Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

Class metrial (slides and practical excercises) will be in english and/or spanish

Teachers

Anna López Ratera

Prerequisites

It is advisable to have knowledge on Probability, Statistical Inference and Linear models

Objectives and Contextualisation

This course is devoted to introduce the student to the study of basic time series models and its applications.

A time series is a collection of observations of a random phenomenon evolving over time ( or any other ordered magnitude).

Time series appear in almost all fields of application. Hence, its analysis and modelling of the underlying random phenomenon is of crucial theoretical and applied importance.

The ultimate goal is the modelling of the mechanism that generates the data, perform model diagnostics and predict future values.

Competences

- Actively demonstrate high concern for quality when defending or presenting the conclusions of one's work.
- Develop critical thinking and reasoning and know how to communicate it effectively, both in one's own languages and in a third language.
• Effectively use bibliographies and electronic resources to obtain information.
• Formulate hypotheses and devise strategies to confirm or reject them.
• Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
• Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
• Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
• Use computer applications for statistical analysis, numeric and symbolic calculus, graphic display, optimisation or other purposes to experiment with Mathematics and solve problems.
• When faced with real situations of a medium level of complexity, request and analyse relevant data and information, propose and validate models using the adequate mathematical tools in order to draw final conclusions.

Learning Outcomes

1. Actively demonstrate high concern for quality when defending or presenting the conclusions of ones work.
2. Data analysis.
3. Develop critical thinking and reasoning and know how to communicate it effectively, both in ones own languages and in a third language.
4. Devise predictions and scenarios.
5. Effectively use bibliographies and electronic resources to obtain information.
6. Filter and store information on digital supports.
7. Identify relationships or associations.
8. Identify the stages of problems that require advanced technologies.
9. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
10. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
11. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
12. Use graphs to summarise multivariate data and show dynamical pictures.
13. Use multivariate data summary indexes, time series and all other advanced techniques.
14. Use quantitative thinking and reasoning.
15. Use statistical programs to calculate sample sizes.
16. Use statistical programs to manage databases.
17. Use statistical programs to obtain summarised indexes of study variables.

Content

3. ARIMA Models I. MA(q) and AR(p). Correlograms.Yule-Walker equations. The difference operator. Relationship between MA and AR models ACF and PACF.
4. ARIMA Models II. ARMA(p,q). Parameter estimation: method of moments, MLE, unconditional least squares, conditional least squares. ARIMA(p,d,q) and SARIMA. Box-Jenkins methodology. Prediction.

Methodology
During the theoretical lessons (2 H/week) the fundamental results will be presented, and computer exercises will be developed.

During the lab hours (with laptop) students will solve by themselves real data problems. The programming language used is R.

**Activities**

<table>
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<th>Learning Outcomes</th>
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<td>Lab sessions</td>
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<td>1.2</td>
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<tr>
<td>Type: Autonomous</td>
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<td>Personal Work</td>
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<tr>
<td>Real data analysis</td>
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<td>0.4</td>
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**Assessment**

During the course, students must handle computer labs. There will 2 partial exams, with both theoretical and practical questions.

In order to pass the course, a minimum of 3/10 in both practice and theory is required, and an average over 5/10.

**Assessment Activities**

<table>
<thead>
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<th>Hours</th>
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<th>Learning Outcomes</th>
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<td>2, 1, 3, 13, 14, 11, 10, 9</td>
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**Bibliography**


