Probability

Code: 104847
ECTS Credits: 6

2025/2026

Degree	Type	Year
Applied Statistics	FB	1

Contact

Name: Maria Merce Farre Cervello

Email: merce.farre@uab.cat

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Calculus 1 and Introduction to Probability.

Objectives and Contextualisation

Probability is a branch of Mathematics that has multiple applications in practically all areas of science and techno

It is also the language of inferential statistics. By this reason, this is one of the fundamental subjects of the Degre

In this second course, it is intended to deepen in some of the subjects started in the Introduction to Probability co

such as simulation of random variables and Markov chains.

Learning Outcomes

1. KM10 (Knowledge) Describe the characteristics of the distribution and density functions of random variables.

Content

1. Generating random variables based on uniform random numbers.

2. Random vectors:

- Expectation of a function of a random vector. Covariance and correlation.
- Independent random variables.
- Conditional expectation.
- Computations in the discrete case.

3. The moments of a random variable and the moments' generating function. Properties and applications.

4. Convergence of a sequence of random variables: almost-sure, in probability and in distribution. Relations and properties.

5. The Laws of Large Numbers and de Central Limit Theorem. Applications.

6. Introduction to random processes: Random Markov Chains with a finit number of states. The probabilities' generating function.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classes of problems	18	0.72	
Classes of theory	26	1.04	
Type: Supervised			
Classes of practice	8	0.32	
Type: Autonomous			
Personal study	82	3.28	

There will be three types of face-to-face activities: theory classes, problem classes and practical classes. In theory classes the concepts and results that form the heart of the subject will be developed. A collection of problem lists will be edited for class work of problems that students should have worked on before. The practices will be in the computer rooms and specialized software will be used, such as R. Attendance to the practical classes is mandatory.

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
Continued evaluation	100%	12	0.48	KM10
Exam of recuperation	80%	4	0.16	KM10

TThe continuous assessment will consist of two partial exams (theory and problems) with a respective weight of 35% for the first (P1) and 45% for the second (P2), and the evaluation of classroom or computer-based practices (Pr) which will represent 20% of the final grade.

$NF = 0.35 \cdot P1 + 0.45 \cdot P2 + 0.2 \cdot Pr$

In the evaluation of the practices, whether classroom or computer-based, the submission of scheduled tasks and the performance of controls will be taken into account.

The part that can be recovered in the retake exam will only be that corresponding to the partial exams. The partial exams are eliminatory.

To pass the subject, it is necessary to have a minimum of 3.5 in the weighted average of the partial exams (or recovery) and in the average grade of the practical part, in addition to a minimum of 5 in NF.

Single assessment The single assessment will be a test of synthesis of the skills of the two partials, based on: (1) An exam with theory questions and problems (weight: 80%). (2) A practical test in front of the computer (weight: 20%).

Bibliography

X. Bardina. *Càlcul de probabilitats.* Materials UAB, 139.

M.H. de Groot. *Probabilidad y estadística*. Addison-Wesley Iberoamericana.

W. Mendenhall et al. *Estadísitica Matemática con aplicaciones*. Grupo editorial Iberoamérica.

K.L. chung. *Teoría elemental de la probabilidad y los procesos estocásticos*. Ed. Reverté.

S.M. Ross. *A First course in probability*. Ed. MacMillan.

Software

We will use statistical software R.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn

(PAUL) Classroom practices	1	Catalan	second semester	afternoon
(PLAB) Practical laboratories	1	Catalan	second semester	afternoon
(PLAB) Practical laboratories	2	Catalan	second semester	afternoon
(TE) Theory	1	Catalan	second semester	afternoon