



IDENTIFYING DATA

Biostatistics

Subject	Biostatistics			
Code	V12G420V01601			
Study programme	Grado en Ingeniería Biomédica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Galician			
Department				
Coordinator	Pardo Fernández, Juan Carlos			
Lecturers	Pardo Fernández, Juan Carlos			
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General description	In this subject we will study statistical models and methods of utility in biomedicine.			

Skills

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C24	CE24 Ability to know how to use statistics to solve biomedical engineering problems and / or establish models.
D1	CT1 Analysis and synthesis.
D2	CT2 Problems resolution.
D5	CT5 Information Management.
D6	CT6 Application of computer science in the field of study.
D9	CT9 Apply knowledge.
D12	CT12 Research skills.

Learning outcomes

Expected results from this subject	Training and Learning Results		
Understanding of concepts and techniques of statistical inference.	B3	C24	D1
Capacity to use statistical models for understanding practical situations in biomedicine.			D2
Capacity to design and interpret statistical studies in biomedicine.			D5
Capacity to handle statistical software for data analysis.			D6
			D9
			D12

Contents

Topic	
Review of descriptive techniques and R software.	Graphs, tables, summary measures. Examples of biostatistical studies. Basic handling of R software.
Probability models of in biostatistics.	Review of probabilistic concepts: density function, distribution function and survival function. Relevant models for random variables in biostatistics. Important concepts in biomedicine: prevalence, incidence, sensitivity, specificity, ROC curve.
Inferential methods.	General review of the main concepts in statistical inference: estimation, confidence intervals and hypothesis testing. Statistical inference in several populations: comparison of means, ANOVA, comparison of variances.
Contingency tables.	Joint, marginal and conditional distributions. Measures of association. Test of independence. Tables 2x2. Relative risk and odds-ratio.

Regression.	Multiple linear regression model. Estimation and analysis of the model. Inference about regression models. Non linear models. Logistic regression.
Multivariate techniques in biostatistics.	Principal component analysis. Discriminant analysis. Cluster analysis. Examples of application in biomedicine.
Introduction to the experimental design.	Basic principles of experimental design. Examples of experimental designs in biomedicine.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	20	30	50
Problem solving	12.5	25	37.5
Laboratory practical	18	22	40
Autonomous problem solving	0	20	20
Essay questions exam	2.5	0	2.5

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

Methodologies

	Description
Lecturing	The lecturer will explain the contents of the course.
Problem solving	Problems and exercises will be solved during the classes. Students will also solve similar problems and exercises.
Laboratory practical	Computer tools will be used to solve problems related to the contents of the course.
Autonomous problem solving	Student will have to solve problems and exercises by their own.

Personalized assistance

Methodologies	Description
Laboratory practical	
Lecturing	
Problem solving	
Autonomous problem solving	

Assessment

	Description	Qualification	Training and Learning Results			
Problem solving	Several follow-up tests will be conducted throughout the course.	40	B3	C24	D1	D2
					D5	D6
					D9	D12
Essay questions exam	Final exam about the contents of the course.	60	B3	C24	D1	D2
					D5	D6
					D9	

Other comments on the Evaluation

Ethical commitment: Students are expected to commit themselves to an adequate and ethical behaviour. Students showing unethical behaviours (exam cheating, plagiarism, unauthorized use of electronic devices, etc.) will be rated with the minimum grade (0.0) in the current academic year.

As a general rule, the use of any electronic device for the assessment tests is not allowed unless explicitly authorized.

Sources of information

Basic Bibliography

- Dalgaard, P., **Introductory statistics with R**, Springer, 2008
- Devore, J. L., **Probabilidad y estadística para ingeniería y ciencias.**, Cengage Learning, 2012
- Everitt, B.S.; Hothorn, T., **An introduction to applied multivariate analysis with R**, Springer, 2013
- Sheather, S.J., **A modern approach to regression with R**, Springer, 2009

Vidakovic, B., **Engineering biostatistics**, Wiley, 2017

Zar, J.H., **Biostatistical analysis**, Prentice Hall, 1999

Complementary Bibliography

Devore, J. L., **Probability and statistics for engineering and sciences**, Thomson-Brooks/Cole, 2004

Lattin, J.; Carroll, J.D.; Green, P.E., **Analyzing multivariate data**, Thomson, 2003

Pepe, M.S., **The statistical evaluation of medical tests for classification and prediction**, Oxford University Press, 2004

Wasserman, L., **All of statistics. A concise course in statistical inference**, Springer, 2004

Recommendations

Subjects that continue the syllabus

Mathematics: algebra and statistics/V12G420V01103

Subjects that it is recommended to have taken before

Computer Science: computer science for engineering/V12G420V01203

Mathematics: calculus I/V12G420V01104

Mathematics: calculus II and differential equations/V12G420V01204
