Universidad de Navarra

AI Technology

Teaching guide 2025-26

PRESENTATION

Description

This course provides hands-on experience with practical AI technologies used in real-world business and technical contexts. It introduces students to modern tools and techniques in machine learning, deep learning, natural language processing, and AI deployment, using Python and related frameworks. It is adapted for business students with limited prior coding experience, emphasizing intuitive tools and guided labs.

- **Bachelor's Degree**: Bachelor's Degree in Business Administration
- **Subject**: AI Technology
- **ECTS**: 6
- **Year, semester**: 3rd year, 1st semester
- **Carácter**: Elective
- **Instructor:** Jef Schroder Aubert
- **Language:** English
- **Office Hours:** By appointment via email (jschroderau@external.unav.es)
- **Classroom & Timetable:** Tuesday 8–10h & Friday 15–17h - Classroom AMI-P0-Aula07 - www.unav.edu/web/facultad-de-ciencias-economicas-y-empresariales/estudiantes/horarios

LEARNING OUTCOMES (Competencies)

Basic Competences:

- BC1: Understand and apply the core principles and real-world uses of AI.
- BC2: Use applied tools to build basic AI systems.
- BC3: Communicate clearly about AI models, their outcomes, and uses in business.

General Competences:

- GC1: Develop analytical thinking to identify AI opportunities in business.

Specific Competences:

- SC1: Understand essential ML concepts: supervised learning, NLP, and recommendation.
- SC2: Work with AI tools (e.g., OpenAI API, LangChain, Scikit-Learn, Streamlit).
- SC3: Design and present small-scale AI-powered applications.

PROGRAM STRUCTURE

Module 1 – Foundations of Programming and Data Handling

- Python essentials, data structures, logic flow

- Jupyter/Colab, GitHub basics

- Working with structured datasets (Pandas, NumPy)

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Module 2 – Machine Learning Fundamentals

- Regression and classification models (Linear Regression, Logistic Regression, Random Forest, SVM…)

- Model training and evaluation (Scikit-Learn)

- Use cases: price prediction, customer segmentation

Module 3 – Deep Learning and Neural Networks

- Multi-layer perceptrons (MLPs), activation functions, loss, and optimizers

- Simple image recognition models

- Tools: PyTorch/TensorFlow libraries

Module 4 – Natural Language Processing (NLP)

- Natural language data preprocessing, tokenization, embeddings, basic transformers

- Sentiment analysis and classification

- Tools: HuggingFace, pre-trained models, NLTK

Module 5 – Unsupervised Learning

- Segmentation of unlabeled data using clustering (e.g., K-Means) and dimensionality reduction techniques (e.g., PCA).

- Customer segmentation, product grouping, etc.

- Tools: Scikit-learn, Pandas, Matplotlib, Seaborn

Module 6 – Prompt Engineering and Large Language Models

- Prompt design and optimization

- Using OpenAI API and LangChain basics

- Building question-answer and generation systems

Module 7 – Agents and Retrieval-Augmented Generation (RAGs)

- Retrieval-Augmented Generation architecture, Vector Indexes

- LLM chains, AI agents with tools and memory

- Tools: ChromaDB / Pinecone, OpenAI API

- Use case: chatbots, smart Q&A assistants

Module 8 – AI Deployment and Interactive Apps

- Gradio and Streamlit for Web Interfaces using Python

- Vibe coding tools (Lovable)

- Deploying ML solutions to the web

LEARNING ACTIVITIES

- Guided lab sessions
- Theoretical assessments
- Practical projects
- Final project + presentations

EVALUATION SYSTEM

- Continuous evaluation projects | 40%
- Class Activities + Participation | 15%
- Final Project (code + report) | 30%
- Final Project Presentation | 15%

BIBLIOGRAPHY & TOOLS

- Mollick, E. & Mollick, L. (2024) – Co-Intelligence: Living and Working with AI Find it in the library.

→ Strategic perspective on LLMs and AI in business

- Marr, B. (2020) – Artificial Intelligence in Practice

→ Business case studies, visuals, accessible explanations

- Scikit-learn Documentation – https://scikit-learn.org/

→ Supervised, unsupervised learning with charts and examples

- Hugging Face NLP Course – https://huggingface.co/learn/nlp-course/

→ NLP & transformers, practical and presentation-friendly

- Fast.ai & DeepLearning.AI (Coursera) – https://course.fast.ai / https://www.coursera.org/specializations/deep-learning

→ Deep learning, model interpretation

- LangChain Docs – https://docs.langchain.com

→ Visual explainers for chaining, memory, agents

- Streamlit Documentation – https://docs.streamlit.io

→ Interactive app building and deployment demos

- OpenAI Cookbook – https://github.com/openai/openai-cookbook

→ Prompt engineering, LLM workflows with examples

- Kaggle Learn Tracks – https://www.kaggle.com/learn

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→ Python, Pandas, ML notebooks convertible into slides

- StatQuest (YouTube) – https://www.youtube.com/user/joshstarmer

→ Visual and intuitive ML/NLP concept explanations