IDENTIFYING DATA
(*)Matemáticas: Álxebra e estatística

Subject	(*)Matemáticas: Álxebra e estatística
Code	V12G320V01103
Study programme	(*)Grao en Enxeñaría Eléctrica

Descriptors	ECTS Credits		Choose	Year	Quadmester
	9		Basic education	1st	1st

Teaching language	Spanish Galician English
Department	
Coordinator	Pardo Fernández, Juan Carlos
Lecturers	Bajo Palacio, Ignacio Calvo Ruibal, Natividad Castejón Lafuente, Alberto Elias Fernández García, José Ramón Fernández Manin, Generosa Fiestras Janeiro, Gloria Fonseca Bon, Cecilio Gómez Rúa, María Illán González, Jesús Ricardo Luaces Pazos, Ricardo Martín Méndez, Alberto Lucio Matías Fernández, José María Pardo Fernández, Juan Carlos Rodríguez Campos, María Celia
E-mail	juancp@uvigo.es
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General description	The aim of this course is to provide to the studend basic techniques in Algebra and Statistics that will be necessary in other courses of the degree.

Competencies

Code	
A3	(*)CG3 Coñecemento en materias básicas e tecnolóxicas que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacións.
A4	(*)CG4 Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razoamento crítico e capacidade para comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial.
A12	(*)FB1 Capacidade para a resolución dos problemas matemáticos que poidan presentarse na enxeñaría. Aptitude para aplicar os coñecementos sobre: álxebra lineal; xeometría; xeometría diferencial; cálculo diferencial e integral; ecuacións diferenciais e en derivadas parciais; métodos numéricos; algorítmica numérica; estatística e optimización.
B2	(*)CT2 Resolución de problemas.
B5	(*)CT5 Xestión da información.
B6	(*)CT6 Aplicación da informática no ámbito de estudo.
B9	(*)CS1 Aplicar coñecementos.

Learning aims

Expected results from this subject	Training and Learning Results	
Purchase basic knowledges on matrices, vectorial spaces and linear applications.	A3 A12	
Handle matrix operations and resolve problems by means of its use.	A3 A12	B2

Understand the basic concepts on eingenvalues and eigenvectors, vectorial spaces with scalar product and quadratic forms.	A3 A12	B2 B9
Perform basic exploratory analysis of databases.	A3 A12	B5
Be able of model situations under uncertainty by means of probability models.	A3 A12	B2
Know basic statistical models and their application to industry and perform inferences from data samples.	A3 A12	B2 B9
Use computer tools to solve problems of the contents of the course.	A4	B2 B6

Contents

Topic	
Preliminaries	The field of the real numbers. The field of the complex numbers: structure and properties.
Matrices, determinants and systems of linear equations.	Definition and types of matrices. Operations with matrices. Elementary transformations, rank. Inverse and determinant of a square matrix. Discussion and resolution of systems of linear equations
Vectorial spaces and linear applications.	Definition of vectorial space. Subspaces. Linear independence, base and dimension. Coordinates, change of base. Basic notions on linear applications.
Eigenvalues and eigenvectors.	Definition of eigenvalue and eigenvector of a square matrix. Diagonalization. Applications of the eigenvalues.
Vectorial spaces with scalar product and quadratic forms.	Vectorial spaces with scalar product. Associated norm and properties. Orthogonality. Gram-Schmidt orthogonalization process. Orthogonal diagonalization. Quadratic forms.
Descriptive statistics and regression.	Concept and uses of the statistics. Variables and attributes. Types of variables. Representations and charts. Position and dispersion measures. Analysis of bivariate data. Linear regression. Correlation.
Probability.	Concept and properties. Conditional probability and independence of events. Bayes Theorem.
Discrete random variables and continuous random variables.	Concept of random variable. Types of random variables. Distribution function. Discrete random variables. Continuous random variables. Characteristics of a random variable. Main distributions: Binomial, Geometric, Poisson, Hypergeometric, Uniform, Exponential, Normal. Central Limit Theorem.
Statistical inference.	General concepts. Sampling distributions. Point estimation. Confidence intervals. Tests of hypotheses.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	40	81	121
Troubleshooting and / or exercises	12	12	24
Laboratory practises	24	12	36
Autonomous troubleshooting and / or exercises	0	40	40
Long answer tests and development	4	0	4

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

Methodologies

	Description
Master Session	The lecturer will explain the contents of the course.
Troubleshooting and / or exercises	Problems and exercises will be solved during the classes. Students will also solve similar problems and exercises.
Laboratory practises	Computer tools will be used to solve problems related to the contents of the course.

Autonomous troubleshooting and / or exercises	Student will have to solve problems and exercises by their own.

Personalized attention

Methodologies	Description
Laboratory practises	
Master Session	
Troubleshooting and / or exercises	
Autonomous troubleshooting and / or exercises	

Assessment

	Description	Qualification
Troubleshooting and / or exercises	Students will make several mid-term exams of Algebra and Statistics during the course.	20
Long answer tests and development	At the end of the semestre there will a final exam of Algebra and a final exam of Statistics.	80

Other comments on the Evaluation

And the end of the first semester (December / January) the final grade will be calculated as the average of the grades obtained in Algebra and in Statistics. Students graded in any of the two parts will be graded for the whole course.

Students who fail to pass the course at the end of the first semester can resit for one final exam of Algebra and one final exam of Statistics in June/July. The average of the grades of those to exams will the 100% of the final grade.

Students who fail the course at the end of the first semester and have obtained a grade of 5 or more in any of the two parts, may keep this grade and only repeat the exam of the other part of the course.

Lecturers:

Group C: Alberto Castejón Lafuente / José María Matías Fernández and Juan Carlos Pardo Fernández

Sources of information

Lay, David C., **Álgebra lineal y sus aplicaciones**, 3ª,
Nakos, George; Joyner, David, **Álgebra lineal con aplicaciones**, 1ª,
Cao, Ricardo et al., **Introducción a la Estadística y sus aplicaciones**, 1ª,
Devore, Jay L., **Probabilidad y estadística para ingeniería y ciencias.**, 4ª,
Devore, Jay L., **Probability and statistics for engineering and sciences**, -,

BIBLIOGRAFÍA COMPLEMENTARIA

1. G. Strang, *Álgebra lineal y sus aplicaciones*, Addison-Wesley Iber., 2007.
2. C. Pérez, *Estadística aplicada a través de Exce*l, Pearson Ed., 2002.
3. W. Navidi, Estadística para ingenieros y científicos, McGraw-Hill, 2006

Recommendations

Subjects that are recommended to be taken simultaneously
(*)Matemáticas: Cálculo I/V12G380V01104