



Teaching Guide				
Identifying Data				2017/18
Subject (*)	Statistics	Code	610G02005	
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	FB	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
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Lecturers	Borrajó López, Laura Estevez Perez, Maria Graciela Jacome Pumar, Maria Amalia López Cheda, Ana Montero Manso, Pablo Vilar Fernandez, Jose Antonio	E-mail	laura.borrajó@udc.es graciela.estevez.perez@udc.es maria.amalia.jacome@udc.es ana.lopez.cheda@udc.es p.montero.manso@udc.es jose.vilarf@udc.es	
Web				
General description	This subject provides a first contact with the statistical techniques: statistical modelling, statistical tools to analyze data, and methods for the critics, diagnosis and interpretation of the results in terms of the considered problem.			

Study programme competences / results	
Code	Study programme competences / results
A21	Deseñar modelos de procesos biolóxicos.
A26	Deseñar experimentos, obter información e interpretar os resultados.
A30	Manexar adecuadamente instrumentación científica.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B6	Organizar e planificar o traballo.
B10	Exercer a crítica científica.

Learning outcomes			
Learning outcomes			Study programme competences / results
To design experiments, to get information and to explain the results			A21 A26 A30
To have a questioning, logical and creative thinking to solve problems effectively.			B2 B3 B6

Contents	
Topic	Sub-topic
Probability Theory	Basic concepts on probability theory Random variables Basic probability distributions in Biology
Descriptive Statistics	Describing univariate data Describing bivariate data



Statistical Inference	Introduction Point estimation Interval estimation Parametric hypothesis testing of one and several samples Nonparametric hypothesis testing of one and several samples
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Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Short answer questions	A21 B2 B3 B6	2	0	2
ICT practicals	A26 A30 B2 B3 B6 B10	13	26	39
Problem solving	A21 B2 B3 B6 B10	8	19.2	27.2
Guest lecture / keynote speech	A21 A26 B2 B3 B10	24	52.8	76.8
Objective test	A26 A30 B2 B3 B10	3	0	3
Personalized attention		2	0	2

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

Methodologies	
Methodologies	Description
Short answer questions	Short answer and/or test questions with the aim of controlling the progress in the PROBABILITY contents block.
ICT practicals	Practicals in the computer lab to introduce a statistical software helpful to solve problems.
Problem solving	Seminars in small groups for the explanation and discussion of problems from the different contents blocks.
Guest lecture / keynote speech	Face to face keynote speeches, where the lecturer will show the fundamental keys of the theoretical program, illustrated suitably with practical examples.
Objective test	Final exam, with short answer questions and/or reasoned solution of practical problems, of the DESCRIPTIVE STATISTICS and STATISTICAL INFERENCE theoretical and practical contents.

Personalized attention	
Methodologies	Description
ICT practicals	<p>Optionally, some academic work consisting of the solution of a practical problem using the statistical software introduced in the ICT practicals, could be requested.</p> <p>There will be personalized advice sessions during the development of the practical works. These sessions will take place by means of the interaction teacher/students at the moment of solving the different activities suggested in class: solving doubts, correcting mistakes, suggesting proper approaches to deal with the proposed problems and reviewing initial versions of the works. In addition, students will have the opportunity of receiving personalized advice in the office of the teachers.</p> <p>Personalize advice may be also received via online, by means of e-mail, virtual platform,...</p> <p>Part-time students may also perform these works and provide them to the teachers for their assessment. Part-time students can also receive personalized assistance using both face-to-face and virtual approaches.</p>

Assessment			
Methodologies	Competencies / Results	Description	Qualification



Short answer questions	A21 B2 B3 B6	Achievement test to assess the knowledge in the PROBABILITY THEORY block.	40
Objective test	A26 A30 B2 B3 B10	Achievement test to assess the knowledge in the DESCRIPTIVE STATISTICS and STATISTICAL INFERENCE block.	60

Assessment comments

The subject is split into two blocks: 1- Probability Theory and 2-Descriptive Statistics-Statistical Inference. Each block will be assessed independently, so that passing one block will not affect the grade or mark of the other block. To pass the whole subject, it will be strictly necessary to pass each block separately.

During the course, two exemption exams will be performed, each for any of the two blocks, so that the student who passes any of the exemption exams, will have the corresponding block passed regarding the may/july final exams.

The PROBABILITY THEORY block represents the 40% qualification, and the DESCRIPTIVE STATISTICS and STATISTICAL INFERENCE block the remaining 60%.

To get the grade/mark NO SHOW in may, the student should not have attended any exemption exams. To get the grade/mark NO SHOW in july, the student will not be able to attend the final exam in july.

The attendance and participation of the seminars, practicals, personalized attention, etc. is not compulsory but additionally could be valued with a maximum of one point over the final mark.

All previous observations are applicable to part-time students.

Sources of information

Basic	? CAO ABAD, R. y otros (2001). Introducción a la estadística y sus aplicaciones. Ed. Pirámide. ? DE LA HORRA NAVARRO, J. (2001). Estadística Aplicada. 2ª Edición. Díaz de Santos. ? GONICK, L. Y SMITH, W. (2001). A estatística ¡en caricaturas!. SGAPEIO. ? MARTÍN, A. A. Y LUNA, J. C. (1999). Bioestadística para las Ciencias de la Salud. 4ª Edición revisada. Ediciones Norma. ? MILTON, J. S. (2001). Estadística para Biología y Ciencias de la Salud. 3ª edición. McGraw-Hill. ? PÉREZ LÓPEZ, C. (2001). Técnicas Estadísticas con SPSS. Ed. Prentice-Hall. ? RIUS DÍAZ, F. y otros. (1999). Bioestadística: Métodos y Aplicaciones. Universidad de Málaga. ? SAMUELS, M. L.; WITMER, J.A. Y SCHAFFNER, A. (2012). Fundamentos de estadística para las ciencias de la vida. 4ª edición. Pearson España. ? TOMELO PERUCHA V. y UÑA JUÁREZ I. (2003). Lecciones de Estadística Descriptiva. Paraninfo. ? RIUS DÍAZ, F. y BARÓN LÓPEZ, F.J. (2005). Bioestadística. Thomson.
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Complementary	<p>? BARÓ LLINAS, J. (1988). Estadística Descriptiva, Cálculo de probabilidades e Inferencia estadística (tres volúmenes). Ed. Parramón. ? CANAVOS, G.C. (1989). Probabilidad y Estadística. Aplicaciones y métodos. MacGraw-Hill. ? CUADRAS, C.M. y otros (1989). Ejercicios de Bioestadística. Editorial Universitaria de Barcelona. ? HERNÁNDEZ, V. RAMOS, E. y YÁNEZ, I. (1995). Estadística I. ITIS. UNED. ? DANIEL, W. W. (1991). Biostatistics. A Foundation for Analysis in the Health Sciences. J. Wiley. ? FISHER, L.D. Y VAN BELL, G. (1993). Biostatistics. A Methodology for the Health Sciences. John Wiley & Sons. ? JOHNSON, R. A. Y BAHTTACHARIYA, G. K. (1992). Statistical Principles and Methods. J. Wiley. ? MANN, P. S. (1995). Introductory Statistics. J. Wiley & Sons, INC. ? NAVIDI, W. (2006). Estadística para ingenieros y científicos. 1ª Edición, Mc Graw-Hill. ? PAGANO, M. Y GAUVREAU, K. (2001). Fundamentos de Bioestadística. 2ª Edición. Math Learning. ? PEÑA SÁNCHEZ DE RIVERA, D. (1991). Estadística. Modelos y Métodos, 1. Fundamentos. Alianza Universidad. ? QUESADA, V., ISIDORO, A. Y LÓPEZ, L. J. (1984). Curso y Ejercicios de Estadística. Alhambra Universidad. ? ROSNER, B. (1990). Fundamentals of Biostatistics. PWS-KENT Publishing Company. ? SOKAL, R.R. Y ROHLF, F.J. (1995). Biometry. The Principles and Practice of Statistics in Biological Research. 3ª Edición. W. H. Freeman and Company. ? VIEDMA, J. A. (1976). Bioestadística (Métodos Estadísticos Aplicados a la Biología y Medicina). Ed. del autor. ? ZAR, J.H. (1996). Biostatistical Analysis. Prentice Hall International Editions. RECURSOS WEB ? Página web del paquete SPSS . http://www.spss.com/ ? Interesante texto electrónico que incluye ejercicios de autoevaluación. Annette Dobson et al. University of Newcastle, Australia. http://www.anu.edu.au/nceph/surfstat/surfstat-home/surfstat.html ? Permite trabajar con conceptos como el histograma, diagrama de cajas, etc. distinguiendo entre variables discretas y continuas. http://lstat.kuleuven.be/java/index.htm ? Calcula intervalos de confianza para la media, la varianza, y contrastes paramétricos y no paramétricos de una muestra y de dos. Además visualiza los errores tipo I y II en función de los parámetros de las distribuciones normales en la hipótesis nula y alternativa. http://lstat.kuleuven.be/java/index.htm ? Versión html del libro Bioestadística, escrito por F. Rius y F.J. Barón y editado por la editorial Thomson. http://www.bioestadistica.uma.es/libro/</p>
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Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Data Analysis in Biology/610G02044

Other comments

Highly recommended: 1- Attendance and participation in the keynote speeches, practicals and seminars. 2- To solve every explained exercise, both with and without the statistical software. 3- To supplement the course material with the sources of information. 4- To study the course material and to solve the proposed problems frequently. 5- Active involvement in the practicals and seminars. 6- To get familiar with the statistical software using it constantly and regularly.

7- To try to use the statistical techniques in other different subjects. 8- Usage and exploitation of the personalized attention sessions.

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