UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2016/17
Subject (*)	Physics 1		Code	630G01008
Study programme	Grao en Arquitectura			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	FB	6
Language	SpanishEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Tecnoloxía da Construción			
Coordinador	Vazquez Rodriguez, Jose Antonio	E-mail	jose.vazquez@udc.es	
Lecturers	Vazquez Rodriguez, Jose Antonio	E-mail	jose.vazquez@udc.es	
Web	http://www.estructuras.udc.es			
General description	Esta asignatura tiene extinguida su docencia de acuerdo con el cronograma de implantación de la titulación de Grado en Estudios de Arquitectura. Todos los alumnos de la asignatura deben conocer, comprender y saber manejar con soltura los contenidos básicos que integran el documento disponible en este enlace http://etsa.udc.es/web/wp-content/uploads/2012/06/Precurso-Física.pdf			

Study programme competences / results	
Code	Study programme competences / results
A53	CÁLCULO MATEMÁTICO: comprensión ou coñecemento do cálculo numérico, a análise matemática, a xeometría analítica e diferencial e os métodos alxebraicos, como bases do entendemento dos fenómenos físicos que atinxen aos sistemas, equipos e servizos propios da edificación e o urbanismo.
A56	BASES DE MECÁNICA XERAL: comprensión ou coñecemento dos principios da mecánica básica e aplicada, a estática, a xeometría de masas e os campos vectoriais e tensoriais necesarios para entender as condicións de equilibrio dos edificios e obras civís e de urbanización.
A57	MECÁNICA ESTRUCTURAL E DO TERREO: comprensión ou coñecemento dos principios de mecánica de sólidos e de medios continuos, dos de mecánica do solo e das calidades plásticas, elásticas e de resistencia dos distintos materiais empregados en estruturas portantes, obra civil e cimentacións.
B1	Learn how to learn
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 colaborativa.
B7	Comunicarse de maneira efectiva nun entorno de traballo.
B11	Capacidade de análise e síntese.
B12	Toma de decisións.
B18	Razoamento crítico.
B21	Intuición mecánica.
B24	Coñecementos de informática relativos ao ámbito de estudo.
B28	Comprensión numérica.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
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.

Learning outcomes

Learning outcomes	Study programme competences / results		
1- Determine the equilibrium conditions of a rigid body in the plane as much space.	A53 A56	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
2- Knowing the kind of connection of isostatic structure	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
3- Evaluate reactions of isostatic structure	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6

4- Know and calculate the internal forces of isostatic frame structure (shear, bending, ...)	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
5- Learn a mixed structure subdivided into parts to proceed with its independent calculation	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
6- Know and calculate the internal force of isostatic articulated structure (tensile and compressive forces. ..)	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
7- Know and calculate internal forces of isostatic structure cables (tensile forces)	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6

8- Locate the mass center of a rigid body.	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
9- Calculate moments and product of inertia of area respect to a plane, axes or point	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6
10- Evaluate the connections in a structure by energy methods / virtual work	A53 A56 A57	B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28	C1 C2 C3 C6

Contents	
Topic	Sub-topic

1- STATIC SOLID RIGID	Review of Mechanics. Concept of force Basic hypothesis Force systems. Properties: Composition of forces. Resultant. Moment of a force respect to a point. Moment of the system. Moment of a force respect to axes. Moment of the system. Torque. Pair composition force. Reduction systems. Invariant of a system. Central axes. Equilibrium conditions in 3D and 2D. Particular cases: Solid rigid balance under the action of two forces. Solid rigid balance under the action of three forces.
2- CONNECTIONS AND REACTIONS FORCES. EQUILIBRIUM OF RIGID SOLID	Introduction. Concept of rigid solid. Free Solid / Solid linked. Support, connection and joint. Definition. Classifications. Active Forces (or actions) and Reactive Forces (or effects). Freedon Degreem: Internal, External and Total. Connection or constraints two-dimensional systems (2D). Connetion in three-dimensional systems (3D). Immobilization of the body: 2D and 3D. Isostatic, hyperstatic and mechanisms systems. Balance in two-dimensional. Calculation of reactions. Balance in three-dimensional. Calculation of reactions. Diagram of rigid solid.
3- ARTICULATED STRUCTURAL ANALYSIS	Introduction. External and internal forces. Equilibrium of solid under action of two forces Axial forces: Tension and Compression Truss structures. Definition. Basic hypothesis . Types Condition Isostatic system Calculation methods truss structures Method sections or Ritter Method joints Particular load cases
4- BEAMS: EXTERNAL AND INTERNAL FORCES	Introduction. Prismatic section. Beams. Types of beams. Loads. Types of loads. External and internal forces. Sign convention. Balance of a section. Axial, shear and bending moments diagrams Drawing diagrams Supported at one articulated at end beam with concentrated load Supported at one articulated at end with uniformity distributed load. Cantilever with concentrated load Cantilever with uniformity distributed load.

5- ISOSTATIC BEAM RESOLUTION	Beams with any types of load Inclined beams with any types of load Beams with hinged connection and intermediate supports: Gerber beam. Broken beams
6- RESOLUTION OF ISOSTATIC PORTAL FRAME	Definition. Types Method of study Portal frame supported-articulated Portal frame with cantilevers Three articulated portal frame Compound porches
7- CABLE STRUCTURES	Basic hypothesis Solidification principle. Balance. Cables with concentrated loads Cables with distributed load Differential equation of a cable Parabolic cable.
8- GRAVITY CENTER AND MASS CENTER	Introduction. Center parallel forces system Weight and mass. Gravity center and mass center Application to Discrete Systems and Dynamic Systems Gravity center of surface. Centroids Static moment Properties of the center of mass. Papus-Guldin theorems
9-MOMENTS OF INERTIA	Introduction Moments of inertia of a particles system Product of inertia of a particles system Properties Moments and products of inertia of continuous systems Moments and products of inertia of plane systems Moments and products of inertia of surfaces and lines Distributive property Steiner theorem applied to moments of inertia Steiner theorem on products of inertia Moments of inertia of compound areas Turning radius of an area. Moment of inertia about any straight line. Rotation of Axes Principal axis of inertia Principal moments of inertia Maximum and minimum moments of inertia Mohr circle for moments and products of inertia Graphical representation of the Mohr circle
10-METHOD OF VIRTUAL WORKS	Introduction Work of a system of forces on a rigid solid Definition virtual displacement. Virtual work Principle of virtual works

Planning

Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Multiple-choice questions	A53 A56 A57 B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28 C1 C2 C3 C6	1	22	23
Objective test	A53 A56 A57 B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28 C1 C2 C3 C6	3	123	126
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
Multiple-choice questions	A multiple choice test will assess the level of learning by the student on theoretical and practical aspects of the subject.
Objective test	Numerical and graphical issues will be proposed on the contents of the subject and the supporting literature will arise. It will assess the level of learning by the student around practical aspects of the subject.

Personalized attention	
Methodologies	Description
Multiple-choice questions Objective test	Attendance and activity will be controlled to the student. He will prove his autonomous work with the delivery of a series of individual solved exercises. A minimum of five exercise of each of the topics of the subject what will be delivered on deadlines determined by the teacher in class. The tutorial schedule for the personalized attention to the student will be exposed in the notice board and web.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Multiple-choice questions	A53 A56 A57 B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28 C1 C2 C3 C6	The accuracy in answering ten questions about practical and theoretical aspects with four options, of which only one is correct. Wrong answers do not subtract . His calculation of the total assessment of the subject will be two points [2ptos.] A minimum of 1 point is established in this test to pass the course, otherwise the student will be qualified as not presented, do not meet the requirements for the consideration of the objective test.	25

Objective test	A53 A56 A57 B1 B2 B3 B4 B5 B7 B11 B12 B18 B21 B24 B28 C1 C2 C3 C6	Three problems or case studies based on the contents and bibliography are raised. Students will give numerical answer to each of them even showing the results graphically. The maximum note of this part is six points [6 pts.] The exam is individual; non-compliance with this requirement will result in his expulsion and implementation of current regulations. Mobile phones turn on, during the examination, is strictly prohibited. During the development of theoretical test, materials of any kind will not be allowed except for pens; while for the realization of the practical question, calculator and drawing materials should be used. Each problem will be answered and will qualify in a DIN A3 format. Each one will be delivered independently, written in indelible ink. The result will be given so that it is clearly visible, indicating the numeric value with precision and its corresponding units. Invalid parties must be clearly crossed out. All papers submitted, tehorical and practical test, will take written the name of the student and his group to be corrected.	75
Others			

Assessment comments
CRITERIA FOR OBTAINING A FAVORABLE EVALUATION: Approved is set in five points over ten possible according to this breakdown (idem in 1st and 2nd chance): Theory test multiple choice: 2,5 ptos. [1 point minimum is required to consider practical objective tests] Practical objective test: 7,5 pts. CRITERIA OF CORRECTION: adjusted to those derived from professional reality of the architect. As a general rule, misconceptions and numerical error are valued according to their seriousness, and may nullify the exercise; for example a wrong sign means an error of 200%.

Sources of information	
Basic	- Gere, James (2002). Resistencia de Materiales. Editorial Thomson - Beer. F.P. & Jonhson. (). Mecánica Vectorial para Ingenieros. Estática. Ed. McGraw-Hill. - Lamas, V; Otero, Mª Dolores (2002). Cálculo de estructuras artículadas. Editorial Gráficas del Noroeste - Meriam, J.L. ? Kraige, L.G (). Mecánica para Ingenieros. Estática. Editorial Reverté - Durá Doménech, A. ? Vera Guarinos, J. (). Fundamentos Físicos de las Construcciones Arquitectónicas . Universidad de Alicante - Lamas, V; Otero, Mª Dolores (2002). Cálculo de solicitaciones en vigas isostáticas. Editorial Gráficas del Noroeste - Fontán, A; Nogueira, P; Pico; J.M.; Vázquez, J.A. (2004). Precurso I. Física. Vicerrectorado de Innovación Tecnológica
Complementary	- Herrero Arnaiz ? Rodríguez Cano ? Vega González (). Estática: Problemas Resueltos. Editorial Reverté

Recommendations
Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously
Proxectos I/630011106
Xeometría Descritiva I/630011102
Debuxo I/630011103
Fundamentos Físicos na Arquitectura I/630011104
Fundamentos Matemáticos na Arquitectura I/630011105
Construción I/630011107
Xeometría Descritiva II/630011108
Fundamentos Matemáticos na Arquitectura II/630011110
Subjects that continue the syllabus
Física 2/630G01013
Estruturas 1/630G01019
Other comments
<p> <p class="MsoNormal">For proper monitoring of the course is the essential previous mastery of the following topics by the students:</p> <p class="MsoNormal"> - Logical reasoning. - Calculate vector. - Unit systems. ? Calculate matrix. - Geometry and trigonometry. </p> - Derivation and integration. - Solving systems of equations. </p><div> <p class="MsoNormal">All students of the subject should know, understand and know how to manage the content available on this link:</p> <p class="MsoNormal">http://etsa.udc.es/web/wp-content/uploads/2012/06/Precurso-Física.pdf</p> </div><div> </div>