

Applied Data Analysis for Political Science, Policy and International Relations

UGRA_017242

Departments	Data, Analytics, Technology and Artificial Intelligence (DATA)
Teaching Languages	English
ECTS	6
Teacher responsible	Jorge Galindo Alfonso - jorge.galindo@esade.edu

Course Goals

By the end of this course, students will be able to: work with data gathering and management, collecting data from diverse sources and structuring it properly for analysis; develop foundational R and AI-driven coding skills, building readable and reproducible workflows, performing basic debugging, and working with AI coding assistants both effectively and critically by verifying, correcting and documenting whatever they produce; understand core analytical techniques through data exploration and foundational statistical methods (descriptive statistics, distributions and correlation), always focusing on interpretability and application; visualise and communicate insights by creating compelling, clear and reproducible visualisations and turning them into honest, data-driven stories for both specialist and non-technical audiences; integrate data science processes into broader decision-making or research cycles; build analytical confidence and problem-solving abilities that transfer across academic, policy and professional spheres; and critically evaluate data and evidence, questioning the quality, limitations and interpretation of data, methods and results, including the output of AI tools, before drawing conclusions.

Previous knowledge

There are no formal prerequisites, but two things will be a significant advantage. First, basic statistical literacy, up to understanding descriptive statistics and correlation. Second, some prior exposure to programming in any language, not necessarily R.

Prerequisites

None. This course has no formal prerequisites and is designed for third- and fourth-year undergraduates. Prior statistical literacy (descriptive statistics and correlation) and some previous exposure to programming in any language are helpful but not required.

Teaching methodology

The course follows a sprint-based, challenge-oriented approach. Students progress through three iterative sprints, each devoted to a real-world challenge from a different domain. This sprint model ensures that every few

weeks students experience the entire data workflow, from collecting and wrangling data to performing analyses and creating visualisations, reinforcing cumulative learning. A lecture-workshop-feedback sequence happens organically within each sprint rather than session by session, giving the instructor flexibility to allocate time based on student needs and challenge complexity. The depth of the methods covered is adapted to the group's prior exposure to statistics and programming. Students work primarily in R while making steady, hands-on use of AI-based coding assistants and other data-oriented AI tools. These assistants are introduced once students have acquired basic coding foundations, and from then on they are a normal part of the workflow. Their use must be transparent, documented and critically assessed: students are expected to test, question and correct AI output rather than take it at face value.

Description

Course contribution to program

As an elective in the Global Governance, Economics and Legal Order and Global Governance Exchange programs, this course contributes applied data-analysis competences that are increasingly central to political science, public policy and international relations. It equips students to gather, manage, analyse, visualise and communicate quantitative evidence, and to critically evaluate data, methods and the output of AI tools. These transferable, hands-on skills complement the programs' substantive coursework and prepare students to use data responsibly and effectively.

Short description

This course offers a challenge-driven, hands-on introduction to modern Data Science methods for third- and fourth-year undergraduates. Through real-world case studies drawn from international relations, markets, policy, politics and elections, and social issues, students learn how to gather, process, manage, transform and analyse complex datasets to derive actionable insights. Emphasis is also placed on visualisation and communication, teaching students how to turn raw data into compelling evidence for decision-making or public dissemination. Students work primarily in R while making steady, hands-on and critical use of AI-based coding assistants and other data-oriented AI tools throughout the course. By the end of the course, students will have completed several cumulative assignments and one final capstone covering data collection, cleaning, analysis, visualisation and communication, with the aim of building a reproducible analysis, interpreting it honestly, and communicating what the evidence shows.

Program Learning Objectives

G114-Global Governance

- Global Mindset and Perspective
- General Management Skills
- Responsible Leadership

Exchange Program

- Critical and Analytical Thinking
- Communication Skills
- Systemic and Strategic Thinking
- Teamwork
- Technological Savviness
- Diversity Understanding and Appreciation
- Self-Development
- Relational Skills
- Lawyering skills and knowledge
- International Relations and Global Governance
- Economic Analysis

GEL23-Bachelor in Global Governance, Economics and Legal Order

- Global Mindset and Perspective
- General Management Skills
- Responsible Leadership
- Critical and Analytical Thinking
- Communication Skills
- Systemic and Strategic Thinking
- Teamwork
- Technological Savviness
- Diversity Understanding and Appreciation
- Self-Development
- Relational Skills
- Lawyering skills and knowledge
- International Relations and Global Governance
- Economic Analysis

Bibliography

Kiko Llaneras, Kiko Llaneras at EL PAÍS (data journalism), EL PAÍS (Website)

Kiko Llaneras, Piensa claro: Ocho reglas para descifraPiensa claro: Eight rules to make sense of the world and succeed in the age of datar el mundo y tener éxito en la era de los datos, Debate, 978-84-18967-07-8 (Book)

Laura Navarro Soler, Laura Navarro Soler at EL PAÍS (visual narratives and data journalism), EL PAÍS (Website)

Borja Andrino, Borja Andrino at EL PAÍS (data journalism), EL PAÍS (Website)

Daniele Grasso, Daniele Grasso at EL PAÍS (data journalism), EL PAÍS (Website)

Marta Ley, Marta Ley at El Confidencial (Data Unit), El Confidencial (Website)

Fundación Cívica, Fundación Cívica (data-driven investigative journalism), Cívica (Website)

Lucía Cobreros Vicente, EsadeEcPol, EsadeEcPol briefs by Lucía Cobreros (dataviz and data work), EsadeEcPol - Center for Economic Policy (Website)

Lucía Cobreros Vicente, Jorge Galindo, Teresa Raigada, Women in STEM: From basic education to the labour market, EsadeEcPol (Insight, 2024) (Document)

Lucía Cobreros Vicente, Lucas Gortazar, Resilient schools: excellence in schools challenged by

poverty, EsadeEcPol (Insight, 2026) (Document)

Edward R. Tufte, The Visual Display of Quantitative Information, Graphics Press (2nd ed., 2001), 978-0961392147 (Book)

Danielle Navarro, Learning Statistics with R, Publicación en abierto (CC BY-SA 4.0) (E-book)

John Burn-Murdoch, John Burn-Murdoch at the Financial Times (Data Points column), Financial Times (Website)

The Economist (equipo de datos), Graphic detail (The Economist data journalism), The Economist (Website)

Activities

Programming exercises

Hands-on coding in R and the tidyverse: building readable, reproducible workflows, reading and wrangling data, and basic debugging.

Analytical exercises

Data exploration and foundational statistical analysis (descriptive statistics, distributions, correlation, moving averages, variance and confidence intervals), focusing on interpretability and application.

Teamwork

Team work on a shared official survey microdataset in Sprint 3, collaborating on collection, wrangling, analysis, visualisation and communication.

Practical exercises with professional software

Working with AI-based coding assistants and other data-oriented AI tools: using them transparently, documenting their use, and critically testing, questioning and correcting their output.

Group presentations

Final team presentation covering the complete workflow (collection, wrangling, analysis and visualisation) and articulating policy recommendations or insights.

Project development and presentation

Final individual capstone project replicating the full pipeline (collection, cleaning, analysis and visualisation) on a self-chosen dataset and question, with a concise report or R Markdown document.

Case study analyses

Challenge-driven, real-world case studies from international relations, markets, policy, politics/elections and social issues, tackled through iterative sprints.

Content

#	Topic
1	Sprint 1 - International relations / markets challenge. Introduction to the course approach using a deliberately scoped, manageable dataset linking international relations and markets, experiencing the complete data workflow end to end in a heavily guided format. Introduction to R and the tidyverse (basic setup and coding structure). Collect and wrangle: reading the dataset from CSV/spreadsheets or open data portals, cleaning and restructuring the data. Visualisation with ggplot2: core structure and first go-to graphs. Deliverable: a short write-up (one or two pages) plus R scripts/notebooks with key insights.

#	Topic
2	Sprint 2 - Politics / electoral challenge. Data focus: aggregated polling. Students gather published poll results ahead of an election (for example from Wikipedia's poll listings). Collect and wrangle: import and tidy published polling tables, handling dates and formats. Incorporation of AI-based coding assistants as a working tool, documenting their use in full and critically assessing their output (checking whether the code does what it claims, spotting errors or invented functions, and fixing them). Analyse: basic statistical concepts and tools introduced from the ground up (means, moving averages, variance and confidence intervals) applied to polling trends, discussing interpretability and the limitations of polling data. Stronger focus on visualisation and narrative for time series, trends over time and uncertainty. Presenting results: how to set up a convincing and rigorous data-based narrative. Deliverable: a short analytical notebook or memo explaining methods, outcomes and data-handling challenges.
3	Sprint 3 - Social / policy challenge (team work). Students form teams to work on a shared dataset: the microdata of a reference survey produced by an official statistical institute, related to a social or policy issue. Collect and wrangle: teams open and prepare the survey microdata for analysis, selecting, cleaning and recoding the handful of variables their question needs. Analyse: exploring relationships between variables using cross-tabulations, group comparisons, series and correlations, reading these patterns carefully and interpreting them for policy insights rather than more advanced modelling. Visualisation and storytelling: clear, well-chosen visuals that highlight geographic or time-based patterns, plus the data-based storytelling techniques needed to reach a policy or social-impact audience. Final presentation and wrap-up: each team gives a formal presentation covering the complete workflow (data collection, wrangling, analysis and visualisation) and articulates policy recommendations or insights drawn from the data. Deliverable: code and a live presentation.

Assessment

Tool	Assessment tool	Category	Weight %
Individual or team exercises	Sprint deliverables: three hands-on deliverables (R scripts/notebooks plus a short write-up), one per sprint, with increasing weight (10%, 15% and 20%). Where AI tools are used, students document how they used them and give a critical assessment of the ou	Ordinary round	45.00%
Final individual project	Final individual project: students select or propose a real-world dataset and question, then replicate the full pipeline (data collection, cleaning,	Ordinary round	30.00%

Tool	Assessment tool	Category	Weight %
	analysis and visualisation). A concise written report or R Markdown document is required, making clear how		
Learning journal	Reflection logs: students keep a brief reflection log or learning diary throughout the course, updated after each session or sprint. Alongside their progress and learning, they record how they used AI tools and, above all, a critical assessment of that us	Ordinary round	15.00%
Participation in program activities	Participation: active, prepared participation in class is valued throughout the course, including in workshops, feedback rounds and team work.	Ordinary round	10.00%
Individual or team exercises	Retake (resit), written piece 1: three short analyses, each combining a reworked sprint output with the matching reflection-log entries, showing the full path from data to result and back, with genuine critical assessment of the data, methods and any AI t	Retake	50.00%
Final individual project	Retake (resit), written piece 2: a separate final project along the lines of the ordinary one, submitted in writing, making clear that the student has followed the full workflow (data collection, cleaning, analysis, visualisation and communication) step b	Retake	50.00%

PROGRAMS

G114-Global Governance Exchange Program (Undergraduates: Law)
G114 Year 1 (Optative)

GEL23-Bachelor in Global Governance, Economics and Legal Order (Undergraduates: Law)
GEL23 Year 3 (Optative)