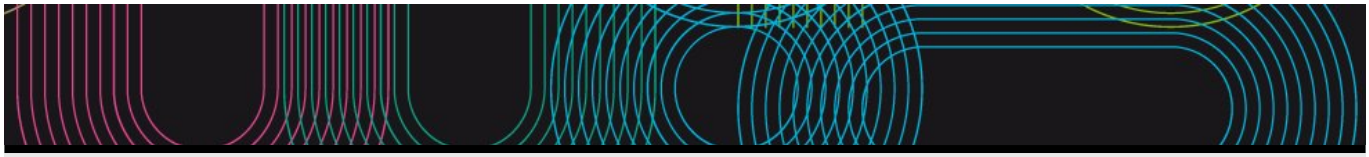

IDENTIFYING DATA

Design, calculation and certification of aircraft and space vehicles

Subject	Design, calculation and certification of aircraft and space vehicles			
Code	O07M197V01103			
Study programme	(*)Máster Universitario en Enxeñería Aeronáutica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Gómez San Juan, Alejandro Manuel			
Lecturers	Gómez San Juan, Alejandro Manuel			
E-mail	alejandromanuel.gomez@uvigo.es			
Web				
General description	(*)A materia "Deseño, cálculo e certificación de aeronaves e vehículos espaciais" é unha disciplina de enxeñaría aplicada. Nela faise uso dos coñecementos apresos no grao para abordar, a fase inicial de deseño conceptual segundo requisitos de deseño, e as dúas fases de *validación do deseño, o cálculo e a *validación/certificación. No primeiro bloque da materia séguese este proceso para aeronaves e no segundo para vehículos espaciais			

Training and Learning Results

Code	
A1	Ability to design, build, inspect, certify and maintain all types of aircraft and spacecraft
A5	Understanding and mastery of atmospheric flight mechanics (performance, stability, static and dynamic control), orbital mechanics and attitude dynamics.
A8	Knowledge and skills for the structural analysis and design of aircraft and spacecraft, including the application of advanced structural design and calculation programs
A9	Ability to design, execute and analyze ground and flight tests of aerospace vehicles, and to carry out a complete aerospace vehicle certification process.
A10	Adequate knowledge of the different subsystems of aircraft and spacecraft

Expected results from this subject

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
GO5. Understanding and command of the mechanics of atmospheric flight (performances, stability, static and dynamic control), of the orbital mechanics and of the dynamics of attitude.	A5
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
GO9. Capacity to design, execute and analyse the essays in earth and in flight of the aerospace vehicles, and to carry out a complete process of certification of the same.	A9
GO10. Suitable knowledge of the distinct subsystems of the aircraft and space vehicles.	A10

Contents

Topic

Aircraft: requirements and preliminary design	-General configuration of aircraft of transport. -Characteristic mass, aerodynamic and *propulsivas. -Calculation of performances -Extension to other aircraft
Aircraft: conceptual design and architecture	-Structure -Systems and teams of tackle.
Aircraft: certification and essays	-Certification of the aeronavegability -Essays of certification -Investigation of accidents.
Space vehicles: requirements and preliminary design	-Space missions -Surroundings of operation and development -Orbit -Geometry of space missions
Space vehicles: conceptual design and architecture	-Subsystems of space vehicles -Power -Structure -thermal Control -AOCS -Communications
Space vehicles: verification and essays	-Guarantee of product -Integration and essays

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	41	41	82
Problem solving	6	18	24
Practices through ICT	20	20	40
Mentored work	1	74	75
Essay questions exam	2	0	2
Case studies	2	0	2

*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 of a subject or resolution of problems by part of the professor according to a previously established script.
Problem solving	Resolution of problems and/or exercises that treat punctual appearances of the contents of the subject, developed by the professor and/or the students in the classroom
Practices through ICT	Use of the available means TIC in the school to tackle the predesign so much of aircraft as of space vehicles
Mentored work	Realisation of cases of practical study with delivery of work 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 tutorials necessary with the professor for the follow-up of the development of the cases of study.

Personalized assistance

Methodologies	Description
Mentored work	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 tutorships necessary with the professor for the follow-up of the development of the cases of study.

Assessment

	Description	Qualification	Training and Learning Results
Essay 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 A5 A8 A9 A10

Case studies	In the subject will develop two cases of study, one for aircraft and another for space vehicles. In each one of them will have to make the preliminary and conceptual design of a vehicle, using the materials given in class and the half available TIC. The works will present in class and each one of them will suppose 30% of the note of the subject.	60	A1 A5 A8 A9 A10

Other comments on the Evaluation

First Chance Assessment

Continuous assessment

To pass the subject on the 1st opportunity, it will be necessary to obtain a score of more than 5 points out of 10 in the joint evaluation of the continuous evaluation during the development of the classes and the exam on the official date. In addition, the exam grade on the official date must be greater than or equal to 5 points out of 10. The final grade of the continuous assessment will be obtained according to the indicated percentages. The default evaluation mode will be continuous evaluation.

Overall evaluation

For the global evaluation, an exam will be carried out on the day of the official date, which includes all the contents of the subject, including the contents and methods used in the case studies. The qualification of said exam to pass the subject will be 5 points out of 10.

The evaluation test schedule officially approved by the Junta de Centro da EEAE is published on the web

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

Continuous assessment tests will be carried out during school hours.

The student has the right to opt for the global evaluation according to the procedure and the term established by the center for each call.
second chance assessment

The student body must take the second call exam of all the contents of the subject, which will mean 100% of the grade, if the final continuous assessment grade is less than 5 points out of 10. They will also have to sit the second call exam in the following cases:

- Obtain a grade of less than 5 points out of 10 in the first chance final exam

In case of obtaining a grade greater than or equal to 5 in the second chance exam, the final grade for the subject will be the highest grade between:

* the 2nd call exam

* the average with the activities carried out during the course (averaging with the percentages of the evaluation table substituting the mark of the first call exam for the second call)
End of career evaluation

For the end of degree evaluation, an exam will be held on the day of the official date, which includes all the contents of the subject. The qualification of said exam to pass the subject will be 5 points out of 10.

Sources of information

Basic Bibliography

Complementary Bibliography

J. Anderson, **Aircraft Performance & Design**, 978-0070019713, 1, McGraw-Hill Education, 1988

D. P. Reymer, **Aircraft Design: A Conceptual Approach**, 978-1624104909, 6, American Institute of Aeronautics & Ast., 2018

P. Fortescue, **Spacecraft Systems Engineering**, 978-0471619512, 3, Wiley, 2003

W. Larson, J. Wertz, **Space Mission Analysis and Design**, 978-0792359012, 3, Springer, 1999

Recommendations

Subjects that continue the syllabus

Advanced calculation of aerospace structures/O07M197V01202
Design, calculation and certification of aerospace propulsion systems/O07M197V01203
Space mechanical, thermal and electrical systems/O07M197V01303