

Academic Year/course: 2022/23

67243 - Electronic neural networks

Syllabus Information

Academic Year: 2022/23

Subject: 67243 - Electronic neural networks

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 622 - Master's in Electronic Engineering

ECTS: 6.0

Year: 1

Semester: Second semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented:

- Lectures will provide the theoretical background on fundamentals of Artificial Neural Networks (ANN) and machine learning, and how these systems can be implemented in computers and electronic circuits.
- Case studies and real engineering applications of ANN will be worked out at the classroom, with special emphasis on intelligent environments (sensor data processing, computer vision, embedded intelligence for home appliances...).
- The students will do practical work, developing ANN applications by using software frameworks.
- Individual or group assignments (course project).

Students are expected to participate actively in the class throughout the semester.

4.2. Learning tasks

- Lectures (A01) (20 hours). Presentation of the fundamentals of ANN and machine learning, including theoretical concepts and practical applications. Course materials are available in advance at Moodle.
- Case studies (A02) (10 hours). Different case studies will be worked out at the classroom, related to fields such as computer vision, speech recognition, quality of service of communications, home appliances with embedded intelligence, etc.
- Practical sessions (A03) (18 hours). Four-six practical sessions will be carried out in small groups, consisting of simulations of ANN.
- Assignments (A06) (36 hours). Individual or group assignments will be proposed, in the form of a course project. The assessment criteria include: difficulty, development, achieved results, quality of the written report and oral presentation.

- Study (A07) (60 hours). Study, preparation of laboratory work and time for preparing the final exam. Students can also attend tutorials to solve specific problems.
- Evaluation activities (A08) (6 hours). Assessment will be based on coursework (laboratory work and assignments) and final examination.

4.3. Syllabus

The course will address the following topics:

1. Fundamentals of Artificial Neural Networks and Machine Learning
2. Supervised learning
3. Unsupervised learning
4. Kernel machines (RBF, Support Vector Machines)
5. Deep Learning
6. Electronic implementations
7. Digital circuit implementations
8. Applications development

Laboratory sessions (tentative)

Introduction to machine learning and tools
Dimensionality reduction and unsupervised models
Supervised models: linear and SVM
MLP and Deep Learning
Deep Learning (II)

4.4. Course planning and calendar

For further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, please refer to the EINA website <https://eina.unizar.es/> and Moodle <https://moodle.unizar.es/>

4.5. Bibliography and recommended resources

Course notes and other documentation:

<https://moodle.unizar.es/add/>

References:

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=67243>