Universida_{de}Vigo

IDENTIFYING DATA
Mathematics: Statistics

Subject	Mathematics: Statistics			
Code	V09G291V01108			
Study programme	Grado en Ingeniería de la Energía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish English			
Department				
Coordinator	Saavedra González, María Ángeles			
Lecturers	de Uña Álvarez, Jacobo Saavedra González, María Ángeles			
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General description	In this subject, the main statistical models applied in engineering are introduced, with the corresponding software.			

Training and Learning Results

Code	
A1	That the students demonstrate to possess and understand knowledge in an area of study that is part of the general education (second level), and often found at a level that, although based on advanced textbooks, also includes some aspects that involve knowledge from the avant-garde of the field of study
A2	That the students know how to apply their knowledge to their work or vocation in a professional way and that they possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study
A3	That the students have the capability to gather and interpret relevant data (usually within their area of study) to issue judgments that include a reflection on relevant social, scientific or ethical issues
A4	That the students can transmit information, ideas, problems and solutions to a specialized and non-specialized audience
A5	That the students develop those learning capabilities necessary to undertake further studies with a high degree of autonomy.
B1	Ability to draw links between the different elements of all the knowledge acquired, understanding them as components of a body of knowledge with a clear structure and strong internal cohesion.
B3	To suggest and develop practical solutions, using the relevant theoretical knowledge, to phenomena and problems-situations of ordinary reality that are specific to engineering, developing appropriate strategies.
B4	To foster collaborative working, communication, organization and planning skills, along with the ability to take responsibilities in a multilingual, multidisciplinary work environment that promotes education for equality, peace and respect for fundamental rights.
B5	To be familiar with the relevant sources of information, including constant updating, in order to practice one[]s profession competently, accessing all the present and future tools of information search, constantly adapting to technological and social changes.
C3	Basic knowledge of use and programming of computers, operating systems, data bases and computer programs that can be applied in engineering.
C8	Understanding the concepts of randomness and uncertainty in physical, social and economic phenomena.
D2	Ability to organize, understand, assimilate, produce and handle all the relevant information to develop their professional work, using appropriate computing, mathematics, physics tools, etc. when these are required.
D5	To become aware of the need for continuous training and the constant improvement of quality, developing the values that are characteristic of scientific thinking, showing flexible, open and ethical attitudes in the face of different situations and opinions, particularly as regards non-discrimination on the grounds of gender, race or religion, respect for fundamental rights, accessibility, etc.

Expected results from this subject

Expected results from this subject		Training and Learning Results		
To understand the basis of Statistics and data handling			C3 C8	D2
To know the experimental procedure when working with random phenomena.	A2 A3 A5	B1 B5	C8	D2
To master the current available technics for the analysis of processes control components reliability.	A1 A5	B4 B5	C3	D2
To look into the modeling techniques of random phenomena and variables prediction.	A3 A5	B3 B5	C8	D2 D5
To acquire skills in the use of computer programs to be applied in engineering		B3 B4 B5	C3	D2 D5
To acquire skills for the analysis of spatial data.	A1 A2 A3 A4 A5	B1 B4	C8	D2 D5

Contents

Topic	
Probability	Definition of probability. Properties Conditional probability. Bayes theorem
Random variables	Discrete random variables Continuous random variables Central limit theorem Simulation
Statistical inference	Point estimation Confidence intervals Hypothesis tests
Spatial statistics	Regression Structural analysis and prediction

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	8	16	24
Problem solving	22	38	60
Practices through ICT	20	36	56
Essay questions exam	2.5	7.5	10

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Introduction of the contents on a certain topic. Theoretical bases and / or guidelines of an assignment, exercise or project to be developed by the student.
Problem solving	Activity in which problems and / or exercises are formulated. Students must develop appropriate solutions through the application of formulas or algorithms, application of procedures to the transformation of the available information and the interpretation of the results. Usually a complement to the lecturing.
Practices through ICT	Application of knowledge to specific situations. Acquisition of basic and procedural skills related to the topic under study. To be held in a computer room. Specific software will be used for data processing.

Personalized assistance

Methodologies	Description
Problem solving	Attention for questions and doubts raised by the students in the development of the work. For all teaching modalities, the tutoring sessions may be carried out by telematic means (email, videoconference, MooVi forums ...) under appointment.
Practices through ICT	Attention for questions and doubts raised by the students in the development of the work. For all teaching modalities, the tutoring sessions may be carried out by telematic means (email, videoconference, MooVi forums ...) under appointment.

Assessment

	Description	Qualification	Training and Learning Results			
Practices through ICT	Autonomous work of data processing from a file with real data, based on the software explained during the practices. EXPECTED RESULTS FROM THIS SUBJECT: To understand the basis of Statistics and data handling To know the experimental procedure when working with random phenomena. To master the current available technics for the analysis of processes control components reliability. To look into the modeling techniques of random phenomena and variables prediction. To acquire skills in the use of computer programs to be applied in engineering To acquire skills for the analysis of spatial data.	60	A2 A3 A4 A5	B1 B4 B5	C3	D2 D5
Essay questions exam	Tests for evaluation that include activities, problems or practical exercises to solve. Students must respond to the activity formulated, applying the theoretical and practical knowledge of the subject. EXPECTED RESULTS FROM THIS SUBJECT: To understand the basis of Statistics and data handling To know the experimental procedure when working with random phenomena. To master the current available technics for the analysis of processes control components reliability. To look into the modeling techniques of random phenomena and variables prediction. To acquire skills in the use of computer programs to be applied in engineering To acquire skills for the analysis of spatial data.	40	A1 A2 A3 A5	B1 B3 B5	C8	D5

Other comments on the Evaluation

First opportunity:

Continuous evaluation system:

Laboratory practices: throughout the term five tests will be carried out with a weight of 12% each.

Exercise exam: 40% of the final grade. A minimum grade of 3.5 out of 10 will be required.

Global evaluation system:

Practical case resolution: 40% of the final grade. A minimum grade of 3.5 out of 10 will be required.

Exercise exam: 60% of the final grade. A minimum grade of 3.5 out of 10 will be required.

Second opportunity:

Same evaluation system as in the first opportunity.

Grades obtained during the laboratory practices in the first opportunity are kept.

Exam calendar:Verify/consult an updated version on the website of the center.http://minaseenerxia.uvigo.es/es/docencia/examenes/

Sources of information

Basic Bibliography

Eguzkitza Arrizabalaga, J.M, **Laboratorio de estadística y probabilidad con R**, Gami Editorial, 2014

Devore, J.L., **Probabilidad y estadística para ingeniería y ciencias**, Cengage Learning, 2016

Devore, J.L., **Probability and statistics for engineering and the sciences**, Cengage Learning, 2016

Walpole, R. E., **Probabilidad y estadística para ingeniería y ciencias**, Pearson Educación, 2012

Walpole, R. E., **Probability and statistics for engineers and scientists**, Pearson Education, 2016

R Development Core Team, **Introducción a R**, http://www.r-project.org/, 2000

R Development Core Team, **An Introduction to R**, http://www.r-project.org/, 2021

Complementary Bibliography

Recommendations

Other comments

To approach the subject, students must know how to make use of the different resources offered by the library; you will be assumed to have basic computer management and the most usual tools of calculus and algebra.