UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2017/18
Subject (*)	Specific structures technology		Code	730497019
Study programme	Mestrado Universitario en Enxeñaría Industrial (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatoria	3
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Naval e Industrial			
Coordinador	Gutierrez Fernandez, Ruth Maria	E-mail	ruth.gutierrez@udc.es	
Lecturers	Gutierrez Fernandez, Ruth Maria	E-mail	ruth.gutierrez@udc.es	
Web	https://sites.google.com/site/structuralanalysislab/G03&con			
General description	Nesta materia perséguese adquirir as competencias especificas básicas necesarias para o deseño e análise de diferentes tipos de estruturas por computador, baseadas en técnicas matriciais de análise estrutural.			

Study programme competences / results	
Code	Study programme competences / results
A19	Coñecementos e capacidades para o cálculo e deseño de estruturas.
A29	Coñecementos e capacidades para aplicar os fundamentos da elasticidade e a resistencia de materiais ao comportamento de sólidos reais.
B1	Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación.
B2	Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en ámbitos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo.
B3	Que os estudantes sexan capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Students will know to apply the foundations of the elasticity and resistance of materials to the actual behaviour of structural elements.	AJ19 AJ29	BJ1 BJ2 BJ3	
Participants will understand the laws that govern the computational analysis of structures. They will analyze and design the structures formed by discrete elements.	AJ19 AJ29	BJ1 BJ2 BJ3	
Students will handle a program based on matrix techniques for the structural analysis and design	AJ19 AJ29	BJ1 BJ2 BJ3	
Participants will use a rigorous language in the field of structural engineering to display and to process data and results.	AJ19 AJ29	BJ1 BJ2 BJ3	

Contents	
Topic	Sub-topic

Chapter 0. The following topics develop the contents set up in the verification memory.	Basic concepts in structural analysis. Description and types of analysis of structures. Regulations applicable to the design and analysis of structures. Introduction to the analysis of structures by a computer.
Chapter 1. Introduction to matrix structural analysis.	Introduction. Structure idealization. System redundances and degrees of freedom. Method of flexibility. Direct stiffness method. Comparison between the two methods. Global and local coordinates. Transformations of spatial coordinates. Transformation matrix.
Chapter 2. Stiffness matrix of structural elements	Introduction. Axial force member with plane movement. General axial force member. Beam bending member with plane movement. Beam torsional and bending member. General beam member. Problems.
Chapter 3. Stiffness matrix of the frame	Compatibility equations. Equilibrium at nodes. Stiffness matrix properties. Problems.
Chapter 4. Boundary conditions.	Need of boundary conditions. Introduction of null displacement. Introduction of prescribed displacement. Other techniques of introduction of boundary conditions. Elastic supports. Inclined supports. Problems.
Chapter 5. Forces.	Introduction. Loads between nodal points. Calculation of fix end forces, bending moment diagrams and reactions. Initial or thermal strain conditions. Problems.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A19 A29 B1 B2 B3	7	21	28
Seminar	A19 A29 B1 B2 B3	5	10	15
Supervised projects	A19 A29 B1 B2 B3	5	10	15
Objective test	A19 A29 B1 B2 B3	4	12	16
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
Guest lecture / keynote speech	Oral lecture supplemented with the use of audiovisual means, aiming transmit knowledge and facilitate the learning within the scope of structural analysis
Seminar	Methodology that allows the realization of activities of practical character, with computer, such as modelization and structural analysis
Supervised projects	Methodology designed to promote autonomous learning of students, solving a problem that involves the contents of the course and involves specific skills, under teacher supervision.
Objective test	Classic test in which the student responds to questions and problems posed by the teacher in order to evaluate and qualify the learning.

Personalized attention	
Methodologies	Description
Seminar Supervised projects	Guidance and revision about specific problems posed at the development of the different activities proposed in the course. Revision and help when making supervised projects.

Assessment			
Methodologies	Competencies / Results	Description	Qualification

Objective test	A19 A29 B1 B2 B3	There will be an exam of the subject. Required a mark of 3 out of 10 in order to average with the project.	80
Supervised projects	A19 A29 B1 B2 B3	Student projects will be carried out along the four-month period. The project that has not received the corresponding follow-up by the teacher will not be accepted. If a student does not make the project, he must take an objective test from this part of the subject.	20

Assessment comments

Sources of information	
Basic	- Celigüeta Lizarza, Juan Tomás (2003). Curso de análisis estructural . Eunsa, Ediciones Universidad de Navarra. Pamplona - McCormac, Jack C. (2011). Análisis de estructuras : métodos clásico y matricial . México : Alfaomega - Hibbeler, Russell C. (2012). Análisis estructural . Naucalpan de Juárez : Pearson - W. McGuire, R. H. Gallagher, R.D. Ziemian (2000). Matrix Structural Analysis. John Wiley & Sons, Inc.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
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.