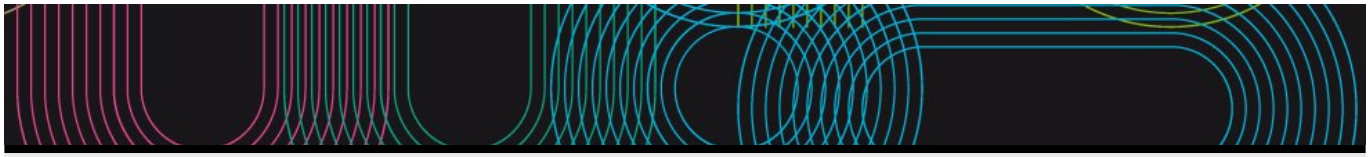

IDENTIFYING DATA				
Mathematics: Statistics				
Subject	Mathematics: Statistics			
Code	O07G410V01401			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Cotos Yáñez, Tomas Raimundo			
Lecturers	Cotos Yáñez, Tomas Raimundo			
E-mail	cotos@uvigo.es			
Web	http://aero.uvigo.es			
General description	This subject is designed to introduce students to stochastic thinking and the modelling of real problems. In many fields of science, and aerospace engineering is no exception, decisions must be taken in many cases in contexts of uncertainty. These decisions involve prior processes such as obtaining as much information as possible, determining the sources of error and modelling the situations. This is where this subject is located. It aims to introduce the bases for a detailed analysis of the available information. Finally, this subject contributes to the development of analytical and mathematical thinking which will be extremely useful in future professional practice. English language is used in written materials. English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
B2	Planning, documentation, project management, calculation and manufacturing in the field of aeronautical engineering (in accordance with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
C1	Capability to solve mathematical problems that may arise in engineering. Aptitude to apply the knowledge about: linear algebra; geometry; differential geometry; differential and integral calculation; differential equations and partial derivatives; numerical methods; numerical algorithm; statistics and optimization.
D1	Capability of analysis, organization and planification.
D3	Capability of oral and written communication in native lenguage
D5	Capability to solve problems and draw decisions
D8	Capabiliity for critical and self-critical reasoning

Expected results from this subject	Training and Learning Results		
Knowledge, understanding and application of statistical models used within the scope of the Engineering.	B2	C1	D1 D3 D5 D8
Knowledge, understanding and application of sampling theory, decision theory and regression models. regression models.	B2	C1	D1 D5 D8

Contents

Topic	
Theory of Probability	Sample space, events and probability, combinatorics. Conditional probability, independence of events Product rule, total probabilities and Bayes' theorem
Random variables	One-dimensional and two-dimensional random variables: characteristic measures Main discrete random variables Main continuous random variables
Statistical inference	Introduction to statistical inference Point and interval estimation Parametric hypothesis testing Non-parametric tests: goodness-of-fit, position, independence and homogeneity tests
Regression	Introduction to regression models. Simple linear regression: estimation, adjustment and prediction. Multiple linear regression

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	18	38	56
Problem solving	15.5	41.5	57
Practices through ICT	15.5	18	33.5
Laboratory practice	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
Introductory activities	Activities aimed at making contact with and gathering information about students, as well as introducing the subject. introducing the subject matter.
Lecturing	Presentation by the teaching staff of the contents of the subject to be studied, theoretical bases, theoretical theoretical bases, exercises or practices to be carried out by the student.
Problem solving	Resolution of problems, readings, summaries, diagrams and questions on each of the topics of the subject programme. of the subject syllabus. Resolution of the exercises on the blackboard. The following software will be used free statistical software R
Practices through ICT	Resolution of exercises with the help of the computer. Use will be made of the free statistical software R

Personalized assistance

Methodologies	Description
Lecturing	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, etc.) by prior arrangement.
Problem solving	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, etc.) by prior arrangement.
Practices through ICT	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, etc.) by prior arrangement.

Assessment

	Description	Qualification	Training and Learning Results		
Problem solving	Written tests and/or assignments will be carried out to evaluate the resolution of exercises and/or problems in an resolution of exercises and/or problems in an autonomous way, as well as the active as well as active participation.	50	B2	C1	D1 D3 D5 D8
Practices through ICT	Partial tests will be carried out throughout the four-month period, which will be used to which are intended to to check if the student has achieved the basic competences of the subject. basic competences of the subject.	50	B2	C1	D1 D3 D5 D8

Other comments on the Evaluation

The student has the right to opt for the global assessment according to the procedure and the deadline established by the centre for each call.

CRITERIA FOR CONTINUOUS ASSESSMENT AT THE FIRST CALL:

Partial tests will be held at the end of each subject, except for the last one, which will be in the final test of the first call (the percentage of each test shall not exceed 40% of the subject).). In order for a student to pass the subject at the first call, he/she must obtain a minimum mark of 5 points when adding the different weighted marks together, provided that the mark for each test is not less than 3.5 out of 10.

In the event that the minimum mark of 3.5 out of 10 is not reached the minimum mark of 3.5 in any test, the resulting mark will be the minimum of the weighted average of the marks and 3.5.

In the final test of the 1st call, students will be able to recover the partial marks. All students for continuous assessment will have a final numerical mark following the procedure described above.

NON-CONTINUOUS ASSESSMENT CRITERIA (exam-only assessment):

There will be an evaluation system for students who do not opt for continuous assessment consisting of a single test where all the contents of the course are evaluated. where all the contents exposed throughout the course will be evaluated. It will consist of the resolution of theoretical/practical Theoretical/practical problems with the help of the statistical software R (100% of the mark). The maximum duration of the test will be 3 hours.

Partial tests will be held at the end of each subject, except for the last one, which will be in the final test of the 1st opportunity.

The training and learning results assessed assessed and expected results from the subject are all as described.

CONTINUOUS AND EXAM-ONLY ASSESSMENT CRITERIA IN THE 2ND CALL AND END-OF-PROGRAM CALL:

The assessment system in the 2nd call and end-of-program call for all students (with continuous/exam-only assessment or without assessment in the 1st call) will be the same as the one used in the 1st call for students without continuous assessment.

The calendar of assessment tests officially approved by the EEAE's "Xunta de Centro" is published on the following website the website of the centre http://aero.uvigo.es/gl/docencia/exames

Sources of information

Basic Bibliography

Cao Abad, R., Vilar Fernández, J., Presedo Quindimil, M., Vilar Fernández, J., Francisco Fernández, **Introducción a la estadística y sus aplicaciones**, Pirámide,, 2001

Ángel Mirás Calvo y Estela Sánchez Rodríguez, **Técnicas estadísticas con hoja de cálculo y R : azar y variabilidad en las ciencias naturales**, Servizo de Publicacións da Universidade de Vigo,

Montgomery, D. y Runger, G., **Probabilidad y Estadística Aplicadas a la Ingeniería**, Mc Graw Hill, 1998

M. H. Rheinfurth and L. W Howell, **Probability and Statistics in Aerospace Engineering**, University Press of the Pacific, 2006

Complementary Bibliography

Peña, D., **Fundamentos de Estadística**, Ciencias Sociales Alianza Editorial, 2001

R Development Core Team, **R: A language and environment for statistical computing**, http://www.R-project.org, 2022

Ugarte, M.D., Militino, A.F., Arnholt, A.T,, **Probability and Statistics with R,**, CRC Press, 2008

Recommendations

Subjects that it is recommended to have taken before

Mathematics: Linear algebra/O07G410V01102
Mathematics: Calculus I/O07G410V01101
Mathematics: Calculus II/O07G410V01201

Other comments

Students are expected to display appropriate ethical behaviour. Plagiarism is considered serious dishonest behaviour. In the event of detecting inappropriate ethical behaviour (copying, plagiarism, use of unauthorised electronic devices, and others), it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall

grade for the current academic year will be a fail (0.0) and the incident will be reported to the corresponding academic authorities for prosecution