UNIVERSIDADE DA CORUÑA

<table>
<tr><td colspan="5" align="center">**Teaching Guide**</td></tr>
<tr><td colspan="3" align="center">**Identifying Data**</td><td colspan="2" align="center">**2020/21**</td></tr>
<tr><td>**Subject (*)**</td><td colspan="2">Fundamentals of Mathematics and Data Analysis Tools</td><td>**Code**</td><td>710G03014</td></tr>
<tr><td>**Study programme**</td><td colspan="4">Grao en Xestión Industrial da Moda</td></tr>
<tr><td colspan="5" align="center">Descriptors</td></tr>
<tr><td align="center">**Cycle**</td><td align="center">**Period**</td><td align="center">**Year**</td><td align="center">**Type**</td><td align="center">**Credits**</td></tr>
<tr><td align="center">Graduate</td><td align="center">1st four-month period</td><td align="center">Second</td><td align="center">Basic training</td><td align="center">6</td></tr>
<tr><td>**Language**</td><td colspan="4">English</td></tr>
<tr><td>**Teaching method**</td><td colspan="4">Face-to-face</td></tr>
<tr><td>**Prerequisites**</td><td colspan="4"></td></tr>
<tr><td>**Department**</td><td colspan="4">Matemáticas</td></tr>
<tr><td>**Coordinador**</td><td colspan="2">Tarrio Saavedra, Javier</td><td>**E-mail**</td><td>javier.tarrio@udc.es</td></tr>
<tr><td rowspan="2">**Lecturers**</td><td colspan="2">González Rueda, Ángel Manuel</td><td rowspan="2">**E-mail**</td><td>angel.manuel.rueda@udc.es</td></tr>
<tr><td colspan="2">Tarrio Saavedra, Javier</td><td>javier.tarrio@udc.es</td></tr>
<tr><td>**Web**</td><td colspan="4">estudos.udc.es/gl/subject/710G04V01/710G04040/2020</td></tr>
<tr><td>**General description**</td><td colspan="4">This subject introduces the basic concepts of statistical data analysis, from descriptive statistics to statistical inference, through the introduction to probability, the concept of random variable, time series and the fundamental tools of statistical quality control, focusing its teaching in solving practical problems in the framework of industrial fashion management.</td></tr>
<tr><td>**Contingency plan**</td><td colspan="4">1. Changes in content
The contents are not modified.
2. Methodologies
* Teaching methodologies that are maintained
All the methodologies are maintained.
* Teaching methodologies that are modified
No teaching methodology is modified.
3. Mechanisms for personalized attention to students
Tools: Microsoft Teams, email and Moodle.
Temporalization: Microsoft Teams will be used during class hours, in addition to tutoring hours. E-mail will serve as a means to resolve doubts and to exchange files and information in general. Moodle will serve to exchange information and subject material, in addition we will conduct multiple-choice tests and continuous assessment work using this tool.
4. Modifications in the evaluation
The multiple-choice test will be scored up to a maximum of 40 points out of 100 and will consist of 15 to 20 test questions with three possible answers.
The supervised works will count up to a total of 20 points out of 100, being works to be carried out in groups of 2 to 5 people, applying statistics or data analysis in general, or even related to a specific application of statistics in the management or industry.
The solution of problems will be scored up to a maximum of 20 points out of 100. Student performance will be evaluated through the delivery of resolved exercises.
Practices through ICT will represent 20% of the final grade. In them the performance of the student in the practical classes and / or the delivery of works related to the application of the statistical software R will be evaluated.
* Evaluation observations:
The multiple choice test or exam now accounts for 40% (before 60%), supervised work 20% (before 20%), practices through ICT 20% (before 10%) and the delivery of solved exercises 20% (before 10%).
5. Modifications of the bibliography or webgraphy</td></tr>
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<tr><td colspan="2" align="center">**Study programme competences**</td></tr>
<tr><td align="center">**Code**</td><td align="center">**Study programme competences**</td></tr>
<tr><td>A13</td><td>To know the impact of technology on the different processes of the textile industry</td></tr>
<tr><td>A19</td><td>To acquire the capacity to collect, select and analyse information flows; their integration in the information systems and processes of the firm; and their application to strategic and operational decision-making; always from an ethical perspective</td></tr>
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B1	That students demonstrate that they acquired and understood knowledge in a study area that originates from general secondary education and that can be found at a level that, though usually supported by advanced textbooks, also includes aspects implying knowledge from the avantgarde of its field of study
B2	That students know how to apply their knowledge to their job or vocation in a professional form, and have the competencies that are usually demonstrated through elaboration and advocacy of arguments and problem resolution within their field of study
B3	That students have the capacity to collect and interpret relevant data (normally within their field of study) in order to issue judgements that include a reflection upon relevant topics in the social, scientific or ethical realm
B4	That students may convey information, ideas, problems and solution to the public, both specialized and not
B5	That students develop those learning skills that are needed to undertake ulterior studies with a high degree of autonomy
B8	Capacity to plan, organize and manage resources and operations
B9	Capacity to analyse, diagnose and take decisions
C3	Using ICT in working contexts and lifelong learning.
C7	Developing the ability to work in interdisciplinary or transdisciplinary teams in order to offer proposals that can contribute to a sustainable environmental, economic, political and social development.
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes			
Learning outcomes	Study programme competences		
Acquisition of skills for the statistical analysis of data as support in decision making in the company, industry and research.	A13 A19	B1 B2 B3 B9	C3
Knowledge of the basic concepts of statistics, as well as those more specific related to the industry, management and business analytics, that allow the correct definition of real problems, the adequate collection of data and the application of the appropriate techniques.		B1 B4 B5 B8 B9	
Acquisition of skills for data analysis and decision making using statistical software, as well as for group work in multidisciplinary projects.	A19	B2 B3 B4 B9	C3 C7 C8

Contents	
Topic	Sub-topic
Descriptive statistics of a variable and introduction to the use statistical software.	Basic concepts of descriptive statistics. Characteristics measures of position, dispersion and shape. Graphics. Introduction to R statistical software.
Descriptive statistics of more than one variable.	Measures of association and correlation. Graphics for two or more variables. Linear regression. Unsupervised classification (cluster).
Probability	Experiments and events. Probability definition and properties. Conditioned robability. Total probability and Bayes theorem.
Random variables.	Discrete random variables. Continuous random variables.

Main probability distributions.	
	Binomial distribution.
	Negative binomial distribution.
	Hypergeometric distribution.
	Poisson distribution.
	Uniform distribution
	Normal distribution.
	Exponential distribution
	Distributions associated with the normal.
Statistical inference.	Point estimates.
	Confidence intervals.
	Hypothesis testing.
	Inference in linear regression models.
Basic techniques of statistical quality control.	Basic concepts.
	Six Sigma Methodology
	Ishikawa's diagram.
	Pareto chart.
	Control charts
	Process capacity analysis.
Time series.	Definition.
	Components
	Estimation and prediction.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	B1 B3 B4 B5 B9 C8	67	0	67
Problem solving	B1 B2 B3 B4 B5 B8 B9	16.5	16.5	33
ICT practicals	A19 B2 B3 B4 B9 C3	21.5	21.5	43
Multiple-choice questions	B1 B2 B3 B4 B9	2	0	2
Supervised projects	A13 A19 B2 B3 B8 B9 C3 C7 C8	1	0	1
Events academic / information	A13 B1 C8	4	0	4
Personalized attention		0		0
(*)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	Keynote speech will be given in which the teacher will explain, with the help of appropriate audiovisual media, the main contents of the subject.
Problem solving	Seminars consisting of problem solving will be held in small groups, in order to set the concepts shown in the lectures and provide information about the methodologies for the practical resolution of problems through statistics.
ICT practicals	In the practical classes the student will be introduced to the handling of the statistical software R. Computational tools for the resolution of problems will be shown and applied through the statistical analysis of data, either from simulated or real data.
Multiple-choice questions	At the end of the course, there will be a test of 15 to 20 questions, both practical and theoretical.

Supervised projects	Students will be proposed to develop a group work (2 to 4 people) consisting of the application of statistical and computational tools shown in class to a particular case study, described by real or simulated data. You can also perform a work consisting of the description of a case study in the industry and the management, in which the resolution of a real problem is carried out based on the application of statistical techniques. Another alternative will be the use of statistical tools and data analysis, its usefulness and its application in industry and business management, in particular, those related to the fashion sector.
Events academic / information	Presentations, lectures, small courses or seminars from professionals in the fashion sector and/or data analysis will be presented to complement the teaching and providing a global perspective on the importance and usefulness of data analysis in this industry.

Personalized attention	
Methodologies	Description
Guest lecture / keynote speech	There will be keynote lectures in which the teacher will explain, with the help of appropriate audiovisual media, the main contents of the subject, promoting the debate in class. In the particular case of students with academic dispensation, you can perform face-to-face and virtual tutorials (email, video conference), which allow the student to satisfactorily follow the subject.

Assessment			
Methodologies	Competencies	Description	Qualification
Multiple-choice questions	B1 B2 B3 B4 B9	It will consist of 15 to 20 test questions with three possible answers.	60
Supervised projects	A13 A19 B2 B3 B8 B9 C3 C7 C8	These works will be carried out in groups of 2 to 5 people, applying statistics to real or simulated data, reviewing a topic on statistics or data science or even regarding a specific application of statistics in management and industry.	20
Problem solving	B1 B2 B3 B4 B5 B8 B9	Student attendance and performance in problem classes and / or delivery of resolved problems will be evaluated.	10
ICT practicals	A19 B2 B3 B4 B9 C3	The attendance and performance of the student in the practical classes will be evaluated, as well as the delivery of works related to the application of the statistical software R.	10

Assessment comments
Evaluation at the first opportunity
The mark of the multiple-choice test will be weighted with the corresponding grade for the delivery of practical work related to the practices carried out with the R statistical software, with the attendance to practical classes (ICT practices and exercises) and systematic observation of the performance of the student, with the delivery of exercises and with the accomplishment of supervised projects.
In the case of students with recognition of part-time dedication and academic exemption of attendance that decides not to attend classes, thet will be evaluated in the two opportunities as the rest of the students who are in a similar situation.
Second chance evaluation
The evaluation will be done following the same procedure as in the first opportunity.
In the case of students with recognition of part-time dedication and academic exemption of attendance that decides not to attend classes, thet will be evaluated in the two opportunities as the rest of the students who are in a similar situation.

Sources of information	
Basic	- Cao R., Franciso M, Naya S., Presedo M., Vázquez M., Vilar J.A. y Vilar J.M. (2005). Introducción a la Estadística y sus aplicaciones. Pirámide
- María Dolores Ugarte, Ana F. Militino, and Alan T. Arnholt (2015). Probability and Statistics with R. CRC Press
- Umesh R Hodeghatta, Umesha Nayak (2016). Business Analytics Using R - A Practical Approach. Springer
- Robert H. Shumway, David S. Stoffer (2011). Time Series Analysis and its Applications. Springer
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
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.