UNIVERSIDAD PONTIFICIA ICAI ICADE COMILLAS MADRID

COURSE SYLLABUS
COURSE 2017-18

TRAINING COMPLEMENT DESCRIPTION

TRAINING COMPLEMENT DATA INFORMATION	
Título	Forecasting methods and applications
Planificación temporal	Semester 1
Créditos ECTS	3
Lengua	English

Instructors	
Name	Antonio Muñoz San Roque

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Chapter 1. Introduction and fundamental concepts
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Chapter 3. ARIMA models
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Chapter 5. Intervention Analysis and Outlier Detection
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Chapter 6. Advanced Methods	
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6.2	Nonlinear models
6.3	Combination of forecasts

COMPETENCES

General competences

1. Having acquired advanced knowledge and demonstrated, in the context of scientific, technological or highly specialized research, a solid and specialized understanding of theoretical and practical aspects as well as the work methods in one or more fields of study

Specific competences

1. Mastering the techniques, methods and/or tools needed to cover a research topic in a specific sector or technological context.

Learning Outcomes

By the end of the course students should be able to:

RA1.
RA2. Identify and describe the nature and fundamental characteristics of time series. Identify and describe the structure and fundamental characteristics of the basic models used in time series forecasting.
RA3. Determine the most appropriate techniques to be used for the identification of the basic models used in time series forecasting.
RA4. Determine the most appropriate techniques to be used for the validation and diagnosis of the basic models used in time series forecasting.
RA5. Demonstrate a strong practical experience in the identification, estimation and validation of models for predicting time series using statistical software.

TEACHING METHODOLOGY

General methodological aspects

The best way of gaining a full understanding of forecasting techniques is implementing them and facing real challenges. Consequently, all the proposed activities focus on providing students with the tools they require to be able to successfully develop a forecasting model by the end of the term.

In-class activities

- **Lectures and problem-solving sessions (12 hours)**: The lecturer will introduce the

fundamental concepts of each chapter, along with some practical recommendations, and will go through worked examples to support the explanation. Active participation will be encouraged by raising open questions to foster discussion and by proposing short application exercises to be solved in class either on paper or using a software package.
• **Lab sessions (16 hours):** Under the instructor's supervision, students, divided in small groups, will apply the concepts and techniques covered in the lectures to real problems and will become familiar with statistical software tools.
• **Final project presentations (2h):** students will perform a presentation of their final project to the rest of the class. During the presentation, the instructor and students may ask questions that should be answered by the speakers.
• **Tutoring** for groups or individual students will be organized upon request.
Out-of-class activities
• Personal study of the course material and resolution of the proposed exercises (24 hours).
• Lab results analysis and report writing (24 hours).
• Development of a final project in small groups during the last third of the course (12 hours).

ASSESSMENT AND GRADING CRITERIA		
Assessment activities	**Grading Criteria**	**Weight**
Participation in class	▪ Understanding of the theoretical concepts. ▪ Active participation.	10%
Lab reports	▪ Application of theoretical concepts to real problem-solving. ▪ Critical analysis of numerical results. ▪ Ability to use and develop computer vision software. ▪ Written communication	30%

	skills.	
Final project	▪ Problem analysis. ▪ Quality of the proposed solution. ▪ Critical analysis of numerical results. ▪ Oral presentation and written communication skills.	60%

BIBLIOGRAPHY

- Notes prepared by the lecturer (available in Moodle).
- "Time series analysis. Univariate and Multivariate Methods". William W.S. Wei. 2nd edition. Pearson Addison Wesley. 2006.
- "Introduction to Time Series and Forecasting". Peter J. Brockwell and Richard A. Davies. Springer. 1996
- "Introduction to Time Series Analysis and Forecasting". Douglas C. Montgomery, Cheryl L. Jennings and Murat Kulahci. John Wiley & Sons, Inc. 2008.
- "Forecasting with Dynamic Regression Models". Alan Pankratz. Wiley-Interscience. 1991
- "Time Series Analysis: Forecasting & Control". 3ª Ed. G. Box, G.M. Jenkins, G. Reinsel. Prentice Hall. 1994
- "Análisis de series temporales". Daniel Peña. Alianza Editorial. 2005