

## 69721 - Machine Learning

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 69721 - Machine Learning

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 633 - Master's Degree in Biomedical Engineering

**ECTS:** 3.0

**Year:** 1

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The purpose of this subject is for the student to acquire the necessary knowledge to understand the fundamentals and applications of a machine learning system in biomedical data, such as probabilistic models, decision trees, support vector machines (SVMs), multilayer perceptron (MLP) and convolutional networks. The main objective is to provide the student with an overview of the technologies related to machine learning on biomedical data.

### 2. Learning results

- To learn the basics of pattern recognition and machine learning.
- To know the use of probabilistic models such as Naive Bayes and Bayesian Networks in machine learning.
- To know the use of decision tree models in machine learning.
- To know the use of linear models and SVMs in machine learning.
- To know the use of MLP and convolutional neural networks in machine learning.
- To know the methodology to design and implement a basic pattern recognition system.

### 3. Syllabus

**Topic 1.** Introduction to pattern recognition

**Topic 2.** Probabilistic models: Naive Bayes, Bayesian Networks

**Topic 3.** Decision trees

**Topic 4.** Linear models and SVMs

**Topic 5.** Neural networks

### 4. Academic activities

**Master classes:** 18 hours

Theoretical-practical sessions in which the contents of the subject will be explained.

**Problem solving and case studies:** 4 hours

Classroom resolution of examples and problems associated with the syllabus.

**Laboratory practices:** 8 hours

Model programming and simulation.

**Personal study:** 47 hours

**Assessment tests** 3 hours.

This course is English Language Friendly, which means that: the course syllabus is also available in English; the study and class materials are in English; the course instructors are willing to conduct tutoring sessions in English; students are allowed to take their assessments in English.

### 5. Assessment system

The subject will be assessed by the continuous assessment system by means of the following activities:

-**Test 1: Individual written test** of short questions and solving of exercises (50% of the grade, minimum 4 out of 10).

Assessment criteria are as follows:

- Mastery of content, use of terminology, accuracy of concepts, justification of arguments.

- **Test2: Delivery of individual practice reports** of the subject. (25% of the grade, minimum 4 out of 10)

Assessment criteria are as follows:

- Solution: Correct solution based on the practice script.

- Comments and reports: use of terminology, application of subject concepts, justification of arguments.

-**Test 3: Delivery of the practical group work** done in the subject. (25% of the grade, minimum 4 out of 10)

Assessment criteria are as follows:

- Solution: complexity of the proposed solution, inclusion of elements of the subject.

- Comments and reports: use of terminology, application of subject concepts, justification of arguments.

- Oral presentation of the team project: use of terminology, application of the concepts of the subject, time limit.

## 6. Sustainable Development Goals

3 - Good Health & Well-Being

8 - Decent Work and Economic Growth

9 - Industry, Innovation and Infrastructure