Universitat de Lleida

DEGREE CURRICULUM

ST IN METHODS IN HAZARD ANALYSIS AND RISK ASSESSMENT

Coordination: VEGA GARCÍA, CRISTINA

Academic year 2021-22

Subject's general information

Subject name	ST IN METHODS IN HAZARD ANALYSIS AND RISK ASSESSMENT
Code	111003
Semester	ANUAL CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Master's Degree Erasmus Mundus in Spatial and Ecological Modelling in European Forestry	2	OPTIONAL	Attendance-based
Master's Degree Erasmus Mundus in Spatial and Ecological Modelling in European Forestry		OPTIONAL	Attendance-based

Course number of credits (ECTS)	3
Type of activity, credits, and groups	

Activity type	PRALAB	TEORIA
Number of credits	1.8	1.2
Number of groups	1	1

Coordination	VEGA GARCÍA, CRISTINA
Department	AGRICULTURAL AND FOREST ENGINEERING
Important information on data processing	Consult this link for more information.
Language	English

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
RODRIGUES MIMBRERO, MARCOS	r.marcos.1980@gmail.com	3	
VEGA GARCÍA, CRISTINA	cristina.vega@udl.cat	0	

Subject's extra information

It is recommended, although not mandatory, being knowledgeable on the basics of R, statistical modeling and Geographical Information Systems

Learning objectives

The course will explore several conceptual frameworks for risk assessment of different natural hazards, emphasizing those relevant in the context of forestry and resource management.

The objective of the course is therefore to provide the student with the necessary knowledge to manipulate spatial information and implement spatial techniques from GIS and spatial data with special focus their application to hazard modelling and risk assessment.

Students are provided with a range of applied statistical tools and modelling frameworks that can be used in professional life for the analysis of spatial data.

Competences

On completion of this class, students will:

1. Become familiar with the most widespread frameworks in modeling natural hazards, their likelihood and potential consequences.
2. Be able to select the appropriate techniques, in terms of modeling approaches, to address forestry-related hazards.
3. Implement and validate the main interpolation and spatial regression methods.
4. Interact with spatial data, both as a source of information and as a result of the analysis process.
5. Suggest management strategies based on the evaluation of potential hazard risk.

Subject contents

Module 1: Risk Assessment methods in the field of natural hazards

- Hazards and threats to forest resources and landscapes
- Definitions
- Basics of risk assessments
- Conceptual approaches in risk modeling

Module 2: Statistical modeling of hazard probability and danger:

- Introduction to regression analysis.
- Generalized Linear and Additive Models (GLM & GAM).

- Random sampling and model validation.
- Tree based models: CART and random forest.
- Presence-only models

Module 3: Methods for vulnerability assessment and risk evaluation

- Resources exposure
- Landscape valuation
- Resilience and forest recovery

Module 4: Case studies

- Integrated risk assessment of wildfires.
- Species distribution in a climate change context.

Methodology

The teaching/learning methodology is based on an eminently practical model based on problem solving with work on computer, so that the student is able to gradually assimilate theoretical content on a real application environment.

The contents to be developed within each of the modules will be introduced through brief theoretical presentations in which the essential concepts will be exposed; allowing the proper performance of the corresponding practical sessions.

The completion of each of the modules will involve a synthesis exercise that allows, on the one hand, to assimilate in a global way the contents taught in the module and, on the other hand, to assess the achievement of the objectives of the course.

Development plan

The course will consist on face-to-face lectures and a number of workshops sessions in which different topics will be presented and solved. Several projects will be proposed in a combination of face-to-face lessons and standalone work.

Evaluation

The evaluation of the course will be derived completely from practical exercises. Each student will deliver a portfolio integrating the practical exercises proposed on each module of the course.

Bibliography

Birkmann, J., Kienberger, S., Alexander, D.E., 2014. Introduction Vulnerability: a key determinant of risk and its importance for risk management and sustainability, in: Birkmann, J., Kienberger, S., Alexander, D.E. (Eds.), Assessment of Vulnerability to Natural Hazards. Elsevier, pp. ix–xiii. https://doi.org/https://doi.org/10.1016/B978-0-12-410528-7.02001-4

Bivand, R.S.; Pebesma E; Gómez-Rubio, V. (2013). Applied Spatial Data Analysis with R (Use R!). Springer; 2nd Edition. 424 pp.

Brundson C. and Comber, L. (2015). An Introduction to R for Spatial Analysis and Mapping. SAGE Publications Ltd. 360 pp.

Ofungwu, J., 2014. Statistical Applications for Environmental Analysis and Risk Assessment.

Rougier, J., Sparks, S., & Hill, L. (Eds.). (2013). Risk and Uncertainty Assessment for Natural Hazards.

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