Teaching Guide				
Identifying Data				2022/23
Subject (*)	Advanced Techniques for Data Analysis		Code	611532032
Study programme	Máster Universitario en Economía			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalicianEnglish			
Teaching method	Hybrid			
Prerequisites				
Department	Matemáticas			
Coordinador	Vilar Fernandez, Jose Antonio	E-mail	jose.vilarf@udc.es	
Lecturers	Vilar Fernandez, Jose Antonio	E-mail	jose.vilarf@udc.es	
Web				
General description	Subject devoted to introduce a range of advanced statistical techniques for data analysis, including: (a) descriptive and exploratory methods; (b) techniques for multivariate data analysis; and (c) non-parametric and semi-parametric regression models.			

Study programme competences	
Code	Study programme competences
A2	CE2 - Conocimiento riguroso de los modelos micro y macroeconómicos y su aplicación precisa a situaciones concretas.
A3	CE3 - Manejo de las técnicas econométricas actuales.
A4	CE4 - Capacidad para modelar situaciones económicas concretas y obtener resultados con datos numéricos aplicando las técnicas econométricas pertinentes.
B6	CG1 - Aplicar los conocimientos de economía a la identificación, previsión y solución de los problemas económicos en general, y en particular los relativos al nivel de especialización, en entornos nuevos o poco conocidos.
B13	CG8 - Capacidad para entender y explicar datos económicos y para trabajar con ellos mediante las técnicas más actuales.
C1	CT1 - Capacidad para comprender el significado y aplicación de la perspectiva de género en los distintos ámbitos de conocimiento y en la práctica profesional con el objetivo de alcanzar una sociedad más justa e igualitaria.
C4	CT4 - Capacidad para interaccionar y defender con rigor, claridad y precisión ante otro especialistas trabajos, propuestas, nuevas ideas etc.
C5	CT5 - Comunicación oral e escrita.
C7	CT7 - Capacidad para comunicarse por oral y por escrito en lengua inglesa.

Learning outcomes			
Learning outcomes	Study programme competences		
Ability to search, identify and interpret sources of relevant economic and financial information. Capacity for diagnosis and strategic and prospective analysis, with visión over the medium- and long-term. Capacity to process the information in a comprehensive way by incorporating it to the decisión-making process.	AC2 AC3	BC13	CC1 CC4 CC5 CC7
Ability to work in a team. Capacity to cope with complex issues in a sistematic and creative approach, and to forward the conclusions to all the types of audiences. Adaptation capability, originality and critical spirit.	AC3 AC4	BC6 BC13	CC4

Contents	
Topic	Sub-topic
Lesson 1.- Searching for patterns in databases	Introduction to data mining Introduction to multivariate analysis Descriptive techniques and visualization of multivariate data

Lesson 2.- Dimensionality reduction methods	Principal component analyis Factorial analysis
Lesson 3.- Unsupervised and supervised classification	Clustering Discriminant analysis
Lesson 4.- Statistical inference: advanced techniques	Introduction to nonparametric inference Smoothing techniques Nonparametric regression Semiparametric regression
Practicum	Applications using R software to study cases and practical examples.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A4 A2 A3 B6 B13 C1 C4	10	18	28
ICT practicals	A3 B13 C4 C7	5	20	25
Supervised projects	A4 A3 B6 C1 C4 C5 C7	0	20	20
Objective test	A4 A3 C1 C4 C5	1	0	1
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Oral expositions, with the support of audivisual material, including theoretical concepts and practical examples.
ICT practicals	Supported and supervised by the instructors, the students will carry out empirical applications proposed during the course.
Supervised projects	Every student, properly supervised, must complete a specific project involving real data using techniques developed throughout the course.
Objective test	Final exam conducted to evaluate the capacity of the students in order to understand, interrelate and integrate the concepts and techniques developed during the course.

Personalized attention	
Methodologies	Description
ICT practicals Supervised projects	Every student must complete, properly supervised, a specific project involving real data and using techniques and skills developed throughout the course. Personalized attention will consist in monitoring the different stages of the project at succesive working meetings.

Assessment			
Methodologies	Competencies	Description	Qualification
ICT practicals	A3 B13 C4 C7	Development of empirical applications proposed and supervised by the instructors.	10
Objective test	A4 A3 C1 C4 C5	Written exam	25
Supervised projects	A4 A3 B6 C1 C4 C5 C7	Individual project	65

Assessment comments

Knowledge of English is highly advisable, particularly of reading comprehension, since part of the study material and most of the references are in this language.
Assesment will consist od the weighted sum of of the results attained in the development of the ICT practicals (0.10), the individual project (0.65) and the written exam (0.25). Active participation in the class is also desirable.
In the second opportunity (extraordinary exam of July), the ICT practicals and the individual project will have the same weight as in the first opportunity. Specifically, a new written exam will be carried out in the second opportunity, and the final mark will be the maximum of the three following quantities: (i) the mark attained at the first opportunity, (ii) the mark attained in the new exam, and (iii) the weighted mean of the marks in the new exam and in the ICT practicals and the individual project.

Sources of information	
Basic	- Ruppert D., Wand M.P., Carroll R.J. (2003). Semiparametric Regression. Cambridge University Press - Peña D. (2002). Análisis de datos multivariantes. McGraw-Hill/Interamericana - Li Q., Racine J.S. (2006). Nonparametric Econometrics. Princeton University Press - Horowitz J.L. (2009). Semiparametric and Nonparametric Methods in Econometrics. Springer - Härdle W., Simar L. (2003). Applied Multivariate Statistical Analysis. Springer - Härdle W., Müller M., Sperlich S., Werwatz, A. (2004). Nonparametric and Semiparametric Models. Springer - Everitt B., Hothorn T. (2011). An Introduction to Applied Multivariate Analysis with R. Springer
Complementary	- Dalgaard P. (2002). Introductory Statistics with R. Springer

Recommendations
Subjects that it is recommended to have taken before
Quantitative Methods/611532004 Econometric Techniques/611532003
Subjects that are recommended to be taken simultaneously
Advanced Econometrics/611532027
Subjects that continue the syllabus
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.