



## Teaching Guide

Identifying Data					2018/19
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, Cívís e AeronáuticasEnxeñaría Civil				
Coordinador	Muñoz Vidal, Manuel	E-mail	manuel.munoz@udc.es		
Lecturers	Cuba Cabana, Hilda Muñoz Vidal, Manuel Sabin Díaz, Patricia Suárez Riestra, Félix Leandro Taberner Duque, Fernando Maria	E-mail	hilda.cuba@udc.es manuel.munoz@udc.es patricia.sabin@udc.es felix.suarez@udc.es fernando.taberner@udc.es		
Web					
General description	Knowledge Theory of Elasticity and Strength of Materials				

### Study programme competences / results

Code	Study programme competences / results

### Learning outcomes

Learning outcomes	Study programme competences / results		
Knowledge of Elasticity, Plasticity and Strength of Materials. Indeterminate systems. Numerical and computer methods of structural analysis.	A56 A57 A58	B1 B2 B4 B5 B7 B11 B15 B21 B22 B24	
The student will acquire skills for pre-dimensioning, design, calculation and testing of structures and to direct its material execution	A57 A58	B4 B5 B7 B15	

### Contents

Topic	Sub-topic



01 STRESS STATE	<ol style="list-style-type: none"><li>1 Stress concept: Normal and tangential</li><li>2 Intrinsic components of the stress components</li><li>3 Stress in function of the orientation of the section</li><li>4 Graphical representations of the stress intrinsic components. Mohr circle.</li><li>5 Cauchy Theorem</li><li>6 Plane stress state</li><li>7 Main directions</li></ol>
02 DEFORMATIONS AND DISPLACEMENTS	<ol style="list-style-type: none"><li>1 Specific deformations</li><li>2 Angular deformations or angular rotations</li><li>3 Plane deformational state. Deformation tensor.</li><li>4 Intrinsic components graphic. Mohr circle.</li><li>5 Extensometry</li></ol>
03 MECHANIC RESPONSE OF THE MATERIALS	<ol style="list-style-type: none"><li>1 Elastic constants of the materials</li><li>2 Hooke's law</li><li>3 Lamé equations</li></ol>
04 MATERIALS RESISTANCE	<ol style="list-style-type: none"><li>1 Solid elastic concept. Mechanic prism.</li><li>2 Efforts. Section method. Equivalence equations</li><li>3 Relatively resilient and Bernoulli hypothesis.</li><li>4 Saint-Venant Principle and combining or overlay effects.</li><li>5 Stress-deformation diagrams. Mechanic properties</li><li>6 Fail Criteria</li><li>7 Introduction to Structural calculation. Limited States.</li><li>8 Probability methods and partial safety factors</li></ol>
05 AXIAL FORCE	<ol style="list-style-type: none"><li>1 Stress conditions and uniaxial deformational conditions</li><li>2 Strength of bars</li><li>3 Resolution of monoaxial hyperstatic problems</li><li>4 Introduction of the buckling problems. Euler critical load.</li><li>5 Introduction to axial plasticity.</li></ol>
06 SHEAR FORCE	<ol style="list-style-type: none"><li>1 Elemental theory</li><li>2 Connecting elements</li><li>3 Smugglers calculation</li></ol>
07 PURE BENDING	<ol style="list-style-type: none"><li>1 Hypothesis or assumptions and general solutions</li><li>2 Simetric pure bending. Navier law. Resistant module</li><li>3 Sections calculation</li><li>4 Differential equations or the elastic line.</li><li>5 Plasticity introduction in pure bending</li></ol>
08 SIMPLE BENDING	<ol style="list-style-type: none"><li>1 Colignon formulation</li><li>2 Principal stress. Isostatic</li><li>3 Beams calculations</li></ol>
09 DEVIATION BENDING	<ol style="list-style-type: none"><li>1 Normal and shear stresses</li><li>2 Bend allowance</li><li>3 Analysis of deformations</li></ol>
10 BENDING (COMPOUND FLEXURE)	<ol style="list-style-type: none"><li>1 Normal and shear stresses. Neutral axis</li><li>2 Pressure center and neutral axis</li><li>3 Central core or central nucleus. Concept. Determination.</li></ol>
11 TORSION	<ol style="list-style-type: none"><li>1 Simple torsion and pure torsion.</li><li>2 Torsion in cylindrical bars. Coulomb theory.</li><li>3 Torsion in no circular cross-section prisms</li><li>4 Design consideration in elements with torsion</li></ol>



Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A56 A57 A58	29	29	58
Directed discussion	B1	1	1	2
Problem solving	A56 B2	15	30	45
Objective test	B2 B11	8	16	24
Supervised projects	B4 B5 B7 B11 B15 B21 B22 B24	2	10	12
Seminar	B24	2	3	5
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.
Directed discussion	Presentation and discussion of specific issues.
Problem solving	Practical problem solving related to the subject. This resolution can be carried out by the teacher, students or mixed form
Objective test	Individual practices throughout the course
Supervised projects	Development work throughout the course with teacher assistance
Seminar	Special class development to focus some of the practical proposals
Directed discussion	Discusión cuestiones teóricas

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

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Supervised projects	B4 B5 B7 B11 B15 B21 B22 B24	GLOBAL PRACTICE - Participation and collaboration in group - Original Contributions - Structure and presentation - Quality of documentation	10
Objective test	B2 B11	PARTIAL TEST - Troubleshooting - Mastery of theoretical knowledge - Structuring content - Planning, clarity and precision - Mastering the art of operational	80



Problem solving	A56 B2	<b>INTERACTIVE PRACTICE</b> - Attendance and active participation in class - Carrying out practical - Application of knowledge acquired	10
-----------------	--------	--	----

### Assessment comments

One possible continuous assessment as intended, so to pass the course must complete and submit a series of tests and work along the same. For the processing of the material, the delivery of virtual or electronic record of the student will be detailed as requested.

Facing the course note the following aspects, which have a different weight in the final grade, as broken down in the table of assessment will be assessed:

- \* Class attendance is mandatory understood, verifying by means of list or interactive practices.
- \* Throughout the course an overall practice or work directed by the teacher, the revisions will be made or specific monitoring will be developed, but the student will develop on their own. It is anticipated that this work will be developed in groups of students, and build capacity for organization and a cooperative attitude.
- \* Throughout the course about exams, which consist of questions, problem type, and may also contain conceptual topics will be made. Will be individual and will not be able to see some literature. Must obtain a minimum of 3 pts in each exam.

Satisfactorily overcoming the above aspects, students can obtain the approval of the course without having to go the final tests. 2nd student enrollment or later, they will follow the course in the same conditions as those of first enrollment to be eligible to pass the course.

- \* If it is not approved by course, in the first final opportunity of course there will be a written test or exam. The result of this test counted as partial evidence of progress. The assistance will be weighted as global practice during the course.
- \* In the second final suitability of course there will be a written test or exam containing problems and a series of short questions of theoretical nature. The student may submit this final test without having to meet any other requirement rather than included in the records of the subject. In this case the total weight of the note will be the test.

For the experiments and examination materials will be permitted only:

- ID card or other identification
- Material of writing and drawing
- Calculator
- A summary sheet of formulas
- Mobile phones is expressly prohibited

The offset will consider structuring content, order submission and accuracy of results. Take into account the errors of concepts generally considered very serious, and may nullify the whole exercise.

### Sources of information

<b>Basic</b>	
<b>Complementary</b>	1 BEDFORD, A.; LIECHTI, K. M. Mecánica de materiales. Prentice-Hall Inc. Pearson Educación de Colombia Ltda. Bogotá, 2002. 2 BYARS, E. F.; SNYDER, R. D. Mecánica de cuerpos deformables. Representación y Servicios de Ingeniería S.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 materiales elásticos. Universidad de Santiago de Compostela, 1989. 5 ORTIZ BERROCAL, L. Elasticidad. Universidad Politécnica de Madrid. 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 de 1980). 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 I/670G01001  
 Applied Physics I/670G01002

#### Subjects that are recommended to be taken simultaneously



Mathematics II/670G01006

Construction I/670G01009

**Subjects that continue the syllabus**

Structures II/670G01025

Structures III/670G01034

**Other comments**

Previously reviewed the matter on which previous course work repeatedly, as is recommended:&nbsp;- Geometry mass&nbsp;- Resolution of articulated structures&nbsp;- Diagrams efforts beams and frames&nbsp;The continued treatment of the subject we recommend a review every day of what was discussed in class, planning the doubts that may arise in the next class or tutorial hours.&nbsp;Besides monitoring of classes, the student should consult the literature and recommended material for each part of the subject.

(\*)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.