



UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: BIOSTATISTICS AND BIOINFORMATICS

Code: 310935

Type: ELECTIVE

ECTS credits: 6

Degree: 2351 - MASTER DEGREE PROGRAMME IN PHYSICS AND MATHEMATICS-FISYMAT

Academic year: 2023-24

Center:

Group(s): 20

Year: 1

Duration: C2

Main language: Spanish

Second language: English

Use of additional languages:

English Friendly: Y

Web site:

Bilingual: N

Lecturer: MARIANO AMO SALAS - Group(s): 20				
Building/Office	Department	Phone number	Email	Office hours
Facultad de Medicina / 1.35	MATEMÁTICAS	926295300 ext.6843	Mariano.Amo@uclm.es	
Lecturer: VICTOR MANUEL CASERO ALONSO - Group(s): 20				
Building/Office	Department	Phone number	Email	Office hours
Politécnico/2-A15	MATEMÁTICAS	926052867	victormanuel.casero@uclm.es	
Lecturer: LICESIO JESUS RODRIGUEZ ARAGON - Group(s): 20				
Building/Office	Department	Phone number	Email	Office hours
Edificio Sabatini / 1.47	MATEMÁTICAS	6489	l.rodriguezaragon@uclm.es	

2. Pre-Requisites

It is advisable to have realized a subject of Basic Statistics.

3. Justification in the curriculum, relation to other subjects and to the profession

In the current research context, with the usual use of data, it is necessary to include in the curriculum a subject that provides the student with a wide range of statistical tools for the analysis of data.

4. Degree competences achieved in this course

Course competences

Code	Description
CB06	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
CB07	Apply the achieved knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the area of study
CB08	Be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of knowledge and judgments
CB09	Know how to communicate the conclusions and their supported knowledge and ultimate reasons to specialized and non-specialized audiences in a clear and unambiguous way
CB10	Have the learning skills which allow to continue studying in a self-directed or autonomous way
CE05	Know how to obtain and interpret physical and/or mathematical data that can be applied in other branches of knowledge
CE08	Ability to model, interpret and predict from experimental observations and numerical data
CG01	Know how to work in a multidisciplinary team and manage work time
CG02	Ability to generate and independently develop innovative and competitive proposals in research and professional activity in the scientific field of Physics and Mathematics
CG03	Present publicly the research results or technical reports, to communicate the conclusions to a specialized court, interested persons or organizations, and discuss with their members any aspect related to them
CG04	Know how to communicate with the academic and scientific community as a whole, with the company and with society in general about Physics and/or Mathematics and its academic, productive or social implications
CG05	Gain the ability to develop a scientific research work independently and in its entirety. Be able to search and assimilate scientific literature, formulate hypotheses, raise and develop problems and draw conclusions from the obtained results
CT01	Promote the innovative, creative and enterprising spirit
CT03	Develop critical reasoning and the ability to criticize and self-criticize
CT05	Autonomous learning and responsibility (analysis, synthesis, initiative and teamwork)

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Build the various demographic health indicators

Detect the existing relationship between variables and calculate the necessary parameters to adjust linear and non-linear models between these variables
 Obtain and use epidemiological data and assess trends and risks for health decision making
 Know the statistic aspects of bioinformatics
 Be able to perform different studies and survival analysis
 Use statistic techniques to give confidence intervals for a population parameter and the confidence level of this interval
 Summarize large datasets, using statistical measures and graphical representations
 Apply statistic contrasts to validate hypotheses on a data set for one, two or more populations
 Apply statistic inference techniques from a sample to formulate valid conclusions for the population, also measuring the confidence level of the conclusions obtained
 Apply statistic techniques through the use of software, especially R
 Know the correct use and interpretation of biostatistics to critically evaluate scientific and health information

6. Units / Contents

Unit 1: Probabilistic Models
Unit 2: Stochastic processes
Unit 3: Statistical Inference
Unit 4: Demography
Unit 5: Designs of epidemiological research
Unit 6: Survival analysis
Unit 7: Linear and non-linear models
Unit 8: ANOVA and regression models
Unit 9: Statistical methods in Bioinformatics

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB06 CB07	1.04	26	Y	N	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB10 CE05 CE08 CG01	0.48	12	Y	N	
Workshops or seminars [ON-SITE]	Lectures	CB08 CB09	0.16	4	Y	N	
Writing of reports or projects [OFF-SITE]	Guided or supervised work	CG02 CG03 CG04 CG05 CT01 CT03	0.4	10	Y	N	
Individual tutoring sessions [ON-SITE]	Other Methodologies	CB09	0.24	6	N	-	
Study and Exam Preparation [OFF-SITE]	Self-study	CT01 CT03 CT05	3.68	92	N	-	
Total:			6	150			
Total credits of in-class work: 1.92			Total class time hours: 48				
Total credits of out of class work: 4.08			Total hours of out of class work: 102				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of active participation	10.00%	0.00%	Assessment of active participation
Assessment of activities done in the computer labs	15.00%	20.00%	Labs related with the topics
Theoretical papers assessment	20.00%	25.00%	Reports about topics
Final test	55.00%	55.00%	Final exam
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Correct approach of the problems.
 Correct results.
 Correct written expression.

Non-continuous evaluation:

Same as continuous assessment.

Specifications for the resit/retake exam:

Same as the final exam.

Specifications for the second resit / retake exam:

Same as the final exam.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours
Workshops or seminars [PRESENCIAL][Lectures]	4
Writing of reports or projects [AUTÓNOMA][Guided or supervised work]	10
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	6
Study and Exam Preparation [AUTÓNOMA][Self-study]	92
Unit 1 (de 9): Probabilistic Models	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Unit 2 (de 9): Stochastic processes	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Unit 3 (de 9): Statistical Inference	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2
Unit 4 (de 9): Demography	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Unit 5 (de 9): Designs of epidimological research	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Unit 6 (de 9): Survival analysis	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2
Unit 7 (de 9): Linear and non-linear models	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2
Unit 8 (de 9): ANOVA and regression models	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Unit 9 (de 9): Statistical methods in Bioinformatics	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	1
Global activity	
Activities	hours
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	12
Class Attendance (theory) [PRESENCIAL][Lectures]	26
Workshops or seminars [PRESENCIAL][Lectures]	4
Writing of reports or projects [AUTÓNOMA][Guided or supervised work]	10
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	6
Study and Exam Preparation [AUTÓNOMA][Self-study]	92
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Box, George E. P.	Estadística para investigadores : diseño, innovación y descu	Reverté,		978-84-291-5044-5	2008	
Irala Estévez, Jokin de	Epidemiología aplicada /	Ariel,		978-84-344-3725-8	2011	
Montgomery, Douglas C.	Diseño y análisis de experimentos /	Limusa Wiley,		978-968-18-6156-8	2014	
Peña, Daniel	Análisis de datos multivariantes /	McGraw-Hill, Interamericana de España,		978-84-481-3610-9	2010	
Peña, Daniel	Análisis de series temporales	Alianza		978-84-206-6945-8	2010	
Peña, Daniel	Fundamentos de estadística /	Alianza Editorial,		978-84-206-8380-5	2008	
Peña, Daniel	Regresión y diseño de experimentos	Alianza Editorial		978-84-206-9389-7	2010	
	Bioestadística amigable /	Elsevier,		978-84-9022-500-4	2014	