

## 27454 - Forecasting Techniques

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 27454 - Forecasting Techniques

**Faculty / School:** 109 - Facultad de Economía y Empresa

**Degree:** 417 - Degree in Economics

**ECTS:** 3.0

**Year:** 4

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

## 1. General information

### 1.1. Aims of the course

The main objective is to provide the students with the knowledge of the different econometric techniques to obtain predictions and analysis of the current situation. The approach of the subject is essentially practical, since it is based on the fact that the student have previously worked the basic econometric techniques after previous Econometrics subjects. In this sense, we can encompass the general objectives as follows:

- ? Development of the concept of prediction and decision making. Types of prediction methods.
- ? Criteria for choosing the best prediction method. Stages in the process of making a prediction.
- ? Study of the components of a time series.
- ? Study of non-parametric prediction techniques.
- ? Study of the compliance or not of the stationarity of a time series
- ? Study of parametric prediction techniques with a seasonal component.
- ? Introduction to non-parametric causal prediction models.
- ? Develop the capacity for the analysis of the economic situation.

These approaches and objectives are aligned with objectives 4 (Quality education) and 5 (Gender equality) of the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda [https://www.un.org/sustainabledevelopment / es /](https://www.un.org/sustainabledevelopment/es/)), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to a certain extent to its achievement.

### 1.2. Context and importance of this course in the degree

The meaning of econometric prediction techniques in the field of economics is to provide to future professionals the possibility of anticipating future scenarios based on probabilities and knowledge of the past with the best appropriate techniques. In this sense, this subject acquires special relevance because it completes the previous training obtained with the previous Econometrics subject, providing it with a specific utility.

### 1.3. Recommendations to take this course

To address this subject, the skills acquired in the previous Econometrics courses are necessary. They let students the role that econometrics plays in economic analysis and acquire the necessary knowledge to formulate, quantify and evaluate an econometric model. Additionally, the students will have previously learned to use Gretl software, as the main tool for the application of the different stages of the econometric methodology.

## 2. Learning goals

### 2.1. Competences

## **Generic skills:**

**CG1.-Capacity for analysis and synthesis.**

**CG2.-Ability to solve problems.**

**CG5.-Ability to apply economic reasoning to decision making. CG6.-Mastery of computer tools and mathematical and statistical language.**

## **Specific competences:**

**CE7.- Identify and anticipate relevant economic problems in relation to the allocation of resources in general, both in the private and public spheres.**

**CE10.- Issue advisory reports on specific situations of the economy (international, national or regional) or sectors thereof.**

**CE14.- Identify the sources of relevant economic information and exploit its content to intervene in the economic reality**

**CE19.- Use information and communication technologies in their professional performance.**

## **2.2. Learning goals**

The student must demonstrate the following results ...

- Differentiate the components of a time series
- Know the statistical and econometric characteristics of a time series. Understand the concepts of persistence, stationarity, seasonality.
- Plan and estimate regular and seasonal univariate ARIMA time series models to obtain short-term predictions. Obtain short-term predictions with non-parametric techniques.
- Know how to propose multivariate models, estimate, and check them in order to obtain predictions with the appropriate model.
- Know how to select the best prediction among all the battery of alternative predictions studied.

## **2.3. Importance of learning goals**

**The student understands, through the econometric subjects, the connection between theory and empirical reality. Part of that reality is getting closer to what may happen in**

**the future. This is precisely the objective of the Forecasting Techniques, since it allows the students to be provided with the necessary instruments for decision-making.**

### **3. Assessment (1st and 2nd call)**

#### **3.1. Assessment tasks (description of tasks, marking system and assessment criteria)**

Regarding the evaluation system, students can choose to take the exam in both possible calls. In the first call, students have two assessment options: through continuous assessment or through the global examination of the subject. In the continuous assessment option, practical work is the fundamental axis of the subject and is based on the work carried out by each student during the course. For this, attendance at theoretical and practical classes is recommended, and the final grade is based on the following aspects:

? Test exercises carried out in class on each of the topics. These tests weigh 25% of the final grade for the work.

? Written presentation of two papers covering, on the one hand, the block of univariate analysis, and on the other, the block of extensions of causal models. For the univariate series analysis, a series chosen by each student will be worked on, demonstrating the implementation of the parametric and non-parametric instruments. For the work on causal models, a shorter work proposed by the teachers will be carried out. The presentation of the works in each block is a mandatory requirement for continuous evaluation. The first job weights the final grade of the work by 50% and the second job by 25%.

The student who does not opt ??for continuous assessment or who does not pass the subject through this procedure or who wants to improve his grade, will have the right to sit for the global test, prevailing, in any case, the best of the grades obtained. This global test consists of a final exam with various theoretical and theoretical-practical questions about the theoretical contents of the course and a computer exam about a practical exercise that each student will have to solve with the help of the Gretl econometric program. In this exam, the theoretical part will score 25 points and the practical part of computer another 75 points. The subject is passed obtaining at least 5 points. This option is presented as a less recommended alternative than continuous assessment, given the characteristics of the subject.

These tests are expected to be carried out in person, but if the health circumstances require it, they will be carried out semi-on-site or online. In the case of online assessment, it is important to highlight that, in any test, the student may be recorded, being able to exercise their rights by the procedure indicated in:

[https://protecciondatos.unizar.es/sites/protecciondatos.unizar.es/files/users/lopd/gdocencia\\_reducida.pdf](https://protecciondatos.unizar.es/sites/protecciondatos.unizar.es/files/users/lopd/gdocencia_reducida.pdf) "

The necessary software will be used to check the originality of the activities carried out. The detection of plagiarism or copying in an activity will imply the rating of 0 points in it.

### **4. Methodology, learning tasks, syllabus and resources**

#### **4.1. Methodological overview**

A combination of:

- Theoretical classes, in which the different techniques will be exposed justifying their use and illustrating their calculation.
- Practical classes of each student through the use of computer tools, based on the knowledge acquired in the master classes.
- Tutorial activities: Since the students will have to apply the different techniques to series proposed by the teacher, the work carried out by the students can be supervised, questions on the contents can be answered theoretical-practical of the subject and / or to carry out concrete practices applied to the theoretical contents.  
Non-classroom activities: individual student work.

#### **4.2. Learning tasks**

The program offered to the students to help them to achieve the expected results including the following activities:

- On-site classes: where the core of the subject will be developed with the methodology outlined above.
- Tutorials: teacher will make available to the student a schedule reserved for tutorials to resolve any doubts that may have remained for the student after the theoretical and / or practical classes.
- Proposed exercises: During the development of the lessons, the teacher will propose different exercises to the students to put into practice the acquired knowledge that they must deliver on the dates indicated by the teacher.

The teaching methodology is planned to be on-site. However, if necessary for health reasons, on-site lessons may be taughted online.

### 4.3. Syllabus

<b>Block I: Introduction</b>	
Topic 1: Prediction concepts in Time Series	<ul style="list-style-type: none"> <li>• Introduction.</li> <li>• Fundamentals of Prediction.</li> <li>• Types of predictions</li> <li>• Prediction assessment.</li> </ul>
<b>Block II: Univariate Analysis</b>	
Topic 2: Nonparametric prediction methods	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Basic components, types of series and methods.</li> <li>• Contrasts of trend and seasonality. Daniel, Kendall, Kruskal-Wallis</li> <li>• Linear, exponential and seasonal moving averages and smoothing.</li> <li>• Filters: Hodrick-Prescott, Kalman.</li> </ul>
Topic 3: Parametric methods: seasonal ARIMA	<ul style="list-style-type: none"> <li>• Introduction and basic concepts</li> <li>• Regular and seasonal differences</li> <li>• Pure seasonal methods</li> <li>• Seasonal multiplicative methods</li> </ul>
Topic 4: Prediction and regressions with autocorrelation problems	<ul style="list-style-type: none"> <li>• Concept and causes of autocorrelation</li> <li>• Autocorrelation detection</li> <li>• Estimation of models with autocorrelation</li> </ul>
<b>Block III: Extensions</b>	
Topic 5: Causal models: non-parametric methods	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Non-parametric methods</li> </ul>

### 4.4. Course planning and calendar

Forecasting Techniques has assigned a teaching load of 3 ECTS credits. The on-site hours include the theoretical explanations, the own practices of each subject and the tutorials. The distribution of the teaching load among the five themes that make up the program of the subject will be adapted to its own complexity. In general terms, an attempt will be made to observe the following distribution of times, in terms of theoretical classes and computer practices

	<b>Topic 1</b>	<b>Topic 2</b>	<b>Topic 3</b>	<b>Topic 4</b>	<b>Topic 5</b>	<b>Total</b>
Theoretical classes	2	4	4	2	3	<b>15</b>
Computer practice	2	4	4	2	3	<b>15</b>
Tutoring	1	1	2	1	2,5	<b>7,5</b>
Total hours	<b>5</b>	<b>9</b>	<b>10</b>	<b>5</b>	<b>8,5</b>	<b>37,5</b>