Teaching Guide				
Identifying Data				2022/23
Subject (*)	Structures 1		Code	630G02019
Study programme	Grao en Estudos de Arquitectura			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatory	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Construcións e Estruturas Arquitectónicas, Civís e AeronáuticasEnxeñaría Civil			
Coordinador	Muñoz Vidal, Manuel	E-mail	manuel.munoz@udc.es	
Lecturers	Barreiro Roca, José Carlos Muñoz Vidal, Manuel Suárez Riestra, Félix Leandro	E-mail	jose.barreiro@udc.es manuel.munoz@udc.es felix.suarez@udc.es	
Web				
General description	Knowledge Theory of Elasticity and Strength of Materials			

Study programme competences	
Code	Study programme competences
A7	"Knowledge of the principles of general mechanics, statics, mass geometry and vector and tensor fields, adapted and applied to architecture and urbanism "
A72	Coñecemento avanzado de aspectos específicos da materia de Estruturas no contemplados expresamente na Orde EDU/2075/2010
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
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
B5	Students have developed those learning skills necessary to undertake further studies with a high level of autonomy
B9	Understanding the problems of the structural design, construction and engineering associated with building design and technical solutions
C6	Critically evaluate the knowledge, technology and information available to solve the problems they must face

Learning outcomes			
Learning outcomes	Study programme competences		
Knowledge of Elasticity, Plasticity and Strength of Materials. Indeterminate systems. Numerical and computer methods of structural analysis.	A7 A72	B1 B3 B5	C6
The student will acquire skills for pre-dimensioning, design, calculation and testing of structures and to direct its material execution	A7 A72	B1 B3 B5 B9	C6

Contents	
Topic	Sub-topic

01 STRUCTURE. REQUIREMENTS AND BEHAVIOR	1 Concept of Structure 2 Linear and Surface Structural Elements 3 Structural Systems 4 Balance and Stability 5 Strength and Rigidity 6 Design, Idealization and Analysis 7 Actions, Connections and Coercions.
02 STRESS STATE	1 Concept of tension. Components of the voltage vector. 2 Tensions depending on the orientation of the section. 3 Flat tension state. Tension Tensioner 4 Intrinsic components of the Strain
03 STRAIN STATE	1 Deformations and displacements. Components 2 Flat deformational state. Strain tensor 3 Intrinsic Components of Strain
04 RELATION STRESS STRAIN	1 Elastic constants of materials 2 Generalized Hooke's Law 3 Lamé's Equations
05 STRENGTH OF MATERIALS	1 Solid elastic concept. Mechanical prism. 2 Bernoulli hypothesis and Saint-Venant principle. 3 Diagrams stress - deformation. 4 Failure criteria for Saint Venant and Tresca.
06 AXIAL FORCE	1 Uniaxial stress and strain states 2 Section resistance. 3 Resolution of hyperstatic monoaxial problems 4 Strength of the bars. Buckling. Euler's critical charge.
07 SHEAR FORCE	1 Elemental theory 2 Connecting elements 3 Pin calculation
08 PURE BENDING	1 Hypothesis and general solution 2 Simetric pure bending. Navier law. Resistant module 3 Sections calculation 4 Differential equations or the elastic line.
09 SIMPLE BENDING	1 Colignon formulation 2 Principal stress. Isostatic 3 Beams calculations
10 DEVIED BENDING	1 Normal and shear stresses 2 Bend allowance 3 Analysis of deformations
11 BENDING (COMPOUND FLEXURE)	1 Normal and shear stresses. Neutral axis 2 Pressure center and neutral axis 3 Central core or central nucleus. Concept. Determination.
12 TORSION	1 Simple torsion and pure torsion. 2 Torsion in cylindrical bars. Coulomb theory. 3 Torsion in no circular cross-section prisms 4 Design consideration in elements with torsion

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A7 A72 B5	14	28	42

Problem solving	B1 C6	24	36	60
Practical test:	B3 B9	6	12	18
Objective test	B1 B3 C6	4	20	24
Seminar	A72 B9 C6	1	1	2
Directed discussion	B1	1	1	2
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	They are given to the entire group. In these aspects considered necessary for the development of the field grow.
Problem solving	Practical problem solving related to the subject. This resolution can be carried out by the teacher, students or mixed form
Practical test:	
Objective test	Individual practices throughout the course
Seminar	Special class development to focus some of the practical proposals
Directed discussion	Presentation and discussion of specific issues.

Personalized attention	
Methodologies	Description
Practical test:	Please direct students to the ward focus and work for discussion and solution of theoretical questions and troubleshooting

Assessment			
Methodologies	Competencies	Description	**Qualification**
Objective test	B1 B3 C6	Final test of the first opportunity. (In the second opportunity computes 100% of the note). Class notes and the form sheet are allowed. It will consist of the resolution of practical problems, as well as theoretical questions based on the material given in the theoretical classes and exercises carried out. will also be valued - Content structuring - Approach, clarity and precision - Mastery of the operation of the matter	80
Practical test:	B3 B9	They are called Bulletins or problem solving tests to be carried out by the student throughout the course. Class notes and the form sheet are allowed. Specific doubts can be consulted with the teacher.	20

Assessment comments

The evaluation will be as continuous as possible. For the evaluation and qualification of the subject, the following aspects will be assessed, which will have a different weight in the final grade of the course, as broken down in the previous Table that appears in the evaluation section: * Attendance to class is understood as compulsory, verified through a list or another system. * Interactive practices will be developed, where the student will be able to consult the doubts that arise. * Throughout the course a continuous practice will be developed, directed and proposed by the teachers and that the students must develop and complete independently. * When the qualification consists of several sections, a minimum grade of 35% (3.5 out of 10) will be required in each of the sections to be evaluated either on the first or second opportunity. Once this minimum is exceeded, the sections will average according to the weights indicated in the guide. In the event that in any section the minimum is not reached to make an average, the grade awarded will be the weighted average, but without ever exceeding 4.5.* Throughout the course there will be a partial test, which will consist of problem-type questions, and may also have conceptual issues. It will be liberatory of matter in the face of the first opportunity.* The objective tests will be individual and you will not be able to consult any bibliography. During its development, only the consultation of a summary form will be allowed.* At the first final opportunity of the course, an objective test will be carried out (those who have passed the partial will have fewer questions to answer)* At the first opportunity, the three sections will average according to the weights indicated in the previous table.* In the so-called second opportunity at the end of the course, it will be evaluated through the objective test and a new supervised work similar to that developed during the course. The only requirement to be able to take this final test will be to appear in the minutes of this course. In this case, the subject score will be 60% the objective test and 40% the new supervised work. (The minimum 40% grade is still required in each section to qualify for the pass). * In the case of students who have a waiver of attendance and who can therefore present themselves at the first and second opportunity without requiring continuous evaluation, the assessment will be similar to the second general opportunity on both occasions: 60% the objective test and 40% the supervised work. (The minimum 40% grade is still required in each section to qualify for the pass). It is understood that the supervised work of the first and second opportunity will be the same as for the rest of the students. For the realization of practices and examination, the allowed materials will only be: - DNI or other identification- Writing and drawing material and Calculator- A summary sheet of formulas- Mobile phones are expressly prohibited Teaching to students of mobility programs will be adapted to pedagogical conditions and special supervised work, as well as assessment tests and exams. If the mobility dates do not allow a reasonable follow-up of the course, they may opt in any case for the first and second opportunity exams on the same conditions as the students with no attendance.

Sources of information	
Basic	
Complementary	1 BEDFORD, A.; LIECHTI, K. M.Mecánica de materiales.Prentice-Hall Inc. Pearson Educación deColombia Ltda. Bogotá, 2002.2 BYARS, E. F.; SNYDER, R. D.Mecánica de cuerpos deformables.Representación y Servicios de IngenieríaS.A. México, 1978. 3ª edición.3 GERE, J. M.Timoshenko. Resistencia de materiales.Thomson. Madrid, 2002.5ª edición.4 GONZÁLEZ TABOADA, J.A.Tensiones y deformaciones en materialeselásticos.Universidad de Santiago de Compostela, 1989.5 ORTIZ BERROCAL, L.Elasticidad.Universidad Politécnica deMadrid. Madrid, 1985.6 HIBBELER, R. C.Mecánica de materiales.Prentice Hall Hispanoamericana S.A. México,1998. 3ª edición.7 ORTIZ BERROCAL, L.Resistencia de materiales.McGraw-Hill. Madrid, 2002. 2ª edición (1ª edición de1980).8 POPOV, E. P.; BALAN, T. A.Mecánica de sólidos.Pearson Educación. México, 2000. 2ª edición.

Recommendations
Subjects that it is recommended to have taken before
Mathematics for Architecture 1/630G02004 Mathematics for Architecture 2/630G02009 Physics for Architecture 1/630G02008
Subjects that are recommended to be taken simultaneously
Construction 2/630G02020
Subjects that continue the syllabus

Structures 3/630G02028 Structures 2/630G02023
Other comments
Previously reviewed the matter on which previous course work repeatedly, as is recommended: - Geometry mass - Resolution of articulated structures - Diagrams efforts beams and frames Given the continuous treatment of the subject, a daily review of the subject dealt with in the class is recommended, which will allow to raise the doubts that could arise in the next class or in an individualized way in the tutoring hours.Apart from the monitoring of the classes, it is necessary to consult the bibliography and the recommended material for each part of the subject, where you can find references that complement and reinforce the theme raised from different points of view that add to the training work.