

Degree	Type	Year
2503852 Applied Statistics	FB	1

Contact

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Teachers

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

There are no prerequisites except to take simultaneously the course Calculus 1, or to know already its contents.

To a lesser degree, it may also be convenient to take the course Computer Tools for Statistics at the same time, or to have basic knowledge of the R programming language.

Objectives and Contextualisation

What do have in common a lottery draw, a clinical trial to experimentally assess the efficacy and/or safety of a new medical treatment, weather forecasting for rain in a certain area, inventory management for a company, gene transmission from parents to children, estimating the population size of whales, an epidemiological study on the incidence of a certain disease, inspecting product lots produced by a company to verify their quality, an experiment to study the effect of pressure and temperature on the outcome of a certain chemical reaction, or the effect of using different fertilizers on the agricultural production of a farm ... ?

They are real situations in which chance plays a role.

To study them and draw reliable conclusions, we need to use an appropriate mathematical model. Probability is the mathematical theory that allows us to model random phenomena, that is, situations where chance is involved, and it is fundamental in Statistics. In practical applications, it is about finding the best possible

probabilistic model for a given real situation and, by using it correctly, extracting valuable information, knowledge, and useful conclusions.

The aim of this course is to introduce the theory of Probability. The topics we will cover will be expanded upon and deepened in the "Probability" course of the second semester.

Learning Outcomes

1. CM01 (Competence) Find suitable probabilistic models in a specific real situation to gain useful knowledge and conclusions.
2. KM03 (Knowledge) Select mathematical models for situations of uncertainty.
3. KM03 (Knowledge) Select mathematical models for situations of uncertainty.
4. SM01 (Skill) Apply the concepts studied to calculate the extreme points of functions and moments of random variable distributions.
5. SM04 (Skill) Resolve problems associated with the extreme points of functions of one and several variables, and the calculation of moments.

Content

1. Probabilistic models.
2. Conditioned probability.
3. Random variables.
4. Mathematical expectation and variance.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problems in the classroom	18	0.72	
Theory in the classroom	26	1.04	
Type: Supervised			
Practical sessions	8	0.32	
Type: Autonomous			
Personal work	89	3.56	

The in-person activities consist of theory classes, problem-solving sessions, and computer lab practices. Concepts and examples will be introduced, and exercises will be worked on or the computer will be used when appropriate.

The Moodle classroom on the Virtual Campus will be the communication tool between the teaching staff and the students. All inquiries, whether about the course operation or its content, that may interest other classmates should be made in class or through the General Forum that will be available in the Moodle classroom. Topics that do not interest anyone else will be addressed personally or by email, always sent from the institutional address @autonoma.cat.

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
Assessment Test with R	0.10	1	0.04	CM01, KM03, SM01, SM04
Intermediate tests	0.70	6	0.24	CM01, KM03, SM01, SM04
Submission of solved exercises	0.20	2	0.08	CM01, KM03, SM01, SM04

The evaluation of the course will be based on:

- Two partial exams of combined theory and problems (70% of the final grade).
- Two exercise submissions (20% of the final grade).
- Computer lab exam (10% of the final grade).

To pass the course, it is necessary to:

- Obtain an average of 5.0 out of 10 in the exams, with a minimum of 4.0 in each of the exams.
- Obtain an overall average of 5.0 out of 10, which will be the final grade for the course.

Grades that do not meet these requirements will be considered on a case-by-case basis.

Each exam will have a second sitting ("recuperation" in UAB's official terminology). Attending this second sitting will automatically void the grade of the first. Submissions and the lab exam are NOT recoverable.

A student will be considered evaluable if they have submitted assignments or taken exams totaling at least 50% of the course. Otherwise, they will be marked as Not Evaluable in the records.

For the potential assignment of Honors Distinctions, the grades of the second sitting will not be considered.

Copying or plagiarism in submissions is considered as serious as cheating in an exam and will result in the automatic failure of the course.

Single assessment:

Students who opt for the single assessment modality must take a single exam and submit the required assignments on the day of the second partial exam of the course. Details will be agreed upon with the interested parties.

Bibliography

BASIC BIBLIOGRAPHY:

Bardina, Xavier. Càlcul de Probabilitats. Servei de Publicacions UAB, 2004.

Julià, Olga; Márquez, David; Rovira, Carles i Sarrà, Mónica. Probabilitats: Problemes i més problemes. Publicacions i edicions de la Universitat de Barcelona, 2005.

Ross, Sheldon M. Introduction to Probability Models, Academic Press, 2019, 12th edition.
<https://www.sciencedirect.com/book/9780123756862/introduction-to-probability-models>

Software

We will use the R programming language.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	first semester	afternoon
(SEM) Seminars	1	Catalan	first semester	afternoon
(SEM) Seminars	2	Catalan	first semester	afternoon
(TE) Theory	1	Catalan	first semester	afternoon