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, Gestión y Protección del Patrimonio Cultural

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

Teaching language	#EnglishFriendly Spanish Galician
Department	
Coordinator	Martínez Sánchez, Joaquín
Lecturers	Barros González, Brais Martínez Sánchez, Joaquín Puente Luna, Iván
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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.

Training and Learning Results

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.

Expected results from this subject

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	20	21
Problem solving	0	20	20
Project	0	13	13
Essay	0.5	14.5	15
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.

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.

Assessment

	Description	Qualification	Training and Learning Results
Project	The students presents the results of the preparation of an individual project on the generation of data by means of the technicians of documentation developed in the subject. The results of learning evaluated are the capacity to generate documentary data in diverse formats, so that they cooperate in the work of management of the cultural heritage.	40	A1 B2 C5 D4 C6 D5
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.	40	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

According to the 2023 "*Regulation on the evaluation, qualification and quality of teaching and the student learning process of the University of Vigo*", there are two evaluation systems that students can choose: the preferred one, which will be applied by default, of "**continuous evaluation**" (diversified tests and activities that take place throughout the semester), and the so-called "**global evaluation**" (tests and/or delivery of work/exercises to be carried out on the official dates of evaluation established in the academic calendar), which must be expressly requested by the interested students, and communicated to the responsible teaching staff within a maximum period of 31 days from the beginning of each term.

The "**global evaluation**" tests for this subject will consist as follows: project (50%) and essay (50%).

Students have two evaluation calls/opportunities. The first is carried out during the teaching semester. The second (or 2nd opportunity) will take place in the month of July, for which access to the teaching platform will be enabled again.

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

Other comments

The teaching of the subject will be always of face-to-face telematic way, well was synchronous or asynchronous, using the eMoodle (MooVi) educational platform and participating in the educational activities through multiple videoconference (Remote Campus).

To be able to receive the teaching of effective way it si recommended , previously to the start of the subject, to consult the manual of access to the platform and to follow the technical specifications in order to assist to the remote sessions. It is indispensable that each student access to the educational platform of the subject previously to the beginning of the same. In general, for the practices will employ free software or free versions (demo) of commercial software for operating system Windows 7.