a survey with instruments that have been presented in module 4 and subsequently have been treated in Module 5. Students should be able to use basic computer applications to convey these points will be used setting out the various surveying instruments and put the various signaling elements of the work in the field (stakes).

PART 6. GEOGRAPHIC INFORMATION SYSTEMS

The student must be able to perform the basic operations of a GIS. Load coverage, digitization of these and most common GIS operations, Intersect, Buffer,... and the cartographic design of these. For this purpose a computer application of GIS will be used, that students should be able to handle.

PART 7. DATA COLLECTION MODULE WITH AEROSPACE MEDIA BY PHOTOGRAMMETRY AND REMOTE SENSING SATELLITE

This module intends to approach the methods of making aerospace data, aerial photogrammetry made primarily from conventional flying devices (planes, airplanes, helicopters, drones,...) using photographic methods and spatial Remote Sensing made from satellite primarily with other sensors . The goal is that students know the basic theoretical fundamentals of this tool, and that values its utility to do this, in theory sessions will be presented both theoretical content, as some significant examples of their application; and in the practical sessions, students displayed satellite images and perform some basic operation interpretation thereof.

5.3.Program

MODULE 1. FRAMEWORK OF THE MAPPING

- Types of maps.

- Servers mapping in digital format.

- Cartographic Collections paper.

MODULE 2. FUNDAMENTALS OF GEODESY AND CARTOGRAPHY

- The shape of the land and the issue of its representation.

- Ellipsoid, datum

- Cartographic projections, ellipsoidal height and orthometric height.

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- The datum ED50, WGS84 and ETRS89 addition to the UTM projection.

- Location of UTM coordinates, and distances, and Time zone change

MODULE 3. SURVEYING INSTRUMENTS

- GPS.

- Total station

- Level.

MODULE 4. MAKING MAPS AND PROJECTS TOPOGRAPHICAL

- Computer application TCP-MDT.

- Import points.

- Creating a Digital Model.

- Curving.

- Longitudinal, transverse profiles and gradients.

- Earth movements.

5. MODULE LAYOUT OF WORKS

- Staking works

MODULE 6. GEOGRAPHIC INFORMATION SYSTEMS

- Basic operations of a GIS.

- Charging coverage.

- Scanning coverage.

- Advanced GIS operations.

- Cartographic Design of these.

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MODULE 7. DATA COLLECTION WITH AEROSPACE MEDIA, PHOTOGRAMMETRY AND REMOTE SENSING SATELLITE

- Fundamentals of aerial photogrammetry

- Fundamentals of Remote Sensing Space.

- Airborne LIDAR.

5.4.Planning and scheduling

Weeks	Parts	Theory	Practice	Test
1	FRAMEWORK OF THE MAPPING	1	2	
2	FRAMEWORK OF THE MAPPING		2	
3	FUNDAMENTALS OF GEODESY AND CARTOGRAPHY	1	2	
4	FUNDAMENTALS OF GEODESY AND CARTOGRAPHY	1	3	
5	SURVEYING INSTRUMENTS		3	
6	SURVEYING INSTRUMENTS		4	
7	SURVEYING INSTRUMENTS		4	
8	MAKING MAPS AND TOPOGRAPHY PROJECTS		4	

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9	MAKING MAPS AND TOPOGRAPHY PROJECTS		4	
10	MAKING MAPS AND TOPOGRAPHY PROJECTS		4	
11	MAKING MAPS AND TOPOGRAPHY PROJECTS		4	
12	MAKING MAPS AND TOPOGRAPHY PROJECTS		4	
13	MAKING MAPS AND TOPOGRAPHY PROJECTS		2	2
14	CHRISTMAS HOLIDAY PERIOD			
15	CHRISTMAS HOLIDAY PERIOD			
16	LAYOUT OF WORKS		4	
17	GEOGRAPHIC INFORMATION SYSTEMS	1	2	
18	GEOGRAPHIC INFORMATION SYSTEMS		4	
19	DATA COLLECTION WITH AEROSPACE	1	3	

	MEDIA, PHOTOGRAMMETRY AND REMOTE SENSING SATELLITE			
20	FINAL TEST			3

5.5.Bibliography and recomended resources

- **Basic Bibliography:**
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  - López-Cuervo y Estevez, Serafín. Fotogrametría / Serafín López-Cuervo y Estevez Madrid : Egraf, 1980
  - López-Cuervo y Estevez, Serafín. Topografía / Serafín López-Cuervo y Estévez . - 2a. ed. rev. y act. Madrid : Mundi-Prensa, 1996
  - Sistemas y análisis de la información geografica : manual de autoaprendizaje con ArcGIS / Coordinador Antonio Moreno Jiménez; autores Rosa Cañada Torrecillas ... [et al.] Madrid : Ra-Ma, 2006

- **Complementary bibliography:**
  - Sistemas y análisis de la información geografica : manual de autoaprendizaje con ArcGIS / Coordinador Antonio Moreno Jiménez; autores Rosa Cañada Torrecillas ... [et al.] Madrid : Ra-Ma, 2006
  - Núñez-García del Pozo, Alfonso. G.P.S. : la nueva era de la topografía / Alfonso Núñez- García del Pozo, José Luis Valbuena Durán, Jesús Velasco Gómez . Madrid : Ediciones de las Ciencias Sociales, D.L. 1992
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  - Vázquez Maure, Francisco. Lectura de mapas / por Francisco Vázquez Maure y José Martín López Madrid : Instituto Geográfico Nacional, 1986
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  - Elementos de cartografía/ Arthur H. Robinson...[et al.]; [traducción por Rosa Ma Ferrer] . ed. española/ revisada por Josep M. Rabella i Vives, Josep M. Panareda i Clopés Barcelona : Omega, D.L. 1987
  - Chuvieco Salinero, Emilio. Teledetección ambiental : la observación de la Tierra desde el espacio / Emilio Chuvieco . - 1ª ed. act. Barcelona : Ariel, 2010