Biostatistics

Code: 102947
ECTS Credits: 6

Degree	Type	Year	Semester
2502442 Medicine	FB	1	A

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Maria Mercedes Campillo Grau

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Leonardo Pardo Carrasco

Ferran Torres Benitez

Gianluigi Caltabiano

José Ríos

Albert Navarro Gine

Prerequisites

There are no official prerequisites, still we recommend the student to have previous mathematical knowledge that includes the concepts of derivation and integration.

Objectives and Contextualisation

The subject of Biostatistics is attended during the first year of the Degree in Medicine and is part of the basic education subjects. Its main objective is to introduce students to the knowledge and use of basic knowledge tools in accordance with the scientific method.

The subject will address the problems related to the investigation in the field of Medicine with the statistical method and the theory of probabilities. This approach will allow to quantify, in a precise way, significant relationships between the different phenomena -biological, psychological and social-related to human health and pathology from the perspective of Medical Research.

To achieve these goals, the student will have to work with various conceptual, methodological and instrumental tools necessary to develop a vision of Medicine in accordance with scientific rigor.

The subject of Biostatistics is related to other compulsory subjects such as Epidemiology or Preventive Medicine and Public Health.

Competences

- Critically assess and use clinical and biomedical information sources to obtain, organise, interpret and present information on science and health.
- Demonstrate basic research skills.
- Demonstrate understanding of basic statistical methodologies used in biomedical and clinical studies and use the analytic tools of modern computational technology.
- Demonstrate understanding of the basic sciences and the principles underpinning them.
- Demonstrate understanding of the importance and the limitations of scientific thought to the study, prevention and management of diseases.
- Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
- Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
- Recognise the role of complexity, uncertainty and probability in decision-making in medical practice.
- Use information and communication technologies in professional practice.

Learning Outcomes

1. Calculate sensitivity, specificity and predictive values as measures for evaluating diagnostic tests.
2. Construct hypotheses and test them, assessing the validity of the data compiled.
3. Critique scientific papers on biostatistics.
4. Demonstrate basic research skills.
5. Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
6. Determine the sample size needed to compare hypotheses.
7. Differentiate between the concepts of sample and population.
8. Differentiate between the various types of variables and ways of processing these.
9. Estimate population parameters based on those of the corresponding samples.
10. Explain the application of probability in the mechanisms that govern decision theory and its applications to automatic diagnosis.
11. Explain the role of probability theory in statistical inference.
12. Formulate and compare hypotheses and identify associated errors.
13. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
14. Identify the statistical technique needed to compare hypotheses and choose a procedure from a statistical package to execute this technique.
15. Interpret statistical data in medical literature.
16. Interpret statistical results appropriately.
17. Organise biomedical data for subsequent processing and analysis by computer.
18. Recognise the need for representative samples, and the importance of the sampling methods.
19. Recognise the principles of the scientific method for obtaining laws of general validity.
20. Use information and communication technologies in professional practice.

Content

A. Univariate descriptive statistics

B. Bivariate descriptive statistics

C. Theory of Probabilities

D. Random variables

E. Estimation of parameters

F. Contrast of hypothesis

Methodology

Theory: Theoretical classes will be taught with face-to-face methodology - master classes - although the interaction and participation of the students will be made possible and stimulated to the maximum. The classes will be supported by audiovisual media. The material used in class by the teacher will be available on the Virtual Campus of the subject; students are recommended to print it and take it to class, to use it as a support when it comes to taking notes. The student will be encouraged to deepen into the knowledge acquired in class using the recommended bibliography and simulation software.

specialized seminars: Given the character and orientation of the subject, classes of problems will play a key role in its development and in the learning of the subject. Based on specific practical problems or reading the results of a scientific article, students will be able to apply the knowledge acquired in theory classes and personal study.

Specialized seminars will introduce the dynamic methodology and selected sets of practical cases that the student will have to solve through the statistical software of reference, in order to achieve the objectives pursued by the subject.

Classes of laboratory practices: Practical classes are a fundamental point for the correct fulfillment of the objectives of the subject. During them the student will have to solve practical cases, previously selected and discussed, through statistical software. The practices will be carried out individually or in small groups in computer rooms.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
CLASSROOM PRACTICES	8	0.32	5, 13
LABORATORY PRACTICES (PLAB)	17.5	0.7	4, 5, 20
THEORY (TE)	27	1.08	
Type: Supervised			
ORAL EXPOSITION OF WRITTEN WORKS	15	0.6	
Type: Autonomous			
Narrative records/written works	26.5	1.06	4, 5, 20

READING ARTICLES/REPORTS OF INTEREST	5	0.2	4, 5, 13, 20
SELF-STUDY	40	1.6	4, 5, 20

Assessment

This subject contemplates two types of assessment: a general, valid for all students and second one, only valid for students with a second or later enrollment.

Specifically:

MODALITY 1: available for all students.

The competences of the subject will be assessed with multiple choice exams (Theory: Tests T1 and T2, 60% of the mark; Practices: P1 and P2 tests, 20% of the mark), live resolution of problems during Workshops (S, 10%) and practical work (TP, 10% of the note), according to the following scheme:

THEORY	%
1st partial test	25
2nd partial test	35
PRACTICES	
1st partial test	10
2nd partial test	10
WORKSHOPS-Theory	
Solving Statistical Problems	10
Practical Works	10

Attendance at practical sessions as well as at workshops is mandatory. The minimum global qualification required to pass the subject is 5 points.

MODALITY 2: only available to students with a second or later enrollment.

The competences of the subject will be evaluated with multiple choice exams with (THEORY: T1 and T2 tests), according to the following scheme:

THEORY	%
1st partial test	40
2nd partial test	60

The minimum global qualification required to pass the subject is 5 points. The student at second time of enrollment can choose either modality 1 or modality 2 of evaluation according to what they deems appropriate.

GENERAL CONSIDERATIONS:

- There will be a final examination for those students who have not approved the subject through modality 1 or 2. In order to participate in this exam the students must have been previously evaluated in a series of activities whose weight equals to a minimum of two thirds of the total grade of the subject. The final exam will include the full year subject and the minimum mark required to pass will be 5 points. At the time the student presents for this exam, it will be considered that the final grade of the subject will be the one that he obtains in this test, regardless of whether he has previously followed modalities 1 or 2 of evaluation.

- Single assessment: Students who request it, following the instructions of the University and the Faculty of Medicine, will have the possibility of being evaluated in a single test. The test will be at the end of the academic year and will include all the syllabus taught throughout the course, both theory and practice, and the minimum grade necessary to pass will be 5 points. The moment students request this kind of examination, it will be considered that the final grade of the subject will be the one obtained in this test. Recovery: The same recovery system will be applied as for the continuous evaluation

- It will be considered that a student will obtain the "Non-Appraising" qualification if it is solely presented at one of the first two partial tests (T1 or P1) and is not presented to the final exam.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Elaboration of practical works	10%	3	0.12	1, 2, 3, 4, 5, 6, 7, 8, 12, 9, 11, 10, 13, 14, 16, 15, 17, 19, 18, 20
Practice: Assessments written through objective tests: Multiple choice test	20%	3	0.12	1, 2, 3, 4, 5, 6, 7, 8, 12, 9, 11, 10, 13, 14, 16, 15, 17, 19, 18, 20
Theory: Assessments written through objective tests: Multiple choice test	60%	4	0.16	1, 2, 3, 4, 5, 6, 7, 8, 12, 9, 11, 10, 13, 14, 16, 15, 17, 19, 18, 20
Workshop Problem's solving	10%	1	0.04	1, 2, 6, 7, 8, 9, 13, 14, 16, 15, 17, 20

Bibliography

Bibliography

Milton JS. Estadística para biología y ciencias de la salud. 3a. Edición. Madrid: Interamericana. McGraw-Hill, 2001.

Daniel WW. Bioestadística. Base para el análisis de las ciencias de la salud. 4a Edición. Limusa Wiley, 2002.

Martín M, Horna O, Nedel F, Navarro A. Fundamentos de estadística en ciencias de la salud. Cerdanyola del Vallès: Servei de publicacions UAB, 2010.

Cuadras CM. Fundamentos de estadística: aplicación a las ciencias humanas. Barcelona: EUB, 1996.

Sentís J, Pardell H, Cobo E, Canela J. Manual de Bioestadística. 3a. Edición. Barcelona: Masson, 2003.

Sorribas A, Abella F, Gómez X, March J. Metodologia estadística en ciències de la salut: Del disseny de l'estudi a l'anàlisi de resultats. Edicions de la Universitat de Lleida i F.V. Libros. 1997.

Moriña D, Utzet M, Nedel FB, Martín M, Navarro A. Introducción a la estadística con R-Commander en ciencias de la salud. Bellaterra: Servei de publicacions UAB; 2016

web links:

http://www.bioestadistica.uma.es/libro/

http://www.hrc.es/bioest/M_docente.html

http://davidmlane.com/hyperstat/index.html

Simulators:

http://web.udl.es/usuaris/q3695988/wenessim/Pagines/index.htm

http://www.uco.es/simulaciones_estadisticas/index.php?menu=simula

Software

IBM SPSS