COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

GUÍA DOCENTE
2026 - 2027

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Análisis Multivariante
Código	E000012908
Impartido en	Grado en Administración y Dirección de Empresas (E-2) [Tercer Curso] Grado en Administración y Dirección de Empresas con Mención en Internacional (E-4) [Tercer Curso] Grado en Administración y Dirección de Empresas (E-2) - en inglés [Tercer Curso]
Nivel	Reglada Grado Europeo
Cuatrimestre	Semestral
Créditos	6,0 ECTS
Carácter	Optativa (Grado)
Departamento / Área	Departamento de Métodos Cuantitativos
Responsable	Antonio Rua Vieites

Datos del profesorado	
Profesor	
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

In today's data-driven world, the ability to analyze and interpret data is crucial for professionals in various fields. This course in Data Analysis aims to equip students with essential skills and techniques to extract meaningful insights from data, make informed decisions and contribute effectively to their professional roles.

This course aims to empower students to become data-savvy professionals capable of making informed and impactful contributions across various industries, fostering a data-driven culture in the workplace. Through hands-on training and practical projects, students will gain the confidence to tackle real-world data challenges and make a difference in their future careers. Thus, by the end of this course, students will have a well-rounded understanding of data analysis and its practical applications in a business setting.

The course will incorporate real-world case studies and projects inspired by industry challenges. Students will work with diverse datasets, apply analysis techniques, and derive actionable insights, simulating scenarios encountered in the professional world.

Prerrequisitos

To have completed the subjects from previous courses (especially those related to Statistics) and to have an open mind and the ability to work to learn new concepts related to data science.

Competencias - Objetivos

Competencias

CG01 Capacidad de análisis y síntesis

RA1 Analiza la información identificando sus elementos más significativos

RA2 Realiza la abstracción y simplificación necesaria para modelizar estadísticamente el problema real planteado

RA3 Integra el análisis gráfico, verbal y los datos cuantitativos y cualitativos para definir el modelo estadístico apropiado al problema

CG02 Resolución de problemas y toma de decisiones

RA1 Conoce las metodologías aplicables para resolver el problema real

RA2 Sabe aplicar dichas metodologías

RA3 Reconoce el alcance de las conclusiones y los supuestos necesarios para la validez de las mismas

CG04 Capacidad de gestionar información proveniente de fuentes diversas

RA1 Conoce fuentes y bases de datos profesionales macro y microeconómicas

RA2 Sabe tratar y juzgar críticamente las fuentes utilizadas para que sean válidas en el análisis

CG05 Conocimientos generales básicos sobre el área de estudio

RA1 Desarrolla habilidades necesarias para el estudio e investigación independiente

RA2 Encuentra por sí mismo aplicaciones y extensiones de los conceptos y metodologías estudiadas

CG06 Comunicación oral y escrita en la propia lengua

RA1 Expresa correctamente la metodología empleada y los resultados y conclusiones obtenidas del análisis efectuado

RA2 Comunica de forma efectiva, a público no especialista, los informes y análisis efectuados

CG08 Conocimientos de informática relativos al ámbito de estudio

RA1 Conoce y emplea de forma suficiente herramientas informáticas de uso común para el análisis estadístico

ESPECÍFICAS

CEOPT Conocimiento y comprensión de las principales Técnicas de Predicción y el Análisis Multivariante

RA1 Conocer los principales modelos econométricos empleados en el ámbito de las finanzas especialmente los relativos a la modelización de la volatilidad

RA2 Conocer los principales modelos econométricos empleados en el ámbito de la economía aplicada tanto en el campo microeconómico como macroeconómico

RA3 Conocer las principales técnicas clásicas de dependencias e interdependencias, sabiendo seleccionar la más adecuada según el tipo de problemas y el conjunto de datos disponible

RA4 Adquirir una perspectiva general de las nuevas técnicas de análisis de datos aplicables al nuevo paradigma del análisis masivo de datos (Big Data)

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos
BLOCK 1: Introduction
1.- Introduction to Data Analysis
1.1.- Importance of Data in the Actual World 1.2.- Overview of the Data Analysis Process 1.3.- Types of Data and Data Sources
2.- Exploratory Data Analysis
2.1.- Descriptive Statistics 2.2.- Data Visualization Techniques 2.3.- Handling Missing Data and Outliers 2.4.- Data Cleaning and Preprocessing techniques
BLOCK 2: Dependency Analysis
3.- Dependency Analysis
3.1.- Introduction to Correlation 3.2.- Pearson's Correlation Coefficient 3.3.- Variance and Covariance analysis 3.4.- Practical applications
4.- Regression Analysis for Categorical Variables: Exploring Relationships and Predictive Models
4.1.- Linear Regression 4.2.- Logistic Regression

4.3.- Practical applications to typical industry problems

BLOCK 3: Interdependency Analysis

5.- Overview of ML Models

5.1.- Introduction to ML Models
5.2.- Fundamentals of most used models in the industry
5.3.- Practical examples and applications

6.- Time Series Analysis

6.1.- Introduction to Time Series Data
6.2.- Time Series Visualization
6.3.- Trend Analysis
6.4.- Seasonality and Examples

BLOCK 4: Understanding AI for data analysis

7. Solutions and Tools

7.1. Overview of AI-powered analytics platforms

7.2 Generative AI tools (e.g., ChatGPT, Copilot, Gemini)

7.3 AutoML platforms

7.4 AI-assisted data visualization and reporting

8. Ethics and limitations

8.1. Bias and fairness in AI models

8.2 Privacy and data protection

8.3 Explainability and transparency

8.4 Hallucinations and reliability of generative AI

8.5 Human oversight and critical thinking

8.6 Regulatory frameworks (e.g., EU AI Act)

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

The use of ChatGPT or any other Generative Artificial Intelligence in any assessment activity that is not explicitly authorized by the instructor will be considered a serious offense according to the University's General Regulations, Article 168.2.e: "engaging in actions aimed at falsifying or defrauding the academic performance evaluation systems." The consequences of such actions may include "temporary expulsion of up to three months or a ban on taking exams in the next examination session following the imposition of the sanction, in one or more subjects in which the student is enrolled. A first-time offense of this article, in addition to resulting in a failing

grade (0) in the respective subject, will be sanctioned with a ban on taking the exam for that subject in the next session."

In other words, the use of ChatGPT or any other Generative Artificial Intelligence is strictly prohibited in any assessment activity unless the instructor has explicitly stated that it is allowed.

Metodología Presencial: Actividades

- Mastery exposition of the general framework of each topic.
- Realization and discussion of introductory examples of practical application.
- General tutoring of practical application work.
- Introduction to and guidelines for the use of computer applications of a statistical nature, as well as obtaining and processing economic data from web sources.
- Carrying out practical tests by the students and defending them, if applicable.

Metodología No presencial: Actividades

- Preparation and realization of practical cases to replicate the structure and contents explained in class.
- Study and preparation of the final exam.

RESUMEN HORAS DE TRABAJO DEL ALUMNO

CLASSROOM HOURS		
Expository lessons	Exercises and solving cases and problems	
30.00	30.00	
NON-PRESENTIAL HOURS		
Individual and/or group study and organized reading	Exercises and resolution of cases and problems.	Monographic and research papers, individual or collective.
30.00	30.00	40.00
ECTS CREDITS: 6,0 (160,00 hours)		

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Evaluation Activities	Evaluation Criteria	Weight
Exam covering the entire course content, without the use of computer support.	Numerical grading from 0 to 10.	45%
Coursework to be carried out based on the course content.	Numerical grading from 0 to 10.	45%
Attention and participation in class.	Numerical grading from 0 to 10.	10%

Calificaciones

To pass the course, the student must obtain a grade equal to or higher than 5 (out of a maximum of 10) overall. Additionally, to calculate the average of all assessable parts of the subject, the student must obtain a grade equal to or higher than 4 in the final exam (if the grade in the final exam is below 4.0, the subject will be considered failed, regardless of the grades obtained in the rest of the tests).

Students in ORDINARY CALL (1st call) and EXTRAORDINARY CALL (2nd call): the same grading system will be followed: all continuous evaluation components carried out during the course are weighted.

REST OF CALLS (3rd and following): The final grade will be 100% the grade of the exam, unless they agree with the teacher to carry out the coursework. In that case, the grade will be the best between these 2 options: 100% exam 70% exam-30% course work.

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Text books

Grolemund, G., y Wickham,H.: "R for Data Science".O'Reilly Media. 2017.

Field, Andy; Miles, Jeremy; Field, Zoë: "Discovering Statistics Using R. ISBN: 9781446258460. SAGE. 2012.

Everitt, Brian; Hothorn, Torsten. "An Introduction to Applied Multivariate Analysis with R". ISBN: 9781441996497. Springer New York, NY. 2011.

Bibliografía Complementaria

Neter, John; Wasserman, William; Kutner, Michael H. "Applied Linear Statistical Models: Regression, Analysis of Variance, and Experimental Designs". ISBN: 978-0256083385. CRC Press. 1990.

Mangin, Lévy; et al. "AnálisisMultivariable para las Ciencias Sociales". Editorial Pearson. 2003.