



Teaching Guide

Identifying Data					2017/18
Subject (*)	Strength of Materials	Code		730G03013	
Study programme	Grao en enxeñaría en Tecnoloxías Industriais				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	2nd four-month period	Second	Obligatoria	6	
Language	Galician				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría Naval e Industrial				
Coordinador	Reinosa Prado, Jose Manuel	E-mail	j.reinosa@udc.es		
Lecturers	Gutierrez Fernandez, Ruth Maria	E-mail	ruth.gutierrez@udc.es		
	Reinosa Prado, Jose Manuel		j.reinosa@udc.es		
Web	sites.google.com/site/structuralanalysislab/				
General description	Mechanics of Materials is the basis for the structural analysis and design of mechanical elements. The concepts of stress and strain are explained and discussed. Axial and shear stresses are dealt with as well as torsion and beams bending.				

Study programme competences / results

Code	Study programme competences / results

Learning outcomes

Learning outcomes	Study programme competences / results		
Adquirir os conceptos de elasticidade e inelasticidade.	A14	B2	C1
	A23	B3	C2
	A24	B5	C3
		B6	C4
		B7	C5
		B9	C6
Comprender o comportamento resistente das estruturas e elementos mecánicos, facendo propios os conceptos de tensión e deformación.	A14	B2	C1
	A23	B3	C2
	A24	B5	C3
		B6	C4
		B7	C5
		B9	C6
Análise e deseño de membros estruturales suxeitos a tracción, compresión, torsión e flexión.	A14	B2	C1
	A23	B3	C2
	A24	B5	C3
		B6	C4
		B7	C5
		B9	C6

Contents

Topic	Sub-topic



Os bloques ou temas seguintes desenrolan os contidos establecidos na ficha da Memoria de Verificación:	Conceptos básicos de tensión e deformación; a peza elástica: modelo de barras e leis de esforzos; esforzo axil: tensions e deformacions; tensions producidas polo momento flector, tensions producidas polo esforzo cortante, tensions producidas pola torsión, tensions producidas pola combinación de esforzos
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.
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Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Guest lecture / keynote speech	A14 A23 A24 B2 B3 B5 B6 B7 B9 C1 C2 C3 C4 C5 C6	24	36	60
Seminar	A14 A23 A24 B2 B3 B5 B6 B7 B9 C1 C2 C3 C4 C5 C6	24	24	48
Laboratory practice	A14 A23 A24 B2 B3 B5 B6 B7 B9 C1 C2 C3 C4 C5 C6	5	5	10
Objective test	A14 A23 A24 B2 B3 B7 C5 C4	4	16	20
Personalized attention		12	0	12

(*)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	Competencies / Results	Description	Qualification
Objective test	A14 A23 A24 B2 B3 B7 C5 C4	Final examination	100

Assessment comments



Sources of information

Basic	<ul style="list-style-type: none">- Gere James M.; Tmoshenko (2002). Resistencia De Materiales. Quinta edición.. Editorial Paraninfo, Madrid.- Hibbeler, Russell C. Traducción José de la Cera Alonso, Virgilio González y Pozo. (2006). Mecánica de materiales. Sexta edición.. Pearson Educación, México.- (). .
Complementary	<ul style="list-style-type: none">- Ortiz Berrocal, Luis. (). Resistencia de materiales. . McGraw-Hill, Madrid, ESPAÑA, 2007.- 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.

Recommendations

Subjects that it is recommended to have taken before

Calculus /730G03001
Physics I /730G03003
Linear Algebra/730G03006
Physics II/730G03009

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Theory of Structures /730G03021
Strength of Materials II/730G03027
Steel Structures/730G03035
Theory of Structures II/730G03036
Concrete Structures/730G03037
Theory of Vibration/730G03040

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.