DEGREE CURRICULUM

ST IN SPATIAL STATISTICS

Coordination: COMAS RODRIGUEZ, CARLOS

Academic year 2019-20

Subject's general information

<table>
<tr><td>Subject name</td><td>ST IN SPATIAL STATISTICS</td></tr>
<tr><td>Code</td><td>111002</td></tr>
<tr><td>Semester</td><td>ANUAL CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Master's Degree Erasmus Mundus in Spatial and Ecological Modelling in European Forestry</td><td>2</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>5</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRAULA</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>2</td><td>3</td></tr>
<tr><th>Number of groups</th><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>COMAS RODRIGUEZ, CARLOS</td></tr>
<tr><td>Department</td><td>MATHEMATICS</td></tr>
<tr><td>Language</td><td>English</td></tr>
<tr><td>Distribution of credits</td><td>Total: 5
Theoretical: 70%
Practical: 30%</td></tr>
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Teaching staff

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
COMAS RODRIGUEZ, CARLOS	carles.comas@matematica.udl.cat	5	

Learning objectives

The course will introduce the students to the main statistical techniques used to analyse and model spatially explicit forest data. The student will be able to analyse and model forest point patterns of trees (point processes) and continuous forest variables (geostatistics)

Significant competences

General Competences

- Capacity for mathematical modelling, calculation and simulation using real forest datasets.
- Capacity to apply the knowledge acquired for solving problems in new and unfamiliar situations within broader and more multidisciplinary contexts, and to be capable of integrating this knowledge.

Strategic Competences of UdL

- Command of a foreign language.

Cross-disciplinary Competences

- Capacity of planning and organizing the personal work.
- Capacity to convey information, ideas, problems and solutions to both a specialized and no specialized public.
- Capacity to conceive, design and implement projects and/or contribute to new solutions, using engineering tools.
- To be motivated for the quality and steady improvement.

Basic Competences

- Being able to integrate knowledge and handle the complexity to formulate judgments based on information that being incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
- Knowing how to communicate their conclusions -and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously

Specific competences

- Capacity to model and analyse real forest datasets using statistical tools related to point processes and geostatistical analysis.
- Capacity for incorporating spatil forest statistics to manage real forest scenarios
- Capacity to use specific software tools to analyse and model such datasets.

Subject contents

1) Introduction to spatial statistics and practical examples

2) Spatial point patterns in forest systems

3) Basic theory and model definition of spatial point processes

4) Introduction to geostatistical analysis in forest systems

5) R tools to analyse point patterns and geostatistical data

6) Practical case studies

Methodology

Traditional (face-to-face), blended learning. The course will include lectures, group discussions and seminars.

The course will be based on:

- Lectures and discussions based on the latest scientific literature and research programs

- Seminars and debates about spatial statistics and forest systems (modelling, management, etc.)

- Group work: practical exercises based on case studies

Development plan

Scheduling is by agreement with the students at the beginning of the course.

Evaluation

Grading will be based on (*i*) participation on lectures, seminars and debates, (*ii*) completion of practical exercises and (*iii*) public presentation of the results from exercises

Bibliography

(additional literature will be supplied during the course)

Baddeley, A., Rubak, E. and Turner, R. (2015). Spatial Point Patterns: Methodology and Applications with R. London: Chapman and Hall/CRC Press.

Comas, C. and Mateu, J. (2007) Modelling Forest Dynamics: A Perspective from Point Process Methods. *Biometrical Journal*, 49, (2), 176-196.

Comas, C. (2009) Modelling forest regeneration strategies through the development of a spatio-temporal growth interaction model. *Stochastic Environmental Research and Risk Assessment.* 23 (8), 1089-1102.

Comas, C., Mateu, J., and Delicado, P. (2011) On tree intensity estimation for forest inventories: some statistical issues. *Biometrical Journal.* **53**(6). 994-1010.

Cressie, N. (1993). Statistics for Spatial Data. Wiley, New York.

Diggle, P.J. (2013). Statistical Analysis of Spatial and Spatio-Temporal Point Patterns, Third Edition (Chapman & Hall/CRC Monographs on Statistics & Applied Probability).

Fortin, M.J. and Dale R.T. (2005) Spatial analysis: a guide for ecologists. Cambridge University Press.

Illian J, Penttinen A., Stoyan H., Stoyan D. (2008) Statistical Analysis and Modelling of Spatial Point Patterns. New York: John Wiley & Sons.