



# COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus  
2024 - 2025

## FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Subject name	Machine Learning I: Regression and Classification
Subject code	FCEE-BA-315
Main program	<a href="#">Grado en Análisis de Negocios/Business Analytics</a>
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 Martínez de Ibarreta Zorita
Office hours	upon request by e-mail. The specific schedule will be available as soon as the timetables are finalized.

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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
	<b>RA3</b> 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
	<b>RA2</b> Saber modelizar un problema de predicción (regresión, clasificación)
	<b>RA4</b> 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
	<b>RA2</b> 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
	<b>RA3</b> 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	CG03, CG04, CE19, CE20, CE21, CE22
Realization of simple application examples	
Sharing and correction of cases and problems carried out by the students.	
Evaluation activities	

## Metodología No presencial: Actividades

Personal study	CG03, CG04, CE19, CE20, CE21, CE22
Case studies and practical application work, using data and programming.	

## 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
<b>ECTS CREDITS: 6,0 (150,00 hours)</b>		

## EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN



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%. <ul style="list-style-type: none"><li>proposal 10.5% final grade</li><li>final paper 7% final grade</li><li>oral defense 17.5% final grade</li></ul>	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 assignment, , 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.

## PLAN DE TRABAJO Y CRONOGRAMA

Activities	Date of realization	Delivery date
final work proposal		midterm



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Final practical work		final exam day
Multiple choice tests		at the end of each block of content

## 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

Materiales de Moodle

Shmueli et al. (2017) Data Mining for Business Analytics: Concepts, Techniques, and Applications in R. Ed. Wiley

### 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.

youtube channel dot.csv

<https://www.youtube.com/channel/UCy5znSnfMsDwaLROnZ7Qbg>

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