



Teaching Guide				
Identifying Data				2022/23
Subject (*)	Structural Analysis of Historical Buildings	Code	630548017	
Study programme	Máster Universitario en Rehabilitación Arquitectónica			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Construcción e Estruturas Arquitectónicas, Cívicas e Aeronáuticas Enxeñaría Civil			
Coordinador	Martín Gutiérrez, Emilio	E-mail	emilio.martin@udc.es	
Lecturers	Martín Gutiérrez, Emilio	E-mail	emilio.martin@udc.es	
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General description	The focus of the subject is oriented to the practical application of numerical methods in stability and structural behavior studies related to buildings with historical value and rehabilitation works in general. Thus useful instrumental skills are developed in expert work or when comparatively assessing the incidence of different intervention alternatives.			

Study programme competences / results	
Code	Study programme competences / results
A5	E05. Aptitud o capacidade para a conservación de la obra pesada, mediante la inspección, el análisis, el control de calidad, la definición de las condiciones de mantenimiento, y la estimación de la seguridad de las estructuras de edificación, incluyendo sus posibles cimentaciones, pudiendo igualmente afrontar la redacción de proyectos de reparación y refuerzo, y la dirección de ejecución asociada
A8	E08. Aptitud o capacidade para redactar informes técnicos y proyectos de rehabilitación del patrimonio edificado, incluyendo actividades de asesoramiento y consultoría
B1	CB6. Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación
B2	CB7. Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio
B4	CB09. Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades
C1	T01. Capacidad de análisis y síntesis
C4	T04. Conocimientos de informática relativos al ámbito de estudio
C5	T05. Capacidad para la gestión de la información
C6	T06. Resolución de problemas
C12	T12. Comprensión numérica
C13	T13. Intuición mecánica

Learning outcomes			
Learning outcomes		Study programme competences / results	
Acquire generic knowledge of instrumental techniques for auscultation and monitoring of historical constructions.		AJ5	
		AJ8	
Become familiar with the use of tools that facilitate the tasks of inspection and technical control, and that can be used to analyze the repercussions to be taken into account when faced with a specific intervention.		AJ5	BJ1 CJ4
		AJ8	BJ2 CJ6
			CJ12
			CJ13



Deepen the study of the mechanical behaviour of the masonry work and the models that allow its analytical characterization to be addressed.	AJ5 AJ8		
Propose an approach to the structural diagnosis techniques of buildings with historical value and rehabilitation works in general, using computer applications based on the programming of numerical methods.	AJ5 AJ8	BJ1 BJ2	CJ4 CJ6 CJ12 CJ13
Encourage the development of autonomous attitudinal capacities: a tendency to continuous learning, ability to solve problems effectively, capacities for analysis and synthesis, organization and personal planning, productive management of documentation, and use of information and communication technologies.		BJ4	CJ1 CJ5

Contents	
Topic	Sub-topic
Principles, techniques and tools for data collection.	
Complementarity of instrumental and analytical techniques.	
Mechanical behaviour of the masonry work.	
Numerical simulation techniques.	

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A5 B1 B2	12	12	24
Workshop	A5 B1 B2 C4 C6 C12 C13	9	13.5	22.5
Problem solving	A5 B1 B2 C4 C6 C12 C13	0	5	5
Supervised projects	A5 A8 B1 B2 B4 C1 C4 C5 C6 C12 C13	0	22.5	22.5
Personalized attention		1	0	1

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

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	An exhibition methodology complemented by audiovisual means is applied in order to significantly illustrate the contents treated and to facilitate their understanding. However, and independently of the above, during these sessions the aim is to achieve a certain quota of participation by the students, enhancing their involvement, promoting feedback on the process (and therefore the two-way nature of communication), and energizing the learning mechanisms through interaction techniques.
Workshop	The exercise is proposed through guided practices developed with computer means. It contemplates the acquisition of an operational methodology based on practical assumptions with an increasing level of complexity.
Problem solving	Practical tests are proposed, in which specific problematic situations have to be faced, designed from the previously worked content.



Supervised projects	The teaching methodology is basically oriented according to the criterion of learning in action, in order to enhance the acquisition of specific skills. In this context, the elaboration of a comprehensive work takes center stage, where the professional skills of the subject come together, therefore linked to the use of numerical analysis applications, with others of a transversal nature, such as, among others, the search for documentation (often making use of new technologies), the organization and planning of activities, the management of information, or oral and written expression. Schematically, the following steps are distinguished: topic selection, preparation of a generic work script, on-site examination, photographic report, planimetric survey, location and consultation of reference sources, construction and adjustment of models, interpretation of results, and writing a final report that covers the entire work. Given the supervised nature of the same, regular follow-up sessions must be held with the teaching staff, in order to optimize or, where appropriate, redirect the activities in progress.
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Personalized attention

Methodologies	Description
Supervised projects	Given the specificity of the contents linked to the subject, and the different level of computer training with which students can access it, it is understood to be crucial to articulate personalized attention mechanisms that attend to possible singularities. To this end, the development of face-to-face tutorials and consultations through the resources of the virtual platform is used.

Assessment

Methodologies	Competencies / Results	Description	Qualification
Supervised projects	A5 A8 B1 B2 B4 C1 C4 C5 C6 C12 C13	Its development is fully understood individually and of a non-presential nature. In order to guarantee the authorship of the work, and the adequate acquisition of competences, in its evaluation the successive control sessions are considered relevant, and therefore the degree of compliance in relation to the indications formulated in each case by the teaching staff. Other aspects to assess are: the depth and rigor of development; the search for information sources; the relationships built between the different sections; analysis and synthesis capabilities; the correction of the methodological study, the constructive and structural diagnosis, the modeling and the appropriate conclusions; argumentation; and the grammatical, graphic and technical quality of the final documentation.	100

Assessment comments

As in the other subjects that make up this postgraduate degree, attendance is also required not less than 80% relative to all the scheduled face-to-face sessions. This requirement will have no effect with students who have recognized part-time dedication according to the Norm that regulates the regime of dedication to study and the permanence and progression of undergraduate and master's students at the UDC. Any finding of plagiarism or relevant breach of the conditions established for the development of deliveries and/or exams will result in a failure grade (0) in the matter and in the corresponding call, invalidating any assessment obtained in all previous assessment activities, facing subsequent calls.

Sources of information



Basic	<p>Hendry, A.W, 1998. Structural Masonry. Macmillan.</p> <p>León, J., 2000. Planteamiento del análisis estructural. Identificación de modos de fallo y criterios de decisión.</p> <p>Lombillo, I., Villegas, L., Silió, D., Hoppe, C., 2008. Evaluación no destructiva del patrimonio construido. Revista Internacional Construlink 16, 40?53.</p> <p>Macchi, G., 1992. Diagnosis estructural y rehabilitación de edificios históricos, Cuadernos INTEMAC. INTEMAC, Madrid.</p> <p>Martínez, J.L., Martín-Caro, J.A., León, J., 2001. Comportamiento mecánico de la obra de fábrica, Monografías sobre el análisis estructural de construcciones históricas de fábrica. Universidad Politécnica de Madrid, Madrid.</p> <p>Schuller, M.P., 20003. Nondestructive testing and damage assessment of masonry structures. Prog. Struct. Engng Mater. 5, 239?251. doi:10.1002/pse.160</p> <p>Vázquez M., López, E., 2001. El método de los elementos finitos aplicado al análisis estructural. Noela, Madrid.</p> <p>Bibliografía</p>
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Complementary

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Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments