Teaching Guide				
Identifying Data				2014/15
Subject (*)	RESISTENCIA DOS MATERIAIS		Code	730G03013
Study programme	Grao en Enxeñaría Mecánica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatoria	6
Language	Galician			
Prerequisites				
Department	Enxeñaría Industrial 2			
Coordinador	Reinosa Prado, Jose Manuel	E-mail	j.reinosa@udc.es	
Lecturers	Gutierrez Fernandez, Ruth Maria López López, Manuel Loureiro Montero, Alfonso Reinosa Prado, Jose Manuel	E-mail	ruth.gutierrez@udc.es manuel.lopez.lopez@udc.es a.loureiro@udc.es j.reinosa@udc.es	
Web	sites.google.com/site/structuralanalysislab/			
General description	Resistencia dos materiais é a asignatura base do cálculo e análise de estructuras e elementos mecánicos. Proporciona ó alumno, os conceptos básicos de tensión e deformación. Estudiase o comportamento de elementos sometidos a esforzo axil, cortante, torsor e flector.			

Study programme competences	
Code	Study programme competences
A14	Coñecemento e utilización dos principios da resistencia de materiais.
A23	Coñecementos e capacidades para aplicar os fundamentos da elasticidade e resistencia de materiais ao comportamento de sólidos reais.
A24	Coñecementos e capacidade para o cálculo e deseño de estruturas e construcións industriais.
A33	Capacidade para o deseño e a análise dos principais elementos de máquinas.
A35	Capacidade para analizar e deseñar estruturas metálicas.
A36	Capacidade para dirixir o proceso construtivo de estruturas metálicas.
A37	Coñecemento do deseño de sólidos e estruturas sometidas a esforzos de tracción, compresión, flexión e torsión.
A38	Capacidade de analizar estados tensionais e de deformación en sólidos e estruturas.
A39	Capacidade para analizar e deseñar estruturas de hormigón.
A40	Capacidade para dirixir o proceso construtivo en estruturas de hormigón.
A45	Coñecemento da metodoloxía de análise de fallo dos materiais.
A46	Comprensión dos mecanismos de fallo nos materiais en servizo.
A48	Ampliación de coñecementos e capacidades para o deseño de construcións industriais.
A56	Formular e resolver problemas numéricos no ámbito da enxeñaría mecánica con MATLAB.
A57	Modelar matematicamente sistemas e procesos e resolver o modelo por medio de técnicas numéricas.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar de forma colaboradora.
B8	Actitude orientada ao traballo persoal intenso.
B9	Capacidade de integrarse en grupo de traballo.
B10	Actitude orientada á análise.
B12	Capacidade para encontrar e manexar a información.
B14	Manexo de sistemas asistidos por ordenador.
B18	Capacidade de abstracción, comprensión e simplificación de problemas complexos.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.

C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
Adquirir os conceptos de elasticidade e inelasticidade.	A14 A23 A24 A35 A36 A37 A38 A39 A40	B1 B2 B3 B4 B5 B8 B9 B10 B12 B14 B18	C3 C6 C8
Comprender o comportamento resistente das estruturas e elementos mecánicos, facendo propios os conceptos de tensión e deformación.	A14 A23 A24 A33 A35 A36 A37 A38 A39 A40 A45 A46 A48 A57	B1 B2 B3 B4 B5 B8 B9 B10 B12 B14 B18	C3 C6 C8
Análise e deseño de membros estruturales suxeitos a tracción, compresión, torsión e flexión.	A14 A23 A24 A33 A35 A36 A37 A38 A39 A40 A45 A46 A48 A56	B1 B2 B3 B4 B5 B8 B9 B10 B12 B14 B18	C3 C6 C8

Contents	
Topic	Sub-topic

1. Tension, Compression and Shear	Introduction to Mechanics of Materials Normal Stress and Strain Mechanical Properties of Materials Elasticity, Plasticity, and Creep Linear Elasticity, Hooke?s Law, and Poisson?s Ratio Shear Stress and Strain Allowable Stresses and Allowable Loads Design for Axial Loads and Direct Shear
2. Axially Loaded Members	Introduction Changes in Lengths of Axially Loaded Members Changes in Lengths Under Nonuniform Conditions Statically Indeterminate Structures Thermal Effects, Misfits, and Prestrains Stresses on Inclined Sections Strain Energy
3. Torsion.	Introduction Torsional Deformations of a Circular Bar Circular Bars of Linearly Elastic Materials Stresses and Strains in Pure Shear Relationship Between Moduli of Elasticity E and G Transmission of Power by Circular Shafts Strain Energy in Torsion and Pure Shear
4. Shear Force and Bending Moment	Introduction Types of Beams, Loads, and Reactions Shear Forces and Bending Moments Relationships Between Loads, Shear Forces, and Bending Moments Shear-Force and Bending-Moment Diagrams
5. Stresses in Beams I.	Introduction Pure Bending and Nonuniform Bending Curvature of a Beam Longitudinal Strains in Beams Normal Stresses in Beams (Linearly Elastic Materials) Design of Beams for Bending Stresses
6. Stresses in Beams II.	Shear Stresses in Beams of Rectangular Cross Section Shear Stresses in Beams of Circular Cross Section Shear Stresses in the Webs of Beams with Flanges
7. Analysis of Stress and Strain	Introduction Plane Stress Principal Stresses and Maximum Shear Stresses Mohr?s Circle for Plane Stress Hooke?s Law for Plane Stress Triaxial Stress Plane Strain

8. Deflections of Beams	Introduction Differential Equations of the Deflection Curve Deflections by Integration of the Bending-Moment Equation Deflections by Integration of the Shear-Force and Load Deflections by the Virtual Force Method Strain Energy of Bending. Thermal effects.

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	24	36	60
Seminar	18	27	45
Laboratory practice	6	6	12
Objective test	3	15	18
Personalized attention	15	0	15
(*)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	Oral lecture supplemented with the use of audiovisual means, aiming at transmit knowledges and facilitate the learning within the scope of structural analysis.
Seminar	Technique of work in group to resolve practical cases, by means of exhibition, discussion, participation and calculation. It employed calculator.
Laboratory practice	Methodology that allows the realization of activities of practical character, with computer, such as modelization, analysis and simulation of mechanical and estructural elements, as well as experimental studies in the workshop of structures, for estudying its deformation and resistance.
Objective test	Test writing used for the evaluation of the learning.

Personalized attention	
Methodologies	Description
Seminar Laboratory practice	Monitoring and guidance in the possible problems appearing during the academic activities.

Assessment		
Methodologies	Description	Qualification
Laboratory practice	The attendance is mandatory.	0
Objective test	Final examination.	100

Assessment comments

Sources of information	
Basic	- (). . - Hibbeler, Russell C. Traducción José de la Cera Alonso, Virgilio González y Pozo. (2006). Mecánica de materiales. Sexta edición.. Pearson Educación, México. - Gere James M.; Tmoshenko (2002). Resistencia De Materiales. Quinta edición.. Editorial Paraninfo, Madrid.

Complementary	- Craig, Roy R. (2002). Mecánica de materiales. . Compañía Editorial Continental, México. - Ferdinand P. Beer et al. (2009). Mecánica de materiales. Quinta edición.. Mc Graw-Hill, México, Madrid. - Ortiz Berrocal, Luis. (). Resistencia de materiales. . McGraw-Hill, Madrid, ESPAÑA, 2007.

Recommendations
Subjects that it is recommended to have taken before
ESTRUTURAS/730G03021 RESISTENCIA MATERIAIS II/730G03027 ESTRUTURAS METÁLICAS/730G03035 ESTRUTURAS II/730G03036 ESTRUTURAS DE FORMIGÓN/730G03037 VIBRACIÓNS/730G03040
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
CÁLCULO/730G03001 FÍSICA I/730G03003 ÁLXEBRA/730G03006 FÍSICA II/730G03009
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.