Syllabus
2025 - 2026

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Subject name	Machine Learning I: Regression and Classification
Subject code	FCEE-BA-315
Mainprogram	Grado en Análisis de Negocios/Business Analytics
Involved programs	Grado en Análisis de Negocios/Business Analytics y Grado en Derecho [Third year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Departamento de Métodos Cuantitativos
Coordinator	Carlos Martinez de Ibarreta Zorita
Office hours	upon request by e-mail. The specific schedule will be available as soon as the timetables are finalized.

Datos del profesorado	
Teacher	
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

Many business decisions and problems can be improved by applying analytical techniques to the vast amount of data of all kinds available.

The course is an introduction to machine learning techniques, going into detail on basic prediction and classification techniques.

To be useful, the course will focus on the application of the techniques to real data and real problems, so that the student will have the tools to be able to deal with real business problems later on.

Prerrequisitos

Fundamentals of statistical data analysis

Fundamentals of Python and R programming

Fundamentals of Business Analytics

Competencias - Objetivos

Competencias

GENERALES		
CG03	Resolución de problemas y toma de decisiones en un entorno de datos masivos tanto cuantitativos como cualitativos	
	RA1	Saber seleccionar para cada problema la técnica o técnicas de análisis de datos más adecuada para poder convertir los datos ¿en bruto¿ en información y ésta en conocimiento que ayude a la toma de decisiones y a mejorar la gestión.
CG04	Capacidad para elaborar proyectos e informes de manera oral y escrita, difundiendo estas ideas a través de canales digitales	
	RA1	Ser capaz de resumir, sintetizar y comunicar de una forma atractiva y eficaz los resultados de la aplicación de las técnicas de análisis de datos, incluso de las más sofisticadas, de manera que resulten comprensibles a destinatarios no técnicos y ayuden de forma eficiente a la toma de decisiones empresariales.
ESPECÍFICAS		
CE19	Conocer los fundamentos de las principales técnicas tanto de la estadística clásica (descriptiva e inferencial) como del data mining	
	RA3	Conocer los fundamentos de las principales técnicas de data mining supervisado (predictivo).
CE20	Saber modelizar un problema empresarial real que precise análisis de datos y seleccionar críticamente la técnica o combinación de técnicas más adecuada	
	RA2	Saber modelizar un problema de predicción (regresión, clasificación)
	RA4	Conocer las ventajas y limitaciones de los procedimientos de data mining y saber cómo enfocar un problema desde diferentes técnicas complementarias

CE21	Saber interpretar, evaluar y comunicar resultados derivados de las técnicas de análisis de datos así como usarlos para la ayuda en la gestión y la toma de decisiones empresariales	
	RA2	Saber interpretar, evaluar y comunicar los resultados derivados de un análisis que emplee técnicas de data mining predictivo.
CE22	Saber aplicar las técnicas de análisis de datos (tanto las de la estadística clásica como las técnicas de data mining) a un conjunto de datos reales, mediante el empleo de algún software apropiado para tal fin	
	RA3	Saber aplicar técnicas de data mining predictivo (aprendizaje supervisado) a un conjunto de datos reales usando software apropiado para tal fin

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos
Introduction to Machine Learning techniques. Supervised and unsupervised learning.
Working with data. Preprocessing, enrichment and preliminary descriptive analysis.
Prediction: Multiple linear regression
Predictive performance. Data partitioning: training and validation set.
Classification: Logistic regression
Performance in classification tasks.
Other techniques: KNN, classification trees, and random forest and ensembles
Introduction to neural networks
Tools for building, evaluating and improving a model.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

The course is eminently practical and applied.

Before the class, students should have prepared the contents to be seen.

In the classroom class the theoretical contents and main concepts will be reinforced, to move on to simple cases of application.

There will be five practical sessions in which case studies will be carried out to apply what has been seen and to go deeper into the concepts, as well as some other practices to do at home.

The practical application work will try to apply machine learning techniques to real data applied to a problem, preferably of a business or economic nature.

Use of chatGPT or similar generative AI tools. It is welcome for debugging and correcting code, help with code, resolving doubts, etc. Its use as a "co-pilot" will be encouraged, but the student must always be able to supervise, understand and be able to explain everything done. Its use is expressly forbidden in individual face-to-face evaluation activities (exams, oral defense of the work).

Metodología Presencial: Actividades	
Presentation of the main theoretical concepts Realization of simple application examples Sharing and correction of cases and problems carried out by the students. Evaluation activities	CG03, CG04, CE19, CE20, CE21, CE22

Metodología No presencial: Actividades	
Personal study Case studies and practical application work, using data and programming.	CG03, CG04, CE19, CE20, CE21, CE22

RESUMEN HORAS DE TRABAJO DEL ALUMNO

CLASSROOM HOURS		
Lecciones de Carácter expositivo	Ejercicios y resolución de casos y de problemas	
30.00	30.00	
NON-PRESENTIAL HOURS		
Ejercicios y resolución de casos y de problemas	Estudios individual y/o en grupo, y lectura organizada	Trabajos monográficos y de investigación, individuales o colectivos
30.00	30.00	30.00
ECTS CREDITS: 6,0 (150,00 hours)		

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
Final exam of theoretical and practical nature 35%. Oral evaluation of practical work 17.5%.	Numerical grading	52.5
Periodic testing and continuous assessment 10%		

Midterm 10%	Numeric grading	20
Practical application work Proposal 10.5% Written work work 7%	Use of real data and programming Grading by rubric Proposal 30% and Final paper 70%. • proposal 10.5% final grade • final paper 7% final grade • oral defense 17.5% final grade	17.5
Periodic case studies	To be performed in class-home Numerical grading 0-10	10

Calificaciones

It is necessary to obtain a 5 in the final exam to pass the course in any of the calls.

The practical application work must be done and MUST BE PASSED WITH A 5 in order to pass the course, both in the ordinary and extraordinary exams. The oral defense is a mandatory requirement. In an applied subject, it is necessary to demonstrate that the student has acquired the skills to apply the theoretical concepts to real data by using the appropriate analysis techniques and the necessary programming skills. The professor may ask oral questions about the student's work in order to have evidence that it has been done effectively.

Practical work weights 35% in final score: 10.5% proposal, 7% final written asignment, , 17.5% oral defense.

In third and subsequent exams, it is recommended to do the work again, although it is not compulsory. The final grade in this case will be the better of the following two grades: a) 70% exam and 30% paper and b) 100% exam.

Exchange students (IN): same regime as regular students.

Exchange students (OUT): same system as for third and subsequent exams.

Use of generative AI

The use of ChatGPT or other generative AI tools is welcomed in this course as a *copilot* for generating examples, answering questions, improving and organizing writing, and assisting with coding or debugging, among other tasks. Its use is always under the student's responsibility, as ChatGPT or any other generative AI tool may provide inaccurate results.

The use of generative AI will be valued in the practical project when it involves proposing and applying methods not covered in class (including variations of methods studied in class), provided that the student can explain and demonstrate understanding during the oral defense of the project.

Its use is **strictly prohibited** in individual in-person assessments (final exam, tests, presentations, and oral defense of the project).

PLAN DE TRABAJO Y CRONOGRAMA

Activities	Date of realization	Delivery date
Final project proposal		mid-semester
Final practical work		final exam day
Midterm		mid-semester

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Garrido E. et al (2023). An introduction to Machine Learning for Undergraduate Business Students with 101 Answered Questions. EV Services

Moodle materials

Bibliografía Complementaria

Provost, F., & Fawcett, T. (2013). *Data Science for Business: What you need to know about data mining and data-analytic thinking*. O'Reilly Media, Inc.

James, Gareth, et al. *An introduction to statistical learning*. Vol. 112. New York: springer, 2013.

Online Resources:
- dot.csv YouTube Channel: https://www.youtube.com/channel/UCy5znSnfMsDwaLlROnZ7Qbg
- Cátedra Santa Lucía – Analytics for Education: https://www.youtube.com/@catedraAfE