



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Subject name	Machine Learning and Artificial Intelligence with Python
Subject code	DTC-SAP-333
Credits	6,0 ECTS
Type	Optativa
Department	Department of Telematics and Computer Sciences

Datos del profesorado	
Teacher	
Name	Alexandro Badea Romero
Department	Department of Industrial Organization
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
Aportación al perfil profesional de la titulación
This introductory course provides students with a hands-on foundation in artificial intelligence (AI) and machine learning (ML), offering a practical, beginner-friendly path to understanding and creating their first AI models. Students will explore essential AI and ML concepts, develop skills in Python programming for AI, and gain experience in popular AI domains such as Natural Language Processing (NLP) and Computer Vision.
Prerrequisitos
Python programming.

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos
Course contents
Theory:
<ul style="list-style-type: none">Module 1: Introduction to Artificial IntelligenceModule 2: Machine Learning BasicsModule 3: Supervised Learning Algorithms: classification



- Module 4: Supervised Learning Algorithms: regression
- Module 5: Unsupervised Learning Algorithms: clustering
- Module 6: Unsupervised Learning Algorithms: dimensionality reduction
- Module 7: Introduction to Neural Networks and Deep Learning
- Module 8: Natural Language Processing (NLP)
- Module 9: Computer Vision
- Module 10: Ethics and Social Implications of AI
- Module 11: Final Project and Presentations

Laboratory:

- Lab 1: Setting up Python environment for AI. Using Python for AI.
- Lab 2: Supervised learning algorithms: k-nearest neighbors and logistic regression
- Lab 3: Supervised learning algorithms: Decision trees and ensemble methods
- Lab 4: Feature selection
- Lab 5: Data preprocessing and implementing linear regression.
- Lab 6: Unsupervised learning algorithms: clustering (k-means, hierarchical, ...)
- Lab 7: Unsupervised learning algorithms: PCA for dimensionality reduction.
- Lab 8: Neural networks and deep learning.
- Lab 9: Natural Language Processing: Text preprocessing.
- Lab 10: Computer Vision: Image preprocessing.
- Lab 11: Ethics in AI: Detecting bias in datasets and evaluating model fairness.
- Lab 12: Final project implementation: Guidance on integrating AI techniques into a final project for presentations.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Calificaciones

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the ordinary or/and extraordinary final exam of 4 over 10.

The overall grade is obtained as follows:

- Final exam (50%)
- Midterms (20%)
- Final project (10%)
- Labs (10%)
- Class participation (10%)

BIBLIOGRAFÍA Y RECURSOS



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus
2024 - 2025

Bibliografía Básica

Introduction to Machine Learning with Python: A Guide for Data Scientists. Andreas C. Mueller & Sarah Guido. O'Reilly.

Materials and codes provided by the instructor.

DTC-SAP-333 Machine Learning & Artificial Intelligence with Python

SEMESTER: Spring

CREDITS: 6 ECTS (lecture 3 credits + laboratory 3 credits)

LANGUAGE: English

DEGREES: SAPIENS program

Course overview

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Prerequisites

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Theory:

- Module 1: Introduction to Artificial Intelligence
- Module 2: Machine Learning Basics
- Module 3: Supervised Learning Algorithms: classification
- Module 4: Supervised Learning Algorithms: regression
- Module 5: Unsupervised Learning Algorithms: clustering
- Module 6: Unsupervised Learning Algorithms: dimensionality reduction
- Module 7: Introduction to Neural Networks and Deep Learning
- Module 8: Natural Language Processing (NLP)
- Module 9: Computer Vision
- Module 10: Ethics and Social Implications of AI
- Module 11: Final Project and Presentations

Laboratory:

- Lab 1: Setting up Python environment for AI. Using Python for AI.

- Lab 2: Supervised learning algorithms: k-nearest neighbors and logistic regression
- Lab 3: Supervised learning algorithms: Decision trees and ensemble methods
- Lab 4: Feature selection
- Lab 5: Data preprocessing and implementing linear regression.
- Lab 7 Unsupervised learning algorithms: clustering with k-means, hierarchical clustering, and PCA for dimensionality reduction.
- Lab 7: Unsupervised learning algorithms: PCA for dimensionality reduction.
- Lab 8: Neural networks and deep learning.
- Lab 9: Natural Language Processing: Text preprocessing.
- Lab 10: Computer Vision: Image preprocessing.
- Lab 11: Ethics in AI: Detecting bias in datasets and evaluating model fairness.
- Lab 12: Final project implementation: Guidance on integrating AI techniques into a final project for presentations.

Textbook

- Introduction to Machine Learning with Python: A Guide for Data Scientists. Andreas C. Mueller & Sarah Guido. O`Reilly.
- Materials and codes provided by the instructor.

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the ordinary or/and extraordinary final exam of 4 over 10.

The overall grade is obtained as follows (ordinary and extraordinary):

- Final exam (40%)
- Final project (30%)
- Lab (20%)
- Class participation (10%)