



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

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CIHS

Syllabus
2026 - 2027

TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Análisis de datos para la investigación / Data analysis for research
Subject code	E000014101
Mainprogram	Máster Universitario en Métodos de Investigación para Gestión Empresarial, Economía y Finanzas / Master in Research Methods for Management, Economics and Finance por la Universidad Pontificia Comillas [MIGEEF 25]
Involved programs	Máster Universitario en Métodos de Investigación para Gestión Empresarial, Economía y Finanzas [First year]
Credits	4,0 ECTS
Type	Obligatoria
Department	Departamento de Métodos Cuantitativos
Coordinator	Carlos Martínez de Ibarreta Zorita
Course overview	Análisis de datos para la investigación. El curso está orientado a la familiarización y práctica con los métodos y herramientas de análisis fundamentales para abordar problemas de investigación con diseños cuantitativos, tales como regresión lineal múltiple, modelos logit y probit, modelos de ecuaciones estructurales, variables instrumentales, datos de panel y series temporales. Se incluye el trabajo con la obtención, preparación y tratamiento de distintos tipos de datos.

Teacher Information	
Teacher	
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SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject

Contribution to the professional profile of the degree

This compulsory course provides students with the fundamental quantitative concepts and tools required for high-quality empirical research in Management, Marketing, Economics, and Finance. By introducing the core statistical frameworks—such as regression models, limited dependent variable models, causal inference tools, panel data techniques, structural equation models, and introductory time-series analysis—the course enables students to understand the methodological foundations that underlie empirical work in these fields.

The training offered allows students to read, interpret, and critically evaluate academic research articles, as well as to design and implement their own applied empirical studies using standard quantitative methods. At the same time, the course lays the methodological groundwork necessary for students to progress confidently into the more advanced techniques and specialised approaches developed in the programme's elective modules.

Prerequisites

Students are expected to have completed the preceding methodological modules in the programme, in particular *Quantitative Research Designs*.

A basic understanding of descriptive statistics, probability, and simple regression is recommended.

Familiarity with spreadsheet or statistical software is helpful but not required.

Competencies - Objectives

Competences

Conocimientos o contenidos

CN03	Los principios y elementos integrantes del diseño de una investigación en el ámbito de la Gestión, la Economía y la Empresa.
CN04	Los principales enfoques, métodos y técnicas de investigación que permiten responder a problemas de investigación propios de la diversidad de áreas y disciplinas ligadas al territorio de la Gestión, la Economía y la Empresa.

Competencias

CM01	Identificar y formular de modo claro, fundamentado y consistente problemas de investigación relevantes tanto desde la perspectiva científico-académica como social, desde los principios y valores democráticos y el marco de los Objetivos de Desarrollo Sostenible como referentes.
CM02	Desarrollar el proceso completo de diseño y ejecución de un proyecto de investigación (en elementos y fases del proceso), consistentes con el problema de investigación, generadores de contribución científica relevante, y orientados por el impacto social.
CM03	Aplicar enfoques, métodos, análisis y técnicas de investigación propios de las áreas de Gestión Economía y Finanzas de modo consistente y coherente, desde principios y valores democráticos y con orientación hacia el logro de los Objetivos de Desarrollo Sostenible.



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CM04	Reportar y difundir resultados fundamentados de la investigación a través de una comunicación eficaz, oral y escrita, tanto a la comunidad de investigadores y de profesionales relacionados con las problemáticas estudiadas, como a una diversidad de públicos no especializado.
Habilidades o destrezas	
HA01	Aportar perspectivas originales, críticas y holísticas en el desarrollo y aplicación de investigaciones que permitan abordar la complejidad de los problemas de investigación
HA02	Apreciar las implicaciones de los enfoques metodológicos alternativos (y sus fundamentos onto-epistemológicos y axiológicos) sobre el diseño de la investigación, sobre el análisis, interpretación y reporte de datos, y sobre la construcción de teorías.
HA03	Evaluar críticamente los diversos métodos y técnicas de investigación, así como discernir su utilidad para cada contexto de investigación.
HA04	Ser consistentes en el uso de las herramientas de investigación en el conjunto dentro del diseño y el contexto de un proyecto de investigación.
HA06	Saber aplicar e integrar fundamentos teóricos y metodológicos para resolver problemas en entornos nuevos y complejos relacionados con los campos de estudio de la Gestión, la Economía y las Finanzas

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks

Fundamentals of Correlational and Regression Analysis

This block introduces the core logic of quantitative empirical research and the distinction between **observational** and **experimental** designs, outlining when each approach is appropriate and what types of inferences each allows. It covers the foundations of correlation, simple and multiple linear regression, model specification, key assumptions, interpretation of coefficients, and basic diagnostics. The block also includes an introduction to limited dependent variable models (logit/probit) as fundamental tools for categorical outcomes, as well as a high-level overview of other essential techniques such as instrumental variables and panel-data models. In addition, students learn the basic steps of **data acquisition, preparation, and preprocessing** for quantitative analysis, including importing data, handling variable types, managing missingness, and performing essential data cleaning operations. The block establishes the analytical mindset required for all subsequent modules.

Treatment and analysis of questionnaire data

This course provides students with the practical and theoretical foundations needed to treat and analyse data from questionnaires. Students will begin by learning to curate raw survey data, addressing common issues such as missing values, reverse-coded items, and variable transformation. The course then introduces Factor Analysis (FA), covering latent construct theory, exploratory factor extraction and the assessment of scale reliability through Cronbach's alpha. Students will subsequently apply Principal Component Analysis (PCA) to aggregated team-level survey data, learning to identify and interpret dominant components. Throughout, the course emphasises the conceptual and practical differences between FA and PCA, equipping students to select the appropriate technique for each research context.



Introduction to Time-Series Analysis

This block introduces the fundamental concepts required to analyse data observed over time. Students are introduced to stochastic processes, univariate and multivariate time series, stationarity, autocorrelation and different forms of temporal dependence. The course also covers white noise and martingale difference processes, conditional moments and volatility clustering, together with the basic intuition behind stochastic trends, random walks and ARIMA-type models. Throughout the block, the emphasis is placed on understanding how temporal dependence affects statistical inference and empirical modelling.

Fundamentals of Experimental Analysis

This block provides a structured introduction to experimental and quasi-experimental methods as causal identification strategies. Students learn the logic of random assignment, treatment-control comparisons, internal validity, common threats to validity, and basic estimands (ATE, ATT). The block also introduces practical aspects of analysing simple experimental data and distinguishes controlled experiments from natural and field experiments, setting the stage for more advanced causal inference techniques in later elective modules.

TEACHING METHODOLOGY

General methodological aspects of the subject

Given that the course is delivered by four instructors, each responsible for a distinct thematic block, the structure combines **self-contained units** with **cross-block integration** to ensure coherence throughout the course.

The methodology follows a progression from **core theoretical concepts** to **guided practice** and then to **applied empirical work**:

Theoretical explanation

Each block introduces the fundamental quantitative concepts, assumptions, and methodological logic underlying the techniques studied.

Illustrative “toy” examples

Simple, small-scale examples are used to clarify the intuition behind each method, making abstract ideas concrete and easy to follow.

Hands-on applied cases

Students work with real or realistic datasets to learn how to:

choose the appropriate technique for a research problem,

justify the methodological choice,

implement the model in statistical software,

interpret and critically evaluate results,

discuss limitations and robustness,

and communicate results effectively.

Integration across blocks

Although each block is taught by a different instructor, the course design ensures continuity: concepts introduced in one block (e.g., identification, model assumptions) are linked explicitly to methods covered in subsequent blocks.

The methodological approach aims to enable students not only to understand the fundamental tools of quantitative research, but also to



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apply them rigorously and to interpret empirical findings with academic and professional clarity.

GENERATIVE ARTIFICIAL INTELLIGENCE

Depending on the specific activity, this course will operate at two levels of the **AI Assessment Scale** (Perkins et al., 2024):

1 – NO AI: The use of AI is not permitted, as students are expected to apply their own knowledge and practice problem-solving independently. This level applies to **IN-PERSON ACTIVITIES**, e.g., final exams, weekly quizzes, in-class exercises, and the oral defense of the final project.

3 – AI COLLABORATION: The use of AI is permitted as an "assistant" during the completion of the activity. However, the student is solely responsible for the submitted work and must critically review all AI-generated outputs and adapt them as needed. This level applies to **NON-IN-PERSON ACTIVITIES**, e.g., weekly homework assignments or assistance in preparing the final project.

Notwithstanding the general guidelines above, the instructor may explicitly authorize other levels of AI use for specific course activities.

SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS		
AF1. Lecciones de carácter expositivo. Sesiones en las que los/as docentes exponen contenidos concretos, que pueden estar apoyados o no por recursos tecnológicos, en la que existirán periodos de explicación a cuestiones o dudas planteadas por los/as estudiantes.	AF3. Ejercicios y resolución de casos y de problemas. Sesiones en las que los/as docentes realizan de manera individual o junto con los/as estudiantes problemas, casos o cualquier tipo de ejercicio pertinente vinculado con la actualidad de la materia y/o con empresas u organizaciones reales, para la adquisición de competencias de las asignaturas.	AF2. Exposición pública de temas o trabajos. Los/as estudiantes presentarán en el aula de manera individual o en grupo, con apoyo de medios audiovisuales, los temas que les hayan encargado los/as docentes o que hayan elegido libremente, dentro de un conjunto de contenidos de la asignatura.
16.00	8.00	4.00
NON-PRESENTIAL HOURS		
AF3. Ejercicios y resolución de casos y de problemas. Sesiones en las que los/as docentes realizan de manera individual o junto con los/as estudiantes problemas, casos o cualquier tipo de ejercicio pertinente vinculado con la actualidad de la materia y/o con empresas u organizaciones reales, para la adquisición de competencias de las asignaturas.	AF7. Estudio y lectura organizada. Tiempo de estudio por parte del estudiante dedicado a preparar, profundizar y analizar en los contenidos de las asignaturas o materias, así como realizar ejercicios prácticos.	
52.00	40.00	
ECTS CREDITS: 4,0 (120,00 hours)		



EVALUATION AND CRITERIA

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 Multiple choice test on basic concepts 40% (10% each module) Oral presentation of projects 40% (choose two)	60 %
	In each module, students will complete a short applied assignment in which they must select the appropriate technique, justify its methodological foundation, analyse a provided dataset using statistical software, interpret the results, and communicate the main empirical conclusions clearly and rigorously.	40 %

Ratings

Passing the course requires **meeting two compulsory conditions**:

Obtaining at least a 5/10 in the Final Multiple choice test on basic concepts , and

Passing all practical projects, which assess the student's ability to apply the techniques covered in each module.

The use of **generative artificial intelligence** is allowed as a **support tool** to improve ideas, enhance writing, or explore alternative methodological approaches, **provided it is used critically and transparently**.

However, its use is **strictly prohibited in in-class evaluation activities**, including oral presentations and the written test.

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

Moodle materials