

Machine Learning 1

Code: 104870
ECTS Credits: 6

2025/2026

Degree	Type	Year
Applied Statistics	OB	3

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

This course assumes that the student has acquired the knowledge taught in various subjects on the following topics:

- Linear Algebra and Calculus
- Probability and Statistical Inference
- Computer Tools for Statistics and Introduction to Programming
- Linear Models

Objectives and Contextualisation

This course aims to introduce students to the field of Supervised Machine Learning by presenting various methodologies and basic concepts.

Learning Outcomes

1. CM11 (Competence) Create new machine learning models, running experiments to demonstrate their feasibility and improved performance compared to the state of the art.
2. CM12 (Competence) Assess the existence of inequalities on the grounds of gender in databases, to avoid bias in automatic (algorithmic) decision-making.
3. KM16 (Knowledge) Recognise supervised and unsupervised, profound and generic machine learning models, fostering innovation in the field of statistics.

Content

- Introduction to Supervised Machine Learning.
- Support Vector Machines
- K-Nearest Neighbors
- Decision Trees and Random Forests
- Validation, confusion matrices, and performance metrics (binary case)
- Additional topics: cost-sensitive learning, imbalanced datasets, bias, ethical issues, ...

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	30	1.2	
Type: Supervised			
Theory sessions	50	2	
Type: Autonomous			
Personal study of the subject	46	1.84	

Teaching will combine classroom lessons by teachers and practical work for students with a computer.

In all aspects of teaching/learning activities, the best efforts will be made by teachers and students to avoid language and situations that can be interpreted as sexist.

To achieve continuous improvement in this subject, everyone should collaborate in highlighting them.

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

Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Deliveries and practical project	40%	18	0.72	CM11, CM12, KM16
Exam	40%	3	0.12	KM16
PAC1	20%	3	0.12	KM16

Continuous Assessment

The assessment of the course will consist of three components: the PAC1 grade (test), the exam grade Ex, and the practical work grade NP. The overall grade will be calculated as $N = 0.2 \cdot PAC1 + 0.4 \cdot Ex + 0.4 \cdot NP$, provided that each of these individual grades is at least 3.5 out of 10. Otherwise, that grade will be considered as 0 in the computation of N.

If $N \geq 5$, the course is considered passed with a final grade $NF = N$.

Otherwise, the student may take a resit exam (ExRec), in which case the final grade will be $NF = 0.7 \cdot ExRec + 0.3 \cdot NP$. That is, the practical grade, which is NOT recoverable, will account for 30% of the final grade.

The resit exam cannot be used to improve the grade once the course has already been passed.

A student will be considered "evaluable" if they have participated in at least one assessable activity. Otherwise, they will appear on the record as "Not Evaluable."

Single Assessment

Students opting for the single assessment modality will be graded based on the final exam (60%) and a practical assignment (40%).

Bibliography

- Geron, A. (2019) Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow (O'Reilly)
- Hastie, T. et al (2008) The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer Series in Statistics.
- Bishop, C.M. (2006) Pattern Recognition and Machine Learning. Information Science and Statistics Series. Springer.

Software

Python and RStudio will be used, the latter being an IDE (Integrated Development Environment) specifically designed for the R programming language.

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
(PLAB) Practical laboratories	1	Catalan	first semester	afternoon
(PLAB) Practical laboratories	2	Catalan	first semester	afternoon
(TE) Theory	1	Catalan	first semester	afternoon