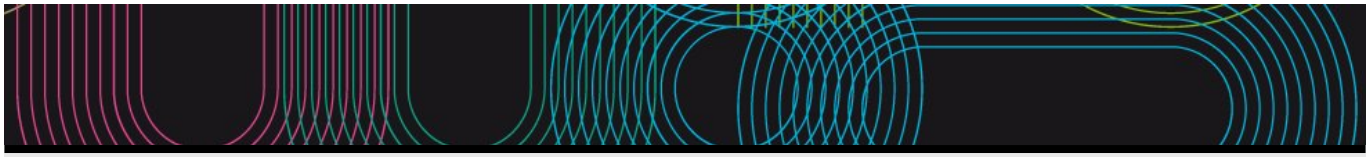

IDENTIFYING DATA				
Advanced calculation of aerospace structures				
Subject	Advanced calculation of aerospace structures			
Code	O07M197V01202			
Study programme	(*)Máster Universitario en Enxeñería Aeronáutica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Gómez San Juan, Alejandro Manuel			
Lecturers	Gómez San Juan, Alejandro Manuel			
E-mail	alejandromanuel.gomez@uvigo.es			
Web				
General description	In the subject "Advanced calculation of aerospace structures" we start from the more general knowledge acquired in the degree about the functioning of structures, to specify structures for aerospace use, which have requirements that differentiate them from other structures. After completing the course, the student should be able to design and analyze the combinations of structures and materials in the most common boundary conditions in the industry.			

Training and Learning Results	
Code	
A1	Ability to design, build, inspect, certify and maintain all types of aircraft and spacecraft
A6	Adequate knowledge of metallic and composite materials used in aerospace vehicle manufacturing
A8	Knowledge and skills for the structural analysis and design of aircraft and spacecraft, including the application of advanced structural design and calculation programs

Expected results from this subject	Training and Learning Results
GO1. Aptitude to project, build, inspect, certify and keep all type of aircraft and space vehicles.	A1
GO6. Suitable knowledge of the metallic materials and compound materials used in the manufacture of aerospace vehicles.	A6
GO8. Knowledges and capacities for the analysis and structural design of the aircraft and space vehicles, including the application of programs of calculation and design advanced of structures.	A8

Contents	
Topic	
Types of aerospace structures	-Typologies of structures -Structures of aeronautical use -Structures of space use
Types of structural analysis	-Static analysis -Dynamic Analysis -Analysis stability
Materials for aerospace use	-Linear elastic materials -Non-linear elastic materials -Plastic materials -Visco-elastic materials

Multidisciplinary analysis and optimisation	-Multidisciplinary analysis joined up -Optimisation of structures

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	29	29	58
Practices through ICT	15.5	0	15.5
Case studies	1	73	74
Objective questions exam	2.5	0	2.5
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Exhibition by part of the professor of the contents on the matter object of study, theoretical bases and guidelines of a work or exercise that the/the student has to develop.
Practices through ICT	Activities of application of the knowledges in a determinate context and of acquisition of basic skills and procedures in relation with the matter, through the TIC, fundamentally with tools of simulation used in the industry.
Case studies	Realisation of cases of practical study on the contents of the subject, the which will be explained and initiated in the classroom to be finished and delivered by part of the students out of the classroom. The cases of study will require of the use of specific software

Personalized assistance	
Methodologies	**Description**
Case studies	Realisation of cases of practical study on the contents of the subject, the which will be explained and initiated in the classroom to be finished and delivered by part of the students out of the classroom. The students will have of the personal lessons necessary with the professor for the follow-up of the development of the cases of study

Assessment			
	Description	Qualification	Training and Learning Results
Objective questions exam	Examination based in the resolution of problems and/or conceptual questions on the contents of the subject. It will be in date of official examination. Minimum note of 5.0.	40	A1 A6 A8

Other comments on the Evaluation

First Opportunity Evaluation

To pass the subject on the 1st opportunity, it will be necessary to obtain a grade higher than 5 points out of 10 in the overall assessment of continuous evaluation during the course and the exam on the official date. Additionally, the grade for the official exam must be equal to or higher than 5 points out of 10. The final grade for continuous evaluation will be obtained according to the indicated percentages.

For the overall evaluation, there will be an exam on the official date, which includes all the contents of the subject, including the contents and methods used in the case studies. The passing grade for this exam will be 5 points out of 10.

The officially approved schedule of evaluation tests by the EEAE Center Board will be published on the website:

http://aero.uvigo.es/gl/docencia/exames

The continuous evaluation tests will be conducted during regular class hours.

The student has the right to choose the overall evaluation according to the procedure and deadline established by the institution for each examination session.

Second Opportunity Evaluation

Students must take the resit exam, which covers all the subject contents and accounts for 100% of the final grade, if the final grade for continuous evaluation is lower than 5 points out of 10. They must also take the resit exam in the following

cases:

- Obtaining a grade lower than 5 points out of 10 in the final exam of the first opportunity.

If a grade equal to or higher than 5 is obtained in the resit exam, the final grade for the subject will be the higher grade between:

- the resit exam grade,
- the average grade from the coursework activities (averaging with the percentages specified in the evaluation table, substituting the grade of the first opportunity exam with the grade of the resit exam).

Final Year Evaluation

For the final year evaluation, there will be an exam on the official date, which includes all the contents of the subject. The passing grade for this exam will be 5 points out of 10.

Sources of information

Basic Bibliography

Complementary Bibliography

T. H. G. Megson, **Aircraft Structures for Engineering Students**, 978-0081009147, 6, Butterworth-Heinemann, 2016

D. J. Peery, **Aircraft Structures**, 978-0486485805, Dover Publications, 2011

Bruhn, **Analysis and Design of Flight Vehicle Structures**, 978-0961523404, Jacobs Pub, 1973

M. Niu, **Airframe Structural Design: Practical Design Information and Data on Aircraft Structures**, 978-9627128045, 1988

J. Wijker, **Spacecraft Structures**, 978-3540755524, Springer, 2008

V.P Singh, **Mechanical Vibrations**, Dhanpat Rai, 2014

Recommendations

Subjects that are recommended to be taken simultaneously

Advanced fluid mechanics/O07M197V01201

Subjects that it is recommended to have taken before

Advanced aerospace materials and production/O07M197V01102

Other comments

Given the absence of the subject of Vibrations in one of the two intensifications of the degree we recommend to the students that do not have it passed the study of the concepts that are given in the said subject. In particular the book Mechanical Vibrations included in the bibliography recommended constitutes a good introduction.