Teaching Guide				
Identifying Data				2023/24
Subject (*)	Structures 5		Code	630G02038
Study programme	Grao en Estudos de Arquitectura			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Obligatory	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Construcións e Estruturas Arquitectónicas, Civís e AeronáuticasEnxeñaría Civil			
Coordinador	Muñiz Gomez, Santiago	E-mail	santiago.muniz@udc.es	
Lecturers	Freire Tellado, Manuel Jose Muñiz Gomez, Santiago	E-mail	manuel.freire.tellado@udc.es santiago.muniz@udc.es	
Web				
General description	The content of the subject, as stated in the corresponding Study Plan, covers knowledge on prestressed concrete structures, factory structures and wooden structures, both in its structural project aspects, as well as in dimensioning, testing and pathology. The knowledge to acquire, regarding these typologies, is included in: -Conception and structural project -Dimensioning and checking -Integration of the structure with the rest of the building project -Control and supervision of the project -Construction management -Structural pathology This subject is integrated into what is called in the Curriculum of the current Degree WORKSHOP 8.			

Study programme competences	
Code	Study programme competences
A12	Ability to conceive, calculate, design, integrate in buildings and urban units and execute building structures (T)
A17	Ability to apply technical and construction standards and regulations
A18	Ability to maintain building structures, foundations and civil works
A63	Development, presentation and public review before a university jury of an original academic work individually elaborated and linked to any of the subjects previously studied
B1	Students have demonstrated knowledge and understanding in a field of study that is based on the general secondary education, and is usually at a level which, although it is supported by advanced textbooks, includes some aspects that imply knowledge of the forefront of their field of study
B2	Students can apply their knowledge to their work or vocation in a professional way and have competences that can be displayed by means of elaborating and sustaining arguments and solving problems in their field of study
B3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues
B4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist public
B5	Students have developed those learning skills necessary to undertake further studies with a high level of autonomy
B6	Knowing the history and theories of architecture and the arts, technologies and human sciences related to architecture
B9	Understanding the problems of the structural design, construction and engineering associated with building design and technical solutions
B11	"Knowing the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into planning "
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		
With the passing of STRUCTURES 5, it is intended that the student acquires the necessary skills in:	A12	B1	C1
-Project, dimensioning and checking of wooden structures, factory and prestressed concrete	A17	B2	C3
-Integration of this structural project within the overall architectural project	A18	B3	C4
-Knowledge of pathology and rehabilitation techniques focused on the aforementioned contents	A63	B4	C5
-Capacity of supervision and control on site of the types used.		B5	C6
		B6	C7
		B9	C8
		B11	

Contents	
Topic	Sub-topic
WOOD STRUCTURES	-Project of wooden structures -Physical and mechanical properties of wood -Calculation of wooden structures according to CTE SE M -Construction of wooden structures -Project of cross-laminated wood structures (CLT)
MANSONRY STRUCTURES	-Project of mansory structures -Dimensioning of mansoryy structures according to CTE SE F
PRESTRESSED CONCRETE STRUCTURES	-Introduction to prestressed concrete. -Material and construction aspects in prestressed concrete -Post-tensioned tiles in building -Calculation of prestressed concrete structures -Losses -Project of prestressed concrete structures

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	30	37	67
Problem solving	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	15	30	45
Supervised projects	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	1	2	3
Workshop	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	15	15	30

Mixed objective/subjective test	A12 A17 A18 A63 B1 B2 B3 B4 B5 B6 B9 B11 C1 C3 C4 C5 C6 C7 C8	4	0	4
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	They constitute an important part of the student's face-to-face activity and are developed through a fundamentally expository method, trying, however, to involve the student, to the extent possible, in the stage of development of the topic exposed, providing them with the opportunity to ask questions and express ideas, leading in this way, by indirect influence, to the learning process. The exhibition is carried out with the support of audiovisual and computer media and is structured in the following stages: introduction, development, summary and bibliographic orientation. Punctuality: Out of respect for the rest of the students, the punctuality of the students is required. The teacher can set time limits for joining the class. There is attendance control, which must be active and not only in person. It is to be noted that not all the syllabus of the subject has to be developed through direct exposition of the teaching staff. The exhibition will focus on those aspects that are considered more important or more complex to acquire autonomously by the student. But the rest of the sections of the syllabus must be prepared by the student himself. Controls can be established that allow both the self-assessment of the student himself and the supervision by the teacher of the knowledge acquired. During the development of the course, depending on the existing heterogeneity characteristics, various controls can be established under the ICT platform or in person, in order to include student self-assessment criteria, which allows them to know their degree of content assimilation with the aim of in order to take the appropriate corrective educational measures.

Problem solving	Its contents can be: -Practical resolution of problems related to the subject. This resolution can be carried out by the teacher, by the students or in a mixed way. They are delivered weekly. -Theoretical-practical work. On the basis of bibliographic references, the development of parts of the subject is deepened. -Follow-up of the practical activities proposed in the subject. These practices are of significant importance since, although by themselves, they do not lead to knowledge of the subject, they allow the consolidation and clarification of the concepts acquired in the lectures, see the practical and professional applications of the knowledge that are being provided and therefore constitute the necessary complement to the theoretical training acquired. The project work of building structures, like all the project work in general, is a work with a strong component of self-learning and training, and that will be one of the objectives of this practical part: the acquisition of "trade" by the student , under the tutelage of the teacher and even with the essential collaborative reflection of the group. These activities are designed for students who attend the course continuously from the beginning, since it is in these first days where possible subgroups and practical topics to be developed are established, being part of the basis of these common themes for the entire course. The duration of these classes is 1.00 hour. The teacher can prevent access to the classroom or not collect a certain practical activity for a student who intends to enter the classroom with an excessive delay, damaging the collaborative work in the classroom. In any case, the arrival to an interactive class with a delay of more than 15 minutes, is considered NOT PERFORMED. This is extendable to the delivery of said activity, unless authorized by the teacher. In general, all practical activities are collected for evaluation, with the conditions established at all times. There may be practical activities that are developed throughout the school period, as a self-training of the student as a complement and preparation for the various objective tests. -Class practices: Developed during interactive classes (classes for subgroups), delivered or not as deemed appropriate at all times. They can be exclusively practical in content or contain theoretical development. They can also have a graphic, numerical or mixed component. Although they are individual, their resolution is done collaboratively and assisted by teachers. It is possible that practices are provided to the student as a self-training and complement to the teaching activity, which allow them to complement their knowledge about the subject and adequately prepare the various objective assessment tests. -Special class practices: Specific practices as a summary of each of the parts of the subject, carried out individually by the student and delivered during said class. They have a weight in the specific qualification. They are announced in advance in a timely manner and can have both theoretical and practical content. To carry it out, the use of a handwritten form A3 format (1 page on both sides), a calculator, the corresponding legal regulations and the documentation that, in each case, may be supplied for such purposes, will be allowed. In this aspect, what is stated in the exams section governs.

Supervised projects	-Course practices: Optionally they can be developed throughout the course as autonomous work of the student, although follow-up controls will be carried out throughout the semester. These practices allow the student to face cases closer to structural reality and their resolution, thus concretizing the knowledge acquired to the usual building problems. Depending on the aforementioned characteristics of heterogeneity, the development of this course practice may be individual or in a small group of students. This will be fixed in the presentation of the practice. Part of the class practices will deal with specific problems of these course practices and may be linked to the Workshop activity. In order not to overload the student with work for adults, it will be tried that these practices have a fundamentally structural content, focused on the theme that is being dealt with in the course. Thus, normally, they will be buildings for which architectural graphic documentation is delivered and in which it is necessary to define a certain structure. In the case of needing some type of architectural design, simple typologies are normally sought where the structural component predominates. As far as possible they will be linked and coordinated with each of the parts of the subject. They are therefore conceptually different from the WORKSHOP practice, where work is done on a building designed by the student himself and where he has to coordinate all his project effort in the various branches involved in the process. Regardless of what has been indicated, they may be totally or partially linked to the Workshop itself, depending on the specific characteristics of the work proposed in it. In the case of students who do not have a workshop, these practices will be based on the specific situation of the student. The teacher should be consulted the first few days. Normally they will try to make them look at a previous project carried out by the student, if this possibility exists. If they arise, during the course the specific conditions for this type of internship and its characteristics will be made explicit. It is not possible to fix them a priori since they will depend in part on the contents and themes defined by the coordination of the WORKSHOP, not available at the time of writing the present document.
Workshop	As mentioned, STRUCTURES 5, is included within the so-called WORKSHOP 8. This implies that it is highly convenient to have passed the materials corresponding to WORKSHOP 7. In the WORKSHOP the work proposed in it will be monitored, analyzing and reflecting on the project tools used to solve the project. The process by which the student has to integrate the various technologies, increasingly present, within their project work will be fundamental. The result of a good project will be precisely the integration of the various constructive, structural, regulatory, facilities, etc., aspects within the overall work. Remember what the current Undergraduate Study Plan indicates regarding the workshop (art. 5.1.2. And following).

Mixed objective/subjective test	The final exams will be adjusted to the official calendars established by the Center, having an estimated duration of 4 hours. Identification by means of DNI or equivalent official documentation may be required, being an essential condition for conducting the exam. A single handwritten A3 format sheet will be allowed for each part of the course, calculator, the corresponding legal regulations (without annotations in it) and any documentation that, in each case, may be supplied for such purposes. Any other type of documentation and the use of communication media is expressly prohibited. The use of electronic devices beyond traditional calculators is not allowed. In case of doubt, it is advisable for the student to consult whether a certain device can be used in any of these tests. In general, no device that allows Wi-Fi, Bluetooth or similar connection will be allowed. Mobile phones, smartphones, i-pods, tablets, computers, devices with headphones, programmable calculators, etc. will not be allowed. These exams will cover the diverse knowledge acquired during the course, being able to have a theoretical and practical component, having to reach a minimum level of knowledge in each one of the parts of the subject that is evaluated. The exam grade is in accordance with the UDC grading standards (grade 0-10), applied to the part in which the student has not passed. In the specific case of presentation for exam with a part not passed, the grade obtained will be a condition of passing that part, making the corresponding average with the rest of the course grade. There is no provision for ?saving? grades from one course to the next. In other words, a student who does not pass the subject on the 2nd opportunity, even if only has a pending part, the following year must follow up on the entirety of it, with the exception of WORKSHOP 8, which has specific grading standards already contemplated in The study plan These exams will be governed by the so-called "Regulations for the Conduct and Review of exams and assignments" of the UDC that is in force at all times. Regardless of the specific and particular instructions for each exam, in addition to its overall qualification, a partial pass is required from each of the parties, and these are not directly compensable for each other. This is because the subject has 3 clearly differentiated parts. For example, a student with an excellent grade in Factory and Wood, but with very serious deficiencies in Prestressed Concrete, is not admissible. Regardless of what is legally indicated on possible teacher fraud, any of the following situations will be considered as serious disciplinary offenses and, consequently, the automatic qualification of SUSPENSION (0): -Impersonation of a partner in attendance checks or activities -this fault extends to both the impersonating student and the impersonating student. -Fraudulent performance of practices and controls by a person other than the signing student. -Copy of practices. -Copy of exams. -Equivalent situations -Plagiarism

Personalized attention	
Methodologies	**Description**
Workshop Problem solving Mixed objective/subjective test Guest lecture / keynote speech Supervised projects	The tutoring hours are indicated on the corresponding official pages of the University and the School. Given the current situation, it is convenient to request such tutorials by email, being able to resolve doubts either in person or online, as the case may be.

Assessment			
Methodologies	Competencies	Description	Qualification
Workshop	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	The WORKSHOP qualification is already established in the Study Plan itself. Those students who have passed WORKSHOP 8 in previous courses must communicate this situation reliably (in writing) to the teacher, in order to update the corresponding grades. This is so since the currently existing qualification procedure does not allow immediate and easy access to these specific situations. As a course practice, they will carry out the tasks that are indicated by the teacher, normally associated with said workshop that has already been passed. This will be the basis of the qualification of the practical part of the subject. On the other hand, in accordance with the provisions of the current Study Plan, the workshop is subject to a process of continuous evaluation since it is also an interdisciplinary work between several subjects. It makes no sense if there is no continuous monitoring. The revisions and deliveries that are made throughout the course are those that also allow guaranteeing the authorship of the work and contrasting its evolution. For this reason, monitoring is required throughout the course and its delivery on the dates specified for it, not admitting the substitution of this monitoring by its direct delivery, either in the first or second opportunity. In order to be qualified in the subject, a minimum qualification in the workshop is required, which is mentioned in the appropriate section.	30

Problem solving	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	The overall qualification of the subject will be based on Continuous Assessment methods, not being admitted waivers of assistance except under the conditions established by the University itself. This assumes that the attendance and attitude shown during the various teaching activities planned is controlled and that a part of the grade will be obtained from this activity and from the work carried out by the student throughout the semester. This condition is imposed by the TALLER's own philosophy included in the Center's Study Plan, thus being alien to the subject itself. This daily work must be completed with the realization of theoretical - practical tests that allow to verify the degree of assimilation, by the student, of the conceptual and procedural contents of the subject. -Assistance. Given that a continuous assessment is chosen, attendance of more than 80% is mandatory in order to be qualified in this subject. Attendance is understood as active attendance, this is not only the mere physical presence, but also the interest and participation in the various face-to-face sessions. -Class practices: with a minimum level of development, with the assistance conditions indicated above. Practices developed by the student independently are included in this section. -Special class practices: Specific practices as a summary of each of the parts of the subject, carried out individually by the student and delivered during said class. They are announced in advance in a timely manner and can have both theoretical and practical content. These practices have a liberatory nature of the corresponding subject and themselves replace the exams, with the qualifications indicated in this guide. To carry it out, the use of an A3 format handwritten form (1 sheet on both sides), a calculator, the corresponding legal regulations and the documentation that, in each case, may be supplied for such purposes, will be allowed. In this aspect, what is stated in the exams section governs. All attendance controls, questionnaires, practices and, in general, the aforementioned course activities, will only be computed for those students who are duly registered and who appear on the official lists at the time they are carried out. That is, the possibility is not contemplated, for example, that a student attends the course as a "listener" while not "making official" their enrollment: all the activities and grades obtained before they appear in the official lists will not be taken into account. (The teachers will not manually expand any type of student list, only official lists will be used). In the specific case of non-compliance with the conditions of attendance or delivery of a minimum number of short practices, it is not possible to pass the course in parts, being necessary to take the 1st and 2nd opportunity exam with the entire course material. This applies to part-time enrollment students. The indicative percentages indicated are applicable to the follow-up of the course. Logically, they are not applicable to exams, which must be passed independently.

The rest of grades are used to establish the final grade for students who pass this item.	60

Mixed objective/subjective test	A12 A17 A18 A63 B1 B2 B3 B4 B5 B6 B9 B11 C1 C3 C4 C5 C6 C7 C8	To correct the results obtained in the course, the student may take the so-called 1st and 2nd chance official exams but subject to the conditions indicated. In this case, the percentages indicated above are: -Exam: 60% -Course practices: 10% -Workshop: 30% Being necessary to obtain a PASS in the exam so that the previous percentages are applied. Likewise, it is necessary to have a minimum qualification both in course practices and in the workshop to be able to apply the previous averages. This minimum rating is set at a score of 3.00 out of 10.00. The foregoing is valid for both special practices, curo practices or Workshop. The exam grade is in accordance with the UDC grading standards (grade 0-10), applied to the part in which the student has not passed. In the specific case of presentation for exam with a part not passed, the grade obtained will be a condition of passing that part, making the corresponding average with the rest of the course grade. There is no provision for ?saving? grades from one course to the next. In other words, a student who does not pass the subject on the 2nd opportunity, even if only has a pending part, the following year must follow up on the entirety of it, with the exception of WORKSHOP 8, which has specific grading standards already contemplated in The study plan These exams will be governed by the so-called "Regulations for the Conduct and Review of exams and assignments" of the UDC that is in force at all times. Regardless of the specific and particular instructions for each exam, in addition to its overall qualification, a partial pass is required from each of the parties, and these are not directly compensable for each other. This is because the subject has 3 clearly differentiated parts. For example, a student with an excellent grade in Factory and Wood, but with very serious deficiencies in Prestressed Concrete, is not admissible. Regardless of what is legally indicated on possible teacher fraud, any of the following situations will be considered as serious disciplinary offenses and, consequently, the automatic qualification of SUSPENSION (0): -Impersonation of a partner in attendance checks or activities -this fault extends to both the impersonating student and the impersonating student. -Fraudulent performance of practices and controls by a person other than the signing student. -Copy of practices. -Copy of exams. -Equivalent situations -Plagiarism	0

Supervised projects	A12 A17 A18 A63 B2 B3 B4 B5 B9 B11 C1 C3 C5 C6 C7 C8	Grade obtained in the various activities carried out throughout the course by the student, which demonstrates its follow-up. The practical activities make sense if their development takes place throughout the course, so there is a single delivery at the end of the course. In principle, the possibility of delivering these activities once the course is finished is not considered (2nd opportunity or advanced opportunity) This grade percentage is only applicable to students who have passed the first item.	10

Assessment comments

The indicated percentages are intended for the overall grade of the course. In the case of needing to attend exams, it will logically be necessary to pass them. The items of "Practices" and "Workshop" are counted once the first item of "Special class practices" has been passed. It is also necessary to pass a 4 out of 10 to be able to count any of the parts of the subject.
Regardless of the previous overall rating, each of the indicated items must be passed specifically and individually in order to obtain a PASS rating in its various grades in the subject.
Failure to complete or pass any of the items indicated above implies the qualification of NOT PRESENTED.
To rectify the results obtained in the course, the student may take the so-called official 1st and 2nd opportunity exams, but subject to the conditions indicated.
Likewise, it is necessary to have a minimum qualification both in course practices and in the workshop to be able to apply the previous averages. This minimum rating is set at a score of 4.00 out of 10.00. The above is valid for both special practices, course practices or Workshop.
In the special case of Early Announcement, the previously indicated evaluation criteria are maintained with the exception that only the practices carried out in the immediately previous academic year are computed. For example, for the Adelantada of December 2000, the qualifications of the practices obtained in the 1999-2000 academic year are taken into account.
For this call, no extension of the practical activities indicated above is allowed. In the event that the student had not developed these practical activities, the maximum mark of said exam would be 60% of the total. In this exam, a 5 out of a maximum score of 10 is considered as an Approved grade.
If the particular situations of development of the course so advise, the above percentages and criteria may be adjusted. If this happens, it will be announced in a timely manner and published on the subject's Moodle platform.
Students with recognition of part-time dedication and academic attendance waiver: the 80% attendance criterion is eliminated but the rest of both weekly and global deliveries and the corresponding corrections that allow guaranteeing their authorship are maintained.
Failure to complete any of the course items implies a grade of not submitted.
The previously indicated percentage criteria are maintained.
STUDENTS WITH RECOGNITION OF PART-TIME DEDICATION AND ACADEMIC WAIVERPERSONALIZED ATTENTION: no changes.ATTENDANCE: is governed by the general criteria of the UDCASSESSMENT: no change.

Sources of information

Basic	BIBLIOGRAFÍA SELECCIONADAPROXECTO DE ESTRUTURASGORDON, J.E.Estructuras o por qué las cosas no se caen.Celeste, 1.999MALCOM MILLAISEstructuras de edificaciónCeleste Ediciones, Madrid 1.997MUÑIZ GOMEZ, S; FREIRE TELLADO, J.M.Representación de estructurasEd. Tórculo, La Coruña, 1.994REGALADO TESORO, F.Breve introducción a las estructuras y a sus mecanismos resistentesCype Ingenieros, Alicante, 1.999SALVADORI, M.Why Buildings stand up. The Strength of Architecture.W.W. Norton and Company, New York, 1980SALVADORI, M. / HELLER, R.Estructuras para arquitectos.Editorial CP67, Buenos Aires, 1.987TORROJA, E.Razón y ser de los tipos estructurales.Consejo Superior de Investigaciones Científicas I.E.T.c.c., Madrid 1.991ESTRUCTURAS DE MADEIRAARGÜELLES, R. / ARRIAGA, F.Estructuras de madera: Diseño y cálculo.Asociación de Investigación Técnica de las Industrias de Madera y Corcho. Madrid, 1.996ARGÜELLES, R. / ARRIAGA, F.Estructuras de madera: Bases de cálculo. 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Complementary	

Recommendations
Subjects that it is recommended to have taken before
Facilities 1/630G01030 Projects 7/630G01031 Construction 5/630G01033 Structures 4/630G01034
Subjects that are recommended to be taken simultaneously
Projects 8/630G01036 Construction 6/630G01037 Facilities 2/630G01039
Subjects that continue the syllabus
Unique Structures/630G01049 Structures Projects/630G01050
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.