



Teaching Guide

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Structural Design		Code	630519002
Study programme	Mestrado Universitario en Arquitectura			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	Yearly	First	Obligatory	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Construcións e Estruturas Arquitectónicas, Cívís e AeronáuticasEnxeñaría Civil			
Coordinador	Estévez Cimadevila, Francisco Javier		E-mail	javier.estevezc@udc.es
Lecturers	Estévez Cimadevila, Francisco Javier		E-mail	javier.estevezc@udc.es
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Web				
General description	The subject addresses the integration of structural design within the architectural projection process, as well as the analysis of both graphic and written documentation that integrates the structure execution project. This analysis is carried out through the design of structures with the materials normally used, concrete, steel and timber, as well as the surface and deep foundation elements present in the building.			

Study programme competences

Code	Study programme competences
A1	Ability to conceive, calculate, design and integrate in buildings and urban developments and implement: Building structures (T)
A9	Ability to preserve, restore and renovate the built heritage (T)
A12	Development, presentation and public review, once the student has all credits, undergraduate and master's degree, of an original exercise done individually, before a university jury including at least one prestigious professional proposed by the professional associations. The exercise will consist of a comprehensive architectural design of professional nature in which all the skills acquired in the degree and master's degree, are developed to an extent of demonstrating sufficiency to guarantee the full execution of the construction works according to technical and administrative regulations (T)
B1	Students have the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous
B2	Have knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context
B3	Students can apply acquired knowledge and ability to solve problems in new or unfamiliar environments within broader or multidisciplinary contexts related to their field of study
B4	Students are able to integrate knowledge and handle complexity and formulate judgements based on information that is incomplete or limited, including reflection on social and ethical responsibilities linked to the application of their knowledge and judgements
B5	Students can communicate their conclusions and the knowledge and the rationale supporting them to specialists and non-specialists in a clear and unambiguous way
B6	Knowing the methods of research and preparation of construction projects
B7	Creating architectural designs that meet both aesthetic and technical requirements and the needs of users within the limits imposed by cost factors and building regulations
B8	"Understanding the architectural profession and its role in society, in particular, elaborating projects that take into account the social factors"
C1	Adequate oral and written expression in the official languages.
C3	Using ICT in working contexts and lifelong learning.
C4	Exercising an open, educated, critical, committed, democratic and caring citizenship, being able to analyse facts, diagnose problems, formulate and implement solutions based on knowledge and solutions for the common good
C5	Understanding the importance of entrepreneurial culture and the useful means for enterprising people.
C6	Critically evaluate the knowledge, technology and information available to solve the problems they must face



C7	Assuming as professionals and citizens the importance of learning throughout life
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes			
Learning outcomes		Study programme competences	
Aptitud para concebir, calcular, diseñar e integrar en edificios y conjuntos urbanos y ejecutar: Estructuras de Edificación.		AC1	BC1
		AC9	BC2
		AC12	BC3
			BC4
			BC5
			BC6
			BC7
			BC8
		CC1	
		CC3	
		CC4	
		CC5	
		CC6	
		CC7	
		CC8	

Contents	
Topic	Sub-topic
Architecture and structural design	.
The structural system	.
Structural project. Representation	.
Structural project. Reinforcement concrete	.
Structural project. Steel	.
Structural project. Timber	.
Geotechnic and foundations	.
Lateral earth elements	.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	A1 A9 B4 B5 B6 B7 B8 C1 C3 C7 C8	20	20	40
Supervised projects	A1 A9 A12 B1 B2 B3 B4 B5 B7 B8 C1 C3 C4 C5 C6 C7	18	50	68
Workshop	A1 A9 A12 B1 B2 B3 B4 B5 B6 B7 B8 C1 C3 C4 C6 C7	20	20	40
Personalized attention		2	0	2

(*)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	Unha parte da actividade presencial desenvólvese a través do método expositivo fomentando, con todo, involucrar ao alumno na etapa de desenvolvemento do tema exposto, proporcionándolle a oportunidade para formular preguntas e expresar ideas, conducíndolle desta maneira , por influencia indirecta, ao proceso de aprendizaxe. Dado o tipo de materia, a exposición realízase cunha ampla utilización de medios audiovisuais.



Supervised projects	A realización de traballos tutelados constitúe nesta materia unha metodoloxía básica e fundamental para a adecuada formación do alumno. Iso é así pois permite enfrontarse ás situacións reais que formarán parte do seu exercicio profesional, debendo coñecer o proceso e as implicacións que ten a toma de decisións sobre o proxecto estrutural dunha obra de arquitectura. Esta metodoloxía permite non só a consolidación e aclaración dos conceptos adquiridos nas sesións maxistrais, senón tamén implementar os coñecementos que se van achegando adquirindo así unha práctica de manexo dos mesmos.
Workshop	A materia participa no Taller PFM, onde se integran igualmente Proxecto de Construción, Proxecto de Instalacións, Proxectos Avanzados e Instrumentos de Intervención urbanística . O taller enténdese como un espazo de traballo e intercambio concibido para facilitar a confluencia dos contidos das diferentes materias en torno ao proxecto arquitectónico, e por tanto baséase na integración multidisciplinar sobre a resolución de casos prácticos.

Personalized attention	
Methodologies	Description
Workshop Guest lecture / keynote speech Supervised projects	Unha metodoloxía orientada cara á aprendizaxe require a consideración das singularidades que distancian a uns alumnos doutros dentro dun mesmo grupo, en termos de formación previa, posibles carencias, actitudes e aptitudes, expectativas e motivacións. Esta cuestión adquire maior transcendencia no desenvolvemento dos traballos tutelados e os proxectos propostos a nivel de taller, cuxa metodoloxía só adquire sentido se se produce un contacto regular e xornal co profesorado a fin de optimizar e no seu caso reconducir as actividades en curso.

Assessment			
Methodologies	Competencies	Description	Qualification
Workshop	A1 A9 A12 B1 B2 B3 B4 B5 B6 B7 B8 C1 C3 C4 C6 C7	Valoraranse os resultados obtidos no taller tenendo en cuenta o seu seguimento por parte do alumno, a complexidade da solución estrutural, a súa adecuación á proposta arquitectónica, así como o seu desenvolvemento tanto a nivel de cálculo como gráfico.	20
Supervised projects	A1 A9 A12 B1 B2 B3 B4 B5 B7 B8 C1 C3 C4 C5 C6 C7	Ditas probas contemplarán o deseño e o desenvolvemento de traballos vinculados ao proxecto de estruturas de edificación.	80

Assessment comments
A avaliación para a primeira oportunidade correspóndese co indicado, onde a cualificación final é o resultado da valoración dos traballos tutelados (80% da cualificación final) e dos resultados obtidos no taller (20% da cualificación final). Na segunda oportunidade e na convocatoria adiantada a cualificación final é o resultado do exame no que o alumno terá que desenvolver no período indicado o deseño, predimensionado e grafiado da estrutura proposta. Este exame computará na cualificación final un 80%, en equivalencia á valoración dos traballos tutelados da primeira oportunidade. O 20% restante da cualificación corresponderá aos resultados obtidos no desenvolvemento do taller. Aos alumnos que acrediten matrícula parcial aplicaráselles idénticas condicións ás descritas para o resto dos alumnos coa única excepción de que a asistencia mínima establécese nun 50%. Atendendo ao artigo 14 das NORMAS DE AVALIACIÓN, REVISIÓN E RECLAMACIÓN DÁS CUALIFICACIÓNS DÚAS ESTUDOS DE GRAO E MESTRADO UNIVERSITARIO da UDC, se se detectase a comisión de fraude nas probas de avaliación o alumno suspenderá a convocatoria da materia (ambas as oportunidades) coa cualificación de 0.

Sources of information



Basic	Charleson, Andrew La estructura como arquitectura Ed. Reverté, Barcelona, 2007. ISBN 978-842912117 Ching, Francis D. k. Building structures illustrated. Patterns, systems and design Ed. John Wiley & Sons, New Jersey, 2009. ISBN 978 0470187852 Conzett, Jürg Structure and Space Ed. Architectural Association, Londres, 2006. ISBN 978 1902902012 Cruz, Paulo J.S. (ed.) Structures and Architecture: new concepts, applications and challenges Ed. CRC Press (Taylor & Francis Group), New York, 2013. ISBN 978 1482224610 Deaplazes, Andrea Constructing architecture: material processes structures Ed. Birkhäuser Publishers for architecture, Basel, 2005. ISBN 978 3764373199 Engel, Heino Sistemas de estructuras Ed. Gustavo Gili, Barcelona, 2009. ISBN 978-8425218002 Frampton, Kenneth Estudios sobre cultura tectónica Ed. Akal Arquitectura, Madrid, 1999. ISBN 978-8446011875 Garrison, Philip Basic Structures for enginners and architects Ed. John Wiley and sons, New Jersey, 2005. ISBN 978 1405120531 Gutai, Matyas Trans Structures: fluid architecture and liquid engineering Ed. Actar D, Barcelona, 2015, 9781940291444 Harris, James B. Masted Structures in Architecture Ed. Architectural Press, New York, 1996. ISBN 0750612827 Howard, Herbert S. Structure. An architect's approach Ed. McGraw-Hill Book Company, New York, 1966 Lim, Joseph Eccentric structures in architecture Ed. BIS Publishers, Amsterdam, 2010, 978 9063692421 Mainstone, Rowland J. Structure in Architecture: History, design and innovation Ed. Ashgate, Michigan University, 1999. ISBN 9780860787631 McDonal, Angus J. Structure and Architecture Ed. Architectural Press, Oxford, 2001. ISBN 0750647930 Moore, Fuller Understanding structures Ed. MacGraw Hill, Barcelona, 1999. ISBN 9780070432536 Muttoni, Aurelio The art of structures: introduction to the functioning of structures in architecture Ed. EPFL Press, Laussane, Suiza, 2011. ISBN 978-2940222384 Nervi, Pier L. Aesthetics and technology in buildings Ed. Harvard University Press, Cambrigde, 1965 Nervi, Pier L. Nuevas estructuras Ed. Gustavo Gili, Barcelona, 1973. ISBN 0262640023 Ramsey, Dabby Structure for architects: a primer Ed. John Wiley and sons, New Jersey, 2012. ISBN 978 0470633762 Rogers, Richard Architecture: a modern view Ed. Thames & Hudson, New York, 1992. ISBN 978 0500342930 Sánchez Vibaek, Kasper Architectural system structures: integrating desing complexity in industrialised construction Ed. Routledge Research in Architecture, Abingdon, 2014. ISBN 978 0415828543 Sandaker, Bjorn Normann On span and space: exploring structures in architecture Ed. Routledge (Taylor & Francis Group), Abingdon, 2008. ISBN 978 113432525 Sandaker, Bjorn Normann The structural basis of architecture Ed. Routledge (Taylor & Francis Group), Abingdon, 2011. ISBN 978 0415415453 Siegel, Curt Formas estructurales de la arquitectura moderna Ed. Continental, México, 1966 Spuybroek, Lars The structure of vagueness. Performative architecture beyond instrumentality Ed. Spon Press (Taylor and Francis Group), New York, 2005. ISBN 978-0203017821 Torroja Miret, Eduardo Razón y ser de tipos estructurales Ed. Textos Universitarios CSIC, Madrid, 2004. ISBN 978 8400092825 Wilson, Forrest Structure: the essence of architecture Ed. Van Nostrnad Reinhold, Pennsylvania University, 1983. ISBN 9780442290993 Zalewski, Wacław Shapin structures: statics Ed. John Wiley & Sons, New Jersey, 1998. ISBN 978 0471169680
Complementary	

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Advanced Architectural Design/630519005

Construction Design/630519001

Subjects that continue the syllabus

Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.