COURSE DATA

DATA SUBJECT

Code: 36518
Name: Forecasting with Cross-Sectional Data
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1332 - Degree in Business Intelligence and Analytics	Facultat d'Economia	2	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1332 - Degree in Business Intelligence and Analytics	Herramientas y Técnicas de Análisis de Datos	COMPULSORY

COORDINATION

GOERLICH GISBERT FRANCISCO JOSE

SUMMARY

"*Prediction with Cross-Sectional Data*" is a basic training subject assigned to the areas of Quantitative Methods for the Economy and Business and Fundamentals of Economic Analysis that is taught in the first semester of the second year of the Degree in BUSINESS INTELLIGENCE AND ANALYTICS with a total study load of 6 ECTS credits.

Within the framework of a clearly oriented qualification to train business professionals with deep knowledge of the analysis and process of large volumes of information, this is the first subject, out of a set of 4, dedicated to predictive techniques, and it is done in the data framework cross-section and from the simplest possible statistical models. Other more complex data structures and models will be covered in later subjects.

The subject has an eminently practical and computational orientation. For this reason, the theoretical developments will be presented in a brief and schematic way, with special emphasis on their applicability and the intuition of the procedures - the theoretical classes represent 25% of the total teaching hours. The practices will be developed on examples with real data and specific software and the emphasis will be on

the student's replicability of the results, as well as on decision-making in the process of building simple predictive models.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

It is assumed that to successfully complete this subject the student has a basic level of mathematics (the knowledge corresponding to the first and second baccalaureate in the branch of science or social science) and is familiar with the contents of the subject "Exploratory Analysis of Data and Chance, Uncertainty and Inference previously submitted. At the same time, it is assumed that you have acquired some of the basic skills previously programmed in information management, software and usage of ICT.

COMPETENCES / LEARNING OUTCOMES

1332 - Degree in Business Intelligence and Analytics

Acquire basic training that can be used to learn new methods and technologies and to adapt to new situations in academic and professional areas.

Apply methods and techniques of analysis, synthesis and graphical representation by means of software tools.

Apply probability and non-probability sampling.

Be able to analyse and search for information from diverse sources.

Be able to apply analytical and mathematical methods for the analysis of economic and business problems.

Be able to define, solve and present complex problems systemically.

Be able to learn autonomously.

Be able to make autonomous decisions in digital environments characterised by the abundance and dynamism of data.

Be able to plan, organise, monitor and evaluate the implementation of business strategies.

Be able to solve problems and to communicate and spread knowledge, skills and abilities, taking account of the ethical, egalitarian and professional responsibility of the activity of business intelligence and analytics.

Be able to use ICT, both in academia and in professional practice.

Be able to work in a team demonstrating commitment to quality, ethics, equality and social responsibility.

Demonstrate skills for analysis and synthesis.

Distinguish between the explanatory and predictive approaches in data analysis and in business.

Express situations of uncertainty and randomness using mathematical, synthetic and graphic languages.

Know and know how to properly use the appropriate quantitative and qualitative methods to reason analytically, evaluate results and predict economic and financial magnitudes.

Make predictions using appropriate software tools to manage time series.

Reorganise and restructure variables and databases.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.

Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

Use data mining software.

Use software to collect and analyse survey data.

Use software tools to solve problems under uncertainty.

DESCRIPTION OF CONTENTS

1. Introduction

Data structures and variable types.
Response variables and predictors.
Statistical modeling or learning.

2. Simple linear regression model

Estimation.
Ordinary least squares.
Goodness of fit.

3. Nearest Neigbours

General principles

4. Multiple linear regression model

Selection of regressors.
Information criteria.
Prediction.

5. Accuracy measurement in a predictive context.

Training set and test set.
The bias-variance trade-off.

6. Non-linear models

Regression transformation.
Non-linear least squares.

7. Qualitative predictors - Factors

Treatment of qualitative information as predictors in the regression model.

8. Generalized linear models

Binary output.
Linear probability model.
Logit / Probit model.
Classification errors in a binary context.

9. Re-sampling methods

Cross-validation
Bootstrap

10. Regularization

Step-wise regression
Ridge-regression
Lasso-regression

11. Local regression models

Splines
Local regression (lowess)
GAM

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	15,00
Computer classroom practice	45,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	20,00
Preparation of lessons	20,00
Preparation for assessment activities	20,00
Resolution of case studies	20,00
Total hours	**90,00**

TEACHING METHODOLOGY

The development of the subject is structured fundamentally around the differentiated theoretical and practical sessions, with the theoretical sessions being 1 hour a week (25%) and the practical sessions 3 hours a week (75%). The methodology, therefore, emphasizes the most practical and computational aspects of the subject.

In the theoretical sessions the foundations of statistical modeling or learning will be presented with special emphasis on the most intuitive aspects, and relegating the most theoretical and formal aspects to complementary readings.

In the practical sessions the theoretical aspects will be put into practice from a computational point of view, using specific software for this purpose, specifically R, which has become in recent years the reference software in statistical matters and data analysis. The student must use these tools to solve practical questions under the tutelage of the teacher. In this way, a certain role is given to the most practical aspects of the use of computer tools, and which is absolutely essential in modern society.

The predominant teaching method in the theoretical classes will be the participatory master class. This methodology allows the large groups of students to be led in an organized way, offering the advantages of a master class without limiting the participation of the students and the teacher-student interaction. An attempt will be made to encourage participation and discussion in the class, in order to offer students a direct involvement with the content.

In the practical sessions, lasting three hours, the teacher will propose to the students exercises, mainly from real data, for solving problems or case studies that they must solve by applying the techniques mentioned in the theoretical classes as well as the use of appropriate computer programs, performing if appropriate, oral presentations or discussions ..., individually and / or in teams. In the practical classes, projects and situations will be proposed that the students must solve, delivering the results that are determined in a timely manner.Send feedbackHistorySavedCommunity

EVALUATION

The evaluation will consist of two parts:

- **Continuous evaluation** of each student, based on the resolution of frequent exercises, both outside the classroom and in the classroom and the delivery of exercises. Continuous assessment will account for **80%** of the final grade.
- A **final test** that will consist of the resolution of exercises with code on the date established by the faultad for the execution of exams. The final test will account for **20%** of the final grade.

The continuous evaluation will be non-recoverable.

REFERENCES

- James, G.; Witten, D.; Hastie, T. & Tibshirani, R. (2013) An Introduction to Statistical Learning. Springer Texts in Statistics. Springer. New York.

- Kuhn, M. & Johnson, K. (2013) Applied Predictive Modeling. Springer. New York.

- Hanck, C.; Arnold, M.; Gerber, A. & Schmelzer, M. (2019) Introduction to Econometrics with R. UNIVERSITÄT DUISBURG ESSEN. Open-Minded.

- Hastie, T.; Tibshirani, R. & Friedman, J. (2008) The Elements of Statistical Learning. Data Mining, Inference and Prediction. Springer Texts in Statistics. 2nd edition. Springer. New York.

- Berk, R. A. (2016) Statistical Learning from a Regression Perspective. Springer. New York.