Information about the subject

Degree: Bachelor of Science Degree in Biotechnology

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 1100101 **Name:** Biostatistics

Credits: 6,00 **ECTS Year:** 1 **Semester:** 2

Module: Physics, Mathematics and Informatics for Molecular Biosciences

Subject Matter: Biostatistics **Type:** Compulsory

Field of knowledge: Science

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

Module organization

Physics, Mathematics and Informatics for Molecular Biosciences

Subject Matter	ECTS	Subject	ECTS	Year/semester
Physics	6,00	Physics	6,00	1/1
Mathematics	6,00	Mathematics	6,00	1/1
Biostatistics	6,00	Biostatistics	6,00	1/2
Bioinformatics	6,00	Bioinformatics	6,00	2/2

Recommended knowledge

To follow the course, it is essential to handle the basic mathematics techniques that are given in compulsory education and high school with ease.

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1   The student has understood and assimilated the contents of the subject.

R2   The student is able to solve problems or case studies related to the subject contents, by using different resources (bibliographic, IT, etc.)

R3   The student is able to write an intelligible and organized text on different aspects of the subject.

R4   The student is able to present and defend his/her work adequately.

R5   The student seeks bibliographic information from different sources and can analyze it with a critical and constructive spirit.

R6   The student collaborates with the teacher and his/her peers throughout the learning process; he/she works in a team; treats everyone with respects, is proactive and fulfills the organization rules of the course.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	Students acquire and understand knowledge in their field of study based on general secondary education but usually reaching a level that, although supported on advanced text books, also includes aspects involving state-of-the-art knowledge specific to their area.			x	
CB2	Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study.				x
CB3	Students are able to collect and interpret relevant data (generally in their field of study) and give opinions that involve reflection on relevant social, scientific or ethical issues.				x
CB4	Students can communicate information, ideas, problems and solutions to a specialized or non-specialized audience.				x
CB5	Students develop the necessary learning skills to undertake further studies with a high level of autonomy.				x

GENERAL		Weighting			
		1	2	3	4
CG01	Capacity to analyze and synthesize.				x

SPECIFIC		Weighting			
		1	2	3	4
CE22	Knowing and understanding contents, principles and theories related to biotechnology.			x	

		1	2	3	4
CE25	Knowing how to analyze and understand scientific data related to biotechnology.				x
CE27	Knowing and applying action plans and assessment criteria of biotechnology processes.		x		
CE28	Integrating life science and Engineering into processes of development of biotechnological products and applications.	x			
CE29	Contrasting and checking results of biotechnological experimentation.				x
CE30	Solving and analyzing problems posed by biotechnology.				x
CE31	Describing and calculating important variables of processes and experiments.				x
CE32	Knowing how to use different specific operating systems and software packages designed for Biotechnology.				x
CE33	Knowing and complying with legislation and ethics of biotechnological processes and applications.			x	
CE34	Knowing main characteristics of Molecular biosciences and biotechnology communication.		x		

TRANSVERSAL		Weighting			
		1	2	3	4
CT02	Capacity to organize and plan.			x	
CT03	Mastering Spanish oral and written communication.			x	
CT05	Knowing and applying Basic ITC skills related to Biotechnology.				x
CT06	Capacity to manage information (capacity to look for and analyze information coming from different types of sources).				x
CT07	Problem solving.				x
CT08	Decision making				x
CT09	Capacity to work in interdisciplinary and multidisciplinary team.		x		
CT10	Interpersonal skills.		x		

CT11	Understanding multicultural and diverse environment		x	
CT12	Critical and self-critical capacity.			x
CT13	Ethics.	x		
CT14	Capacity to learn		x	
CT15	Capacity to adapt to new situations			x
CT16	Capacity to produce new ideas (creativity)			x
CT19	Capacity to apply theoretical knowledge			x
CT20	Research skills			x
CT21	Sensitivity to environmental issues		x	

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6	45,00%	Written test
R1, R2, R3, R4, R5, R6	10,00%	Submission of papers
R1, R2, R3, R4, R5, R6	45,00%	Solving problems with the computer

Observations

MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1   Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.

M2   Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.

M4   Supervised monographic sessions with shared participation..

M5   Application of multidisciplinary knowledge.

M6   Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.

M7   Set of oral and/or written tests used in initial, formative or additive assessment of the student

M8   Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical , practical and/or small-group tutoring sessions. Work done on the university e-learning.

M9   Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R3, R4, R5, R6	33,00	1,32
PRACTICAL CLASSES M2	R1, R2, R3, R4, R5, R6	15,50	0,62
SEMINAR M4	R1, R2, R3, R4, R5, R6	5,00	0,20
TUTORIAL M6	R1, R2, R3, R4, R5, R6	3,00	0,12
ASSESSMENT M7	R1, R2, R3, R4, R5, R6	3,50	0,14
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
AUTONOMOUS GROUP WORK M8	R1, R2, R3, R4, R5, R6	18,00	0,72
AUTONOMOUS INDIVIDUAL WORK M9	R1, R2, R3, R4, R5, R6	72,00	2,88
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
DESCRIPTIVE STATISTICS	Description of samples and populationsTypes of variablesFrequency distributionLocation and dispersion measurementsRepresentation of experimental data using statistical graphsDescription of a population: population parameters
PROBABILITY	Introduction to probability. Dependent and independent events: Bayes formula Random sampling: types and characteristics Discrete and continuous probability distributions
DISTRIBUTION IN SAMPLING	Sample distribution: mean, variance, proportion Distribution in the sampling of the difference of sample means: paired and independent sample
CONFIDENCE INTERVALS	Obtaining and interpreting confidence intervals for different population parameters Determination of the sample size
HYPOTHESIS CONTRASTS	Hypothesis contrasts: stages. Types of errors in contrast Test t, test Z, and test chi2. Prerequisites for these tests Concept of p-value: meaning and calculation
ANOVA	Analysis of the variance of a factor ANOVA's fundamental relationships: the F test Assumption to apply ANOVA Multiple Comparison Procedures

Organization of the practical activities:

Content	Place	Hours
PR1.	Descriptive Statistics	Computer	4,00
PR2.	Confidence intervals	Computer	4,00
PR3.	Test t, test Z, test chi2, and ANOVA	Computer	7,50

Temporary organization of learning:

Block of content	Number of sessions	Hours
DESCRIPTIVE STATISTICS	8,00	16,00
PROBABILITY	3,00	6,00
DISTRIBUTION IN SAMPLING	2,00	4,00
CONFIDENCE INTERVALS	2,00	4,00
HYPOTHESIS CONTRASTS	9,00	18,00
ANOVA	6,00	12,00

References

·Martín González, Germán. Introducción a la estadística. Editorial Universidad Católica de Valencia. Valencia 2009

·Wonnacott, T.H., Wonnacott, R.J. Introducción a la estadística. Editorial LIMUSA, S.A. De C.V. México 1999

·Pagano, Marcelo, Gauvreau, Kimberllee. Fundamentos de bioestadística. Editorial Thomson Editores, S.A. De C.V. México, 2000

·García Pérez, Alfonso. Estadística aplicada: conceptos básicos. Editorial UNED. Madrid, 2005

·Martín González, Germán. Estadística básica con R. Editorial Universidad Católica de Valencia. Valencia 2021

Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

X	Microsoft Teams
	Kaltura

Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

| X | Microsoft Teams |

| | Kaltura |

Explanation about the practical sessions:

The practical sessions are carried out in the same way as the theoretical ones: they are self-evaluations with problems that the student has to solve through R

2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

| | The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus. |

| X | The following changes will be made to adapt the subject's assessment to the online teaching. |

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used
Troubleshooting test	30	To give a little more weight to the work and self-evaluations carried out during the telematic period, the proportion initially granted to this section is lowered: 40%	UCVnet
Problem solving using the statistical program R	30	To give a little more weight to the work and self-evaluations carried out during the telematic period, the proportion initially granted to this section is lowered	UCVnet
Delivery of works and evaluations of both theoretical and practical aspects	40	To give a little more weight to the work and self-evaluations made during	UCVnet

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System:

The final test will be unique, with a self-assessment that will have two parts: a part that will consist of exercises to do using a calculator, more theoretical, and a practical part to do using R. The intention is that in case of confinement, the work becomes more important diary