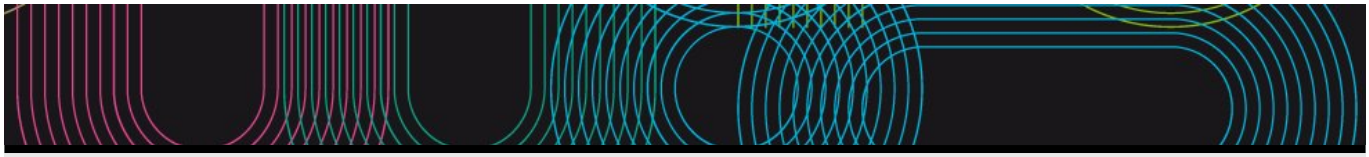
Universidade Vigo

Subject Guide 2020 / 2021



IDENTIFYING DATA

Statistics

Subject	Statistics			
Code	V10G061V01107			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	de Uña Álvarez, Jacobo			
Lecturers	de Uña Álvarez, Jacobo			
E-mail	jacobo@uvigo.es			
Web				
General description	Subject destined to the knowledge and use of the fundamental statistical techniques for the treatment of and analysis of experimental data.			

Competencies

Code	
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B2	Plan and execute surveys in the field and laboratory work, applying basic tools and techniques for sampling, data acquisition and analysis in the water column, sea bottom and marine substratum.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C2	Acquire basic knowledge of mathematics (differential and integral calculation) and statistics.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.

Learning outcomes

Expected results from this subject	Training and Learning Results			
Know the importance of information and be able to assess and classify it in each decision area. Know how to correctly apply and interpret the basic descriptive techniques for the analysis of unidimensional and bidimensional variables.	A2 A3 A4 A5	B2 B4	C2	D1
Understand the concept of hypothesis testing.	A3 A5		C2	D1
Understand the principles of multivariate analysis.	A3 A5		C2	D1
Effectively solve problems and issues of each of the lessons using the appropriate quantitative method.	A5	B2		D1
Introduce the students in the manage of computer packages related to statistics: excel, R. And so favor a positive attitude towards the quantitative methods, in general, and statistics, in particular, as well as their computer manipulation.	A3 A5	B2 B4		D1
Understand the importance of statistical analysis when taking decisions and learn when to apply each technique and interpret the results obtained.	A3 A4	B2		D1
To awaken the taste for the use and study of statistics, seeing it as a tool that allows us to learn more about our own field of knowledge and to start carrying out our own research.	A3 A5			D1

Contents	
Topic	
1. Exploratory data analysis	Measures of central tendency, dispersion and form. Graphic representations. Linear and non-linear transformations. Atypical data and their detection. Mean and variance in subpopulations. Descriptive introduction to the ANOVA.
2. Calculation of probabilities and main distributions of probability	Random experiment. Rule of addition. Conditioned probability. Main probability theorems. Independence of events. Diagnostic tests. Discrete and continuous variables. Mean and variance. Discrete models: binomial, multinomial, hypergeometric and poisson. Continuous models: normal, log-normal, exponential, chi-square, t-Student and F-Snedecor.
3. Introduction to hypothesis testing. Tables of frequencies: measures and tests.	Definition of a test. Type I and type II errors, level of significance, p-value, power and sample size. Types of tests. Normality test. Frequency tables. Association measures for nominal, ordinal and quantitative variables. Measures of prediction and agreement. Chi-square test of goodness of fit, independence and homogeneity.
4. Regression	The simple linear model. Scatter plot. Line of regression. Correlation coefficient and goodness of fit. ANOVA of the regression and residue analysis. Non-linear regression: logarithmic, potential and exponential models. Introduction to multiple linear regression.
5. Statistical inference techniques for comparison of groups	Comparisons between 2 independent or related groups. Previous variance test: F test. Tests to compare two means: t tests. Comparison of more than 2 groups: ANOVA and multiple comparison test. Study of the assumptions of alternative nonparametric techniques.

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	7.5	22.5
Autonomous problem solving	0	27.5	27.5
Lecturing	30	30	60
Seminars	7	14	21
Problem and/or exercise solving	2	2	4
Essay questions exam	3	12	15
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Laboratory practical	Data processing using the free software R.
Autonomous problem solving	Resolution of exercises in the problem sets.
Lecturing	Exposition of the main statistical techniques described in the syllabus of the subject.
Seminars	Resolution of practical exercises of the subjects. In some cases, Excel will be used.

Personalized assistance	
Methodologies	**Description**
Seminars	In the tutorials and seminars.
Laboratory practical	In the tutorials and seminars.
Autonomous problem solving	In the hours of tutoring and seminars. The student who wishes can go to personalized tutoring to answer questions, mainly in the hours indicated. The student may set a different schedule by previously contacting the professor.

Assessment			
	Description	Qualification	Training and Learning Results

Laboratory practical	The result of the analysis of data made during the practices will be uploaded to the faitic platform will be evaluated.	10	A3 A4 A5	B4		
Seminars	The students will be evaluated by solving an exercise in the classroom in an autonomous way.	10	A2 A3 A4 A5			
Problem and/or exercise solving	There will be two midterm exams during the course that will take place during the theory classes. Midterm 1 (10%): lessons 1 and 2. Midterm 2 (10%): lessons 3 and 4.	20	A3 A5		C2	D1
Essay questions exam	Final exam of the subject	60	A3 A5		C2	D1

Other comments on the Evaluation

It is possible to pass the subject through continuous evaluation. The continuous assessment note is obtained as the weighted average of the following qualifications:

- Average grade of laboratory practice reports. (25%)
- Average grade of the exercises solved in the seminars. (25%)
- Average grade of the midterm exams. (50%)

If the subject is not passed through continuous assessment, the grade of continuous evaluation will represent 40% of the final grade, with the remaining 60% being the final exam grade in the official exams.

Date, time and place of exams will be published in the official web of Marien Sciencies Faculty:

http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3

The grade in the extraordinary call is computed exactly in the same way as in the ordinary call. Counting the continuous evaluation (seminars, practices and partials) 40% and the final exam 60%.

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher□s proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record.

Sources of information

Basic Bibliography

Mirás Calvo M.A., Sánchez Rodríguez E., **Técnicas estadísticas con hoja de cálculo y R : azar y variabilidad en las ciencias naturales**, 1, Servizo de Publicacións da Universidade de Vigo, 2018

Sokal R., Rohf F., **Biometría**, 4, Blume, 2012

Steel R., Torrie J., **Bioestadística. Principios y procedimientos**, 4, McGraw-Hill, 1995

Susan Milton J., **Estadística para la biología y las ciencias de la salud**, 3, McGraw-Hill Interamericana, 2007

Complementary Bibliography

Fowler F., Cohen L., Jarvis P., **Practical Statistics for Field Biology**, 2, John Wiley & Sons, 2013

Recommendations

Contingency plan

Description

In the event of cancellation of face-to-face teaching, remote campus of the Universidade de Vigo will be used.

In these exceptional circumstances all the methodologies remain. Accompanying students will be performed through the remote campus (teacher's virtual office). The weights of the evaluation remain the same.