

Course guide

Year 2023/2024 471104 - Biostatistics

Information about the subject

Degree: Bachelor of Science Degree in Podiatry

Faculty: Faculty of Medicine and Health Sciences

Code: 471104 Name: Biostatistics

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

Module: BASIC TRAINING

Subject Matter: STATISTICS Type: Basic Formation

Field of knowledge: Health Sciences

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

BASIC TRAINING

Subject Matter	ECTS	Subject	ECTS	Year/semester
ANATOMY	12,00	Anatomy	6,00	1/1
		Anatomy of the Lower Extremity	6,00	1/2
BIOLOGY	12,00	Cellular and Tissular Biology	6,00	1/1
		Microbiology	6,00	1/2
PHARMACOLOG Y	6,00	Pharmacology	6,00	2/1
MODERN LANGUAGE	6,00	English	6,00	2/2
STATISTICS	6,00	Biostatistics	6,00	1/1
PSYCHOLOGY	6,00	Psychology	6,00	1/2
PHYSIOLOGY	6,00	Physiology	6,00	1/1
BIOCHEMICALS	6,00	Biophysics and Biochemistry	6,00	1/1
ANTHROPOLOGY	6,00	Anthropology	6,00	1/2

Recommended knowledge

Basic knowledge of Introduction to Probability. Equations of lines.





earning 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 knows the tools of Descriptive Statistics (Tables, Graphs and Statistics) and knows which is applicable in each specific case, so that he or she is able to make a critical evaluation of the results a posteriori and thus decide if the solution obtained is reasonable according to the context in which the problem to be solved is formulated. The student also discerns whether the information is reasonable in light of the context in which the problem is formulated.
- R2 The student is capable of understanding and elaborating a descriptive study of a statistical variable, again in such a way that he can make a critical assessment of the results a posteriori that allows him to decide whether the solution obtained is reasonable according to the context in which the study is formulated. If necessary, it also consults the most appropriate sources of information and relies on some of the usual computer tools as a guarantee of its results.
- R3 The student is capable of understanding, quantifying and expressing the linear relationship between two numerical variables, as well as interpreting a two-dimensional descriptive statistics study in its treatment of this linear relationship. The criteria for evaluating this learning outcome coincide with those of R-1 and R-2.
- R4 Understands the basic principles of probability theory and is able to apply them to solve simple problems. Thus, given a verbalized problem, the student is capable of translating it into formal language, for the resolution of which he applies the techniques learned to solve it, his critical attitude being again evaluated to guarantee the suitability of the solution obtained.
- R5 He/she knows, applies and interprets correctly the statistical concepts applied to the diagnostic tests (relative risk, specificity, sensitivity) [in a future context, the student becomes a guarantor of diagnostic decision making with peers]. This result is evaluated based on the same criteria as in R-1, R-2, R-3 and R-4.
- R6 Understands and applies the basic concepts of random variable and probability distribution and knows the main discrete (Binomial, Poisson and Geometrical) and continuous (Uniform and Normal) distributions in such a way that he is also able to correctly interpret memories that include the use of them. Its evaluation follows the standards of those indicated in R-4.
- R7 The student knows and applies the basic tools of statistical inference (confidence intervals and hypothesis tests) using the tables of the Normal, Chi-2, t-student and F distributions. In addition, the student can correctly interpret with a critical attitude the results of the literature based on the confidence intervals and hypothesis tests.





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
CB3	Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.		x

GENERAL		Weighting			
		1	2	3	4
CG3	Students develop the capacity, ability and skill necessary to diagnose, prescribe, indicate, perform and/or elaborate and evaluate any type of podiatric, orthopedic, chiropractic, podiatric surgery, physical, pharmacological, preventive and/or educational treatment, based on the clinical history.	x			
CG6	Students acquire the ability to perform patient-centred clinical management, health economics and efficient use of health resources, as well as effective management of clinical documentation, with particular attention to confidentiality.	X			
CG8	Acquire work skills in the educational and research environments, health care, as well as in uniprofessional and multiprofessional teams. Advise on the development and implementation of care and education policies on issues related to prevention and podiatry care	x			

SPECIFIC		Weighting
	1	2 3 4





CE35 Students know, critically evaluate and know how to use technologies and sources of biomedical information, to obtain, organize, interpret and communicate scientific and health information. To know the basic concepts of biostatistics and its application. Use search and retrieval systems of biomedical information and understand and critically interpret scientific texts. Know the principles of the scientific method, biomedical research and clinical trials.

TRANS	ISVERSAL			hting	I
	1		2	3	4
CT1	Analytical capabilities			x	
CT2	Organizational and planning skills		x		
СТ3	Oral and written communication in native language		x		
CT5	Computer skills related to the field of study			x	
CT6	Information management capacity		x		
CT7	Problem solving				x
CT8	Decision making			x	
CT14	Critical Reasoning			x	
CT15	Ethical commitment X				
CT16	Autonomous learning		x		
CT17	Adaptation to new situations				
CT22	Motivation for quality				





Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7	30,00%	Open questions
R1, R2, R3, R4, R5, R6, R7	55,00%	Tests
R1, R2, R3, R4, R5, R6, R7	15,00%	Oral presentation

Observations

The evaluation instruments used to measure the achievement of learning results are specified in:

1. Solving simple numerical problems (practice evaluation).

2. Short open questions of both a practical and theoretical nature (with a manifest intention of evaluating conceptual knowledge and the ability to critically assess results).

3. Multiple-choice questions (theory and practice assessment).

4. Development of practices with SPSS (evaluation of theory and practice).

Regarding the evaluation system, it will be articulated as follows:

At the end of the teaching of each topic (or two topics if appropriate for the better development of the subject) a test / deliverable / presentation activity will be carried out to be solved in groups or individually and to which the corresponding activity can be added or combined with a practice of SPSS. The average of the corresponding marks will be a 15% of the final mark, which will weighted accordingly with the final exam by the remaining 85%. It will be essential to obtain a grade greater than or equal to 5 in the final exam to pass the course. In case of not reaching 5 in this, the marks obtained in the deliverable tests / activities will not be taken into account in the final grade. In the event that the exam is passed but the weighted average does not reach 5, extraordinary dates of re-delivery of the tests / deliverable activities (news) will be proposed that allow this part to be recovered. In this case, it will not be necessary to take the 2nd call exam.

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 Theoretical classes (TC). Training activity preferably oriented to the acquisition of knowledge skills. It is characterised by the fact that students are spoken to. Also called master class or expository class, it refers to the oral exposition made by the teacher, (with the support of a blackboard, computer and cannon for the exposition of texts, graphics, etc.).
- M5 Computer Practice (CPI). Training activity of work in groups that is developed in the Computer Classroom where the learning is developed using the computer as a support. It includes the work with computer models, specific software, web queries, etc. The size of the group is variable, in a range of 10-20 students.
- M7 Tutorials (T). Set of activities carried out by the teacher with personalised attention to the student or in small groups with the aim of reviewing and discussing the materials and topics presented in the classes, seminars, readings, completion of assignments, etc. The aim is to ensure that education is truly a comprehensive training of the student and is not reduced to a transfer of information. It is, therefore, a personalized relationship of help in which the teacher-tutor attends, facilitates and guides one or more students in the formative process.
- M8 Evaluation (Ev). It is the set of processes that try to evaluate the learning results obtained by the students and expressed in terms of acquired knowledge, capacities, developed skills or abilities and manifested attitudes. It covers a wide range of activities that can be developed for students to demonstrate their training (e.g. written, oral and practical tests, projects or assignments,). It also includes Official Calls.
- M10 Estudio del alumno: Preparación individual de lecturas, ensayos, resolución de problemas, seminarios





IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical lessons ^{M1}	R1, R2, R3, R4, R5, R6, R7	50,00	2,00
Practice lessons	R1, R2, R3, R4, R5, R6, R7	6,00	0,24
Office Hours	R1, R2, R3, R4, R5, R6, R7	1,00	0,04
Evaluation ^{M8}	R1, R2, R3, R4, R5, R6, R7	3,00	0,12
TOTAL		60,00	2,40

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Autonomous work	R1, R2, R3, R4, R5, R6, R7	72,00	2,88
Group work M10	R1, R2, R3, R4, R5, R6, R7	18,00	0,72
TOTAL		90,00	3,60





Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
I. Statistical Conceptualization	Unit 1. One-dimensional and Two-dimensional Descriptive Statistics (tabulation, graphic representation, statistics, linear regression) Unit 2. Random Variables. Probability Distribution Models of v.a. Discrete and Continuous. (Binomial-Poisson-Normal) Unit 3. Statistical Inference. From sampling distribution to hypothesis testing. (The case of the mean)
II. Applied Statistics. Data Treatment	Unit 1. Health Sciences and Biostatistics. Unit 2. Software for data processing - SPSS - Basic operations. Unit 3. Working with data I. Descriptive Statistics. Unit 4. Working with data II. Inferential Statistics.

Temporary organization of learning:

Block of content	Number of sessions	Hours
I. Statistical Conceptualization	22,00	44,00
II. Applied Statistics. Data Treatment	8,00	16,00





References

·Álvarez R, Estadística aplicada a las ciencias de la salud. Ediciones Díaz de Santos. Madrid: 2007

•Cumming, G. Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis. Routledge. 2013

·Field, A. *Discovering statistics using IBM SPSS statistics*. sage. 2013

Field, A., Miles, J., & Field, Z. Discovering Statistics Using R. 2012

·Martín G, Introducción a la estadística. Universidad Católica de Valencia, Valencia: 2009

·Martín G, Prácticas de estadística básica con SPSS. Universidad Católica de Valencia, Valencia: 2012

·Martínez González MA, Sánchez-Villegas A, Toledo Atucha E y Faulin Fajardo J. Bioestadística amigable. 4ª ed. Barcelona: Elsevier: 2020

·Ramírez, M. T. G., & Botella, J. Comparison among Effect-Size indices for dichotomized outcomes in Meta-analysis. *Psicológica*, 27(2), 269-293.

·Levitin, D. J. (2016). A field guide to lies: Critical thinking in the information age. Penguin. ·Egger, M., Higgins, J. P., & Smith, G. D. (Eds.). (2022). Systematic Reviews in Health Research: Meta-Analysis in Context. John Wiley & Sons.

·Schwarzer, G. (2022). Meta-Analysis in R. *Systematic Reviews in Health Research: Meta-Analysis in Context*, 510-534





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:



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:



Microsoft Teams



Kaltura

Explanation about the practical sessions:





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

ONSITE WORK

Regarding the Assessment Tools:

Х

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



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	

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

Comments to the Assessment System: