UAB
Universitat Autònoma de Barcelona

Probability and Statistics

Code: 100965
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500253 Biotechnology	FB	2

Contact

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Teaching groups languages

You can view this information at the of this document.

Prerequisites

A good achievement of the contents of the course of Mathematics of First of Biotechnology guarantees the knowledge that requires this subject, as well as basic notions of descriptive statistics that are used in laboratory practices or in the same practices of the integrated laboratory of this subject .

Objectives and Contextualisation

Probability is the mathematical discipline that models random phenomena and is one of the theoretical bases on which Statistics is supported. Statistics is the basis for understanding the acquisition of empirical knowledge and underpins modern scientific thinking.

The aim of the subject is to introduce the fundamental tools of probability and statistical inference in order to analyze biological data from the description of natural phenomena or experiments, with an impact on their correct use and the interpretation of results, as well as competence training in order to develop scientific thinking and language.

Also learning a computer program with which to implement data analysis and carry out the tests studied in the course is essential and is carried out in a module of the Integrated Laboratories.

Learning Outcomes

1. CM08 (Competence) Solve real problems in the field of biotechnology using mathematical tools and methods.
2. CM09 (Competence) Work collaboratively in teams to solve problems in the field of mathematics, with special emphasis on biotechnological applications.
3. KM07 (Knowledge) Recognise simple mathematical models of physical, chemical or biological phenomena, whether discrete or continuous, described by a function or by a differential equation.
4. KM08 (Knowledge) Recognise the different types of mathematical errors, valuing their importance in the solution of mathematical problems.

5. KM09 (Knowledge) Describe the basic properties of point and interval estimators.
6. SM09 (Skill) Apply graphical and numerical methods to solve problems.
7. SM09 (Skill) Apply graphical and numerical methods to solve problems.

Content

0. Basic notions

Language of sets
combinatorial

1. Probability and random variables

Notion of Probability. Conditional probability. Independent events
Random variable. Hope and variance. Independent random variables
Classical discrete distributions: Bernoulli, Binomial, Geometric, Poisson
Classical continuous distributions: Uniform, Exponential, Normal and derived distributions

2. Statistical inference in data analysis

Population and sample. Statistics: mean, variance and sample proportion
Inference: point estimate and confidence intervals
Hypothesis testing
Parametric hypothesis testing
Introduction to non-parametric hypothesis testing

3. The simple linear regression model

Estimation by the Ordinary Least Squares Method of the regression line
Statistical inference to the coefficients

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classes of problems	16	0.64	
Lectures	32	1.28	
Type: Autonomous			
Problem solving	64	2.56	
Study of the theory	32	1.28	

Theoretical classes:
The concepts of the subject will be presented. Examples will be presented that allow students to approach problem solving independently.

Problem classes:

Students will have a list of course problems (exhaustive enough, with extra exercises proposed for study), which they will work on progressively.

Independent activities:

Individual study of theory: reflection and deepening of the subject introduced through the class notes and the recommended bibliography.
Preparation of the problem classes: the students will try to solve the proposed problems, and limit the doubts that have arisen, which will have an impact on the use of the discussion on the board of the solution of the exercises in the problem class.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery	20%	0	0	CM08, CM09, KM07, KM08, KM09, SM09
Midterm exam II	40%	3	0.12	CM08, KM07, KM08, KM09, SM09
Midterm examen I	40%	3	0.12	CM08, KM07, KM08, KM09, SM09

A continuous evaluation will be carried out by means of:

a) There will be an exam (First Partial = EP1) in the middle of the semester in which the work done until that moment will be evaluated. The mark of this exam will provide 40% of the final grade. All students who take this exam can no longer be graded as NON-EVALUABLE. A student who has not taken this exam will be listed as NON-EVALUABLE for academic purposes and will not have the right to retake it (except for a duly justified reason, in which case the retake exam will be allowed).

b) At the end of the semester there will be a second partial exam (called EP2) in which the knowledge of the subjects that have not been evaluated in the first partial will be evaluated. The mark of this exam will provide another 40% of the final grade. A student who has not taken this exam will not be entitled to retake it (except for a duly justified reason, in which case the resit exam will be allowed).

c) There will be an evaluation corresponding to the deliveries of exercises, with qualification ENT, that will be worth 20% of the final note. This part of the note will not be recoverable.

If the average C = (0.4) EP1 + (0.4) EP2 + (0.2) ENT is 5 or higher, the final grade is C. If not, the student must go to the exam recovery. Students who want to improve their mark can also take the entrance exam.

5% of the students will be able to obtain the qualification of Honorary Enrollment. They will necessarily have to have a grade equal to or higher than 9. The final decision on the MH grade will be made by the teacher.

For each evaluation activity, a place, date and time of review will be indicated in which the student will be able to review the activity with the teaching staff. In this context, claims may be made on the grade of the activity, which will be evaluated by the teacher responsible for thesubject. If the student does not appear for this review, this activity will not be reviewed later. Dates of problem deliveries and midterm exams will be posted on the Virtual Campus (CV) and may be subject to possible scheduling changes for reasons of adaptation to possible incidents; these changes will always be reported to the CV as the CV is understood to be the usual mechanism for exchanging information between teacher and students.

Students who take the single assessment must take an exam of the entire syllabus on the same day as the second partial exam. If they do not pass the exam, they have the right to present themselves for recovery as well as grade improvement.

Bibliography

Sanz i Solé, Marta. 'Probabilitats', Col·lecció UB.

Delgado de la Torre, Rosario. 'Probabilidad y Estadística con aplicaciones'

Software

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Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	421	Catalan	first semester	afternoon
(PAUL) Classroom practices	422	Catalan	first semester	afternoon
(TE) Theory	42	Catalan	first semester	afternoon