

Biostatistics

Code: 100910
ECTS Credits: 3

Degree	Type	Year	Semester
2500252 Biochemistry	OB	2	1

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

Although there are no official prerequisites, it is advisable for the student to review:

- 1) Elementary combinatorics and binomial theorem.
- 2) Statistics and probability theory that have been studied in High School.

The elementary functions (including exponential, logarithm), summations.

Objectives and Contextualisation

(Google translate from catalan version)

This is a subject of the second year, basic education, which develops the foundations of modern scientific thinking.

It is the basis to understand the acquisition of knowledge through experimentation.

Training objectives of the subject: it is intended that the student:

- Be able to use fluently the language of the probability and the statistics that are used in the biosciences.
- Learn to explore different descriptive methods of data sets, resulting from the realization of experiments.
- Be able to raise the most suitable probabilistic model in different situations, and know how to use the probability properties to calculate the probability of the events that interest you.
- Know and understand the concept of random variable, and know the classical examples of random variable and in what situations are used for modeling.
- Learn to use the methods of Statistical Inference (hypothesis tests) to be able to reach conclusions about a population from the partial information contained in a sample.
- Know computer tools (suitable software) for the statistical treatment of data.

- Apply common sense and develop a critical spirit when it comes to dealing with the problems that will have to be solved, both at the time of its resolution and resolution, as well as when drawing conclusions and making decisions.

Competences

- Interpret experimental results and identify consistent and inconsistent elements.
- Understand the language and proposals of other specialists.
- Use ICT for communication, information searching, data processing and calculations.
- Use the basics of mathematics, physics and chemistry that are required to understand, develop and evaluate the chemical procedures of living matter.

Learning Outcomes

1. Analyse the relationship between variables using regression techniques.
2. Describe the basic properties of point estimators and interval estimators
3. Formulate and solve hypothesis contrast problems in one or two populations
4. Interpret experimental results and identify consistent and inconsistent elements.
5. Select the appropriate statistical decision test for each data set or situation and interpret the results in order to reach conclusions
6. Select the appropriate statistical test for the data set
7. Understand statistical language and the probabilistic significance of the conclusions obtained
8. Understand the language and proposals of other specialists.
9. Use ICT for communication, information searching, data processing and calculations.
10. Use a spreadsheet and statistical software to represent or adjust data and perform statistical tests

Content

1.- Descriptive statistics

2.- Probability:

Definition and properties. Conditional probability. Independence of events.

Random variables (discrete and continuous with emphasis on Binomial and Normal models).

Independence of random variables. Central Limit Theorem.

3.-Inference - test of hypothesis:

Statistics that measure position and dispersion. Samples distributions. Confidence intervals.

Introduction to hypothesis tests. Tests for the mean and for the variance of Normal populations. Tests for proportions.

Mean comparison tests for two normal populations. Comparison test for two proportions.

Khi-square independence test.

4.- Introduction to the Analysis of Variance (ANOVA):

Comparison of means of 3 or more populations.

Methodology

(Google translate form Catalan version)

In the process of learning the subject is fundamental the work of the student, who at all times will have the help of the professor. Apart from the face-to-face hours corresponding to the activities led by the teacher, the student will have to devote some time to tutorials, which are supervised activities, and a time for self-employment.

The face-to-face activities hours are distributed in:

Theory: these are lectures to which the teacher introduces the basic concepts corresponding to the subject of the subject, showing examples of its application. These classes are made with slate and with the support of ICT. The student will have to complement the teacher's explanations with the autonomous personal study in order to assimilate the concepts, procedures and demonstrations, in order to detect doubts and to make abstracts and schematics of the subject.

Problems: problem classes are made in smaller groups than those of theory, and in them the comprehension of the concepts introduced into theory is carried out with the accomplishment of problems. Students will work individually or in groups, under the supervision of the teacher, solving the proposed problems. This will be done both in the class of problems and autonomously.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercise resolution classes	4	0.16	1, 2, 5, 4, 10, 6, 7
Individual study	22	0.88	1, 9, 2, 3, 5, 4, 10, 6, 7
Practical works	16	0.64	1, 9, 2, 3, 5, 4, 10, 6, 7
Theory classes	20	0.8	2, 3, 5, 4, 10, 6, 7
Type: Supervised			
Group tutorials	2	0.08	1, 2, 3, 5, 4, 10, 6, 7
Tutorials	2	0.08	9, 2, 5, 4, 10, 6, 7

Assessment

The evaluation of the subject consists of a part of continuous evaluation of the acquired competences that will be realized during the academic period, with some intermediate control, the presentation of solved problems or the realization of practical works.

This part will have a weight of 50% in the final evaluation of the subject. The remaining 50% of the evaluation of the subject is obtained by taking a final written exam. This final exam (50%) can be retaking on the date decided by the Faculty. The part corresponding to the continuous evaluation can not be reevaluated.

To participate in the reevaluation, the students must have been previously evaluated in a series of activities whose weight is at least two thirds of the total grade of the subject or module. Therefore, students will obtain the "Not-evaluable" qualification when the evaluation activities carried out have a weighting of less than 67% in the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam	50%	3	0.12	1, 2, 3, 5, 4, 10, 6
Exercises	20%	4	0.16	1, 9, 2, 3, 8, 5, 4, 10, 6, 7
Mid-term exam	30%	2	0.08	2, 3, 5, 10, 6

Bibliography

R. Delgado: Iniciación a la probabilidad y la estadística. UAB Materials 153 (2004).

W. Daniel: Bioestadística : base para el análisis de las ciencias de la salud. 2002, 4ª ed.

R. Delgado: Probabilidad y Estadística para ciencias e ingenierías, Editorial Delta, 2008.

P. G. Hoel: Estadística elemental. Edició 3 ed. Publicació México 1979

J. L. Devore: Probabilidad y Estadística para ingeniería y ciencias, International Thomson Editores, 1998.

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