Universida_{de}Vigo

IDENTIFYING DATA

2D and 3D Cartographic Documentation Techniques for Cultural Heritage

Subject	2D and 3D Cartographic Documentation Techniques for Cultural Heritage
Code	O02M143V03109
Study programme	(*)Máster Universitario en Valoración, xestión e protección do patrimonio cultural

Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st

Teaching language	Spanish Galician
Department	
Coordinator	Riveiro Rodríguez, Belén
Lecturers	Martínez Sánchez, Joaquín Puente Luna, Iván Riveiro Rodríguez, Belén
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General description	Dominate and be able to apply instrumental and procedures of diverse cartographic technicians to the cultural heritage *inmueble for his dimensional control and the preparation of graphic documentation employing tools *CAD. Analyse, debug and interpret geographic information, as well as or his storage in databases, in function of the technical requirements for the inventory and documentation of a project of intervention.

Competencies

Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
B2	Acquire the necessary knowledge to handle the different tools of graphic, dimensional and geospatial documentation to be applied in the documentation and valuation of Cultural Heritage.
C5	Master and be able to apply instruments and procedures of various cartographic techniques to the real cultural heritage for its dimensional control and the elaboration of graphic documentation using CAD tools.
C6	Analyze, refine and interpret geographic information, as well as its storage in databases, based on technical requirements for the inventory and documentation of an intervention project.
D4	To be able to integrate the diverse information and data contributed by diverse technicians and tools in the writing of conclusions of action.
D5	Be able to predict and control the evolution of complex situations through the development of new and innovative work methodologies adapted to the specific scientific / research, technological or professional field, in general multidisciplinary, in which their activity is developed.

Learning outcomes

Expected results from this subject	Training and Learning Results			
Train students for the geomatics documentation of heritage assets	A1	B2	C5 C6	D4 D5
Train the student to document the physical and formal characteristics and the state of conservation of the immovable cultural heritage and its immediate surroundings	A1	B2	C5 C6	D4 D5

Contents

Topic	
Introduction to photogrammetry and the principles of digital image processing.	Digital cameras, typologies, specifications, applications.
	Parameter during the image acquisition.
	Introduction to the principles of photogrammetry and digital image processing.
	Principles for aerial photogrammetry. Acquisition and processing of images, interpretation, orthorectification, and GSD of image.
Using photogrammetry for the 3D modelling of heritage elements.	Photogrammetric networks and survey planning.
	Relative and absolute orientation.
	3D modelling using Photogrammetry.
	Triangulation and orthophoto production.
Terrestrial laser scanning for the 3D modelling of heritage elements.	Typologies of terrestrial laser scanners. Theoretical principles, platforms for data acquisition, characteristics of the data and attributes.
	Point cloud processing, registration, filtering and modelling.
	Integration of photogrammetric models and laser scanning models. Texturing and orthophoto production.

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0.5	0.5	1
Seminars	4	0	4
Case studies	1	18	19
Problem solving	0	19	19
Autonomous practices through ICT	0	30	30
Essay	0.5	0.5	1
Systematic observation	0	1	1

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Introductory activities	Activities directed to take contact and gather information on the students, as well as to present the module. They will present the module outline form of the matter, aims, calendar, criteria of evaluation, as well as forums of debate and news and other surroundings in which it will manage the learning.
Seminars	Activities focused to the work on each one of the technologies that present in the matter, so that the students can understand the theoretical principles of each technician to the time that take contact with the tools software that will allow them put in technical said practice during a process of documentation. These seminars will realise by means of videoconference and totorial videosl, on the studies of case of employment of each technician.
Case studies	Analysis of a problem or real case, with the purpose to know it, interpret it, resolve it, generate hypothesis, diagnose it and get introduced to alternative procedures of solution, to see the application of the theoretical concepts in the reality. They will employ as I complement of the theoretical classes for the autolearning.
Problem solving	Activities in which they formulate problems and/or exercises related with the matter.
Autonomous practices through ICT	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and procedures related with the matter object of study. It develops through the TIC of autonomous way.

Personalized assistance

Methodologies	Description
Case studies	Resolution of doubts and personalised attention of the work performed by the students. Resources used: platform for virtual teaching Moodle, and videoconference and e-meeting
Problem solving	Resolution of doubts and personalised attention through the videoconference and e-meeting.

| | | | Autonomous practices through ICT | Information and personalised consultancy of the autonomous practices realised by the students through the TIC. Resources used: platform of virtual teaching Moodle and videoconference and e-meeting. |

Assessment

	Description	Qualification	Training and Learning Results
Essay	The student presents the result obtained in the preparation of a document on the thematic of the matter in the preparation of seminars, investigations, memories, essays, summaries of readings, conferences, etc. The results of the learning are the qualification of the student for the geomatic documentation of the heritage. It pretends that the student was able to document the physical characteristics, formal and the state of conservation of the immovable cultural heritage and his immediate surroundings.	80	A1 B2 C5 D4 C6 D5
Systematic observation	The performance of the student is being observed, as well as of the practices and seminars through the telematic tools. The results of the learning are the qualification of the student for the geomatic documentation of the heritage.	20	B2 C5 D4 C6 D5

Other comments on the Evaluation

The student, according to the valid rule, has two announcements of evaluation. The first carries out during the teaching period. In the case that the weeks of teaching of the matter are not sufficient for the delivery of all the planned works, will enable the platform of teaching two additional weeks, at the end of the semester, to facilitate works delivery, establishing in this case an alternative calendar of delivery of tasks. The second evaluation is in the month of July, for which will enable again the access to the educational platform.

Sources of information
Basic Bibliography
Complementary Bibliography
Edward M. Mikhail and James S. Bethel, J. Chris McGlone, **Introduction to modern photogrammetry**, Wiley,

George Vosselman, Hans-Gerd Maas, **Airborne and terrestrial laser scanning**, CRC Press-Taylor and FrancisCRC Press-Taylor and Francis,

Belén Riveiro, Mercedes Solla, **Non-Destructive Techniques for the Evaluation of Structures and Infrastructure**, CRC Press - Taylor and Francis,

Recommendations
Subjects that continue the syllabus
(*)Introdución á avaliación estructural de construcións patrimoniais/O02M143V03217
(*)Técnicas non destructivas para a avaliación do patrimonio cultural inmoble/O02M143V03218

Subjects that are recommended to be taken simultaneously
GIS Technologies for Inventory of Cultural Assets/O02M143V03108

Subjects that it is recommended to have taken before
(*)Introducción á topografía e producción cartográfica/O02M143V03111
CAD Techniques to Present Heritage/O02M143V03107

Other comments
The teaching of the matter carries out using the educational platform Moodle and, of face-to-face way, participating in the educational activities through videoconference or through tools of remote connection (as it Adobe Connect). To be able to receive the teaching of effective way, recommends , previously to the start of the matter, consult the manual of access to the platform and follow the technical specifications to be able to assist to the remote sessions. This information is available in the common space of the Master. It is indispensable that the student access to the educational platform of the matter previously to the start of the same.
In general, for the practices will employ free software or free versions (demo) of commercial software for operating system Windows 7.