



Universitat de Lleida

DEGREE CURRICULUM

RISCOS NATURALS

Coordination: BALASCH SOLANES, JOSE CARLOS

Academic year 2022-23

Subject's general information

Subject name	RISCOS NATURALS			
Code	102459			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Double degree: Bachelor's degree in Forest Engineering and Bachelor's degree in Nature Conservation	4	OPTIONAL	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRACAMP	PRALAB	TEORIA
	Number of credits	2	1	3
	Number of groups	1	1	1
Coordination	BALASCH SOLANES, JOSE CARLOS			
Department	ENVIRONMENT AND SOIL SCIENCES			
Important information on data processing	Consult this link for more information.			
Language	Catalan: 67% Spanish: 33%			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BALASCH SOLANES, JOSE CARLOS	josepcarles.balasch@udl.cat	3,4	
LOPEZ ALONSO, RAUL	raul.lopez@udl.cat	2	
MASICH POLO, JOSEP MARIA	josepmaria.masich@udl.cat	,6	

Learning objectives

The overall objective of the course is to provide students with the basic knowledge to understand the dynamics and operation of the main types of environmental risks (natural and anthropogenic) that currently affect and have affected our society in the past and generate the ability to predict its occurrence in space and time in the future and develop comprehensive or specific protection plans for the various types of risk. Although the scope of the subject addresses all the risks in the world, a greater temporary dedication will be invested to the most active processes and risks in our regions and, by extension, to the geographical characteristics of the Catalan territory.

In order to achieve the objective, the student will acquire knowledge about the nature, magnitude, spatial dimension and frequency of the different types of risk and about the modern tools and methodologies of analysis and work for their monitoring and control.

From an applied point of view, the student will learn to integrate the knowledge provided by carrying out practical work on some type of risk in our territory and proposing measures to act in an emergency situation in according to the legal framework.

Competences

Basic skills

CB1. That students have demonstrated to possess and understand knowledge in an area of study that is based on the general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects involving knowledge from the forefront of their field of study

CB2. That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study

CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific, or ethical issues.

CB4. That students can convey information, ideas, problems and solutions to both specialized and non-specialized audiences

CB5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

Transversal skills

CT3. Acquire training in the use of new technologies and information and communication technologies

CT5. Acquire essential notions of scientific thought

CT6. Apply the gender perspective to the tasks of the professional field

Global competencies

CG1. Demonstrate ability to plan and organize personal work.

CG2. Develop learning skills to improve their training autonomously.

CG3. Work in a team, with a multidisciplinary vision and with the ability to make a rational and effective distribution of tasks among team members.

CG4. Understand and express themselves with the appropriate terminology.

CG5. Be able to search for and use available sources of information related to professional activity.

CG6. Analyze specific situations, define problems, make decisions and implement action plans in the search for solutions.

CG7. Have a critical and innovative spirit.

CG8. Analyze and assess the environmental, social and ethical implications of professional activity.

CG9. Develop work skills and interpersonal relationships in a work environment and know the organization, structure of a company or institution.

CG10. Respect the fundamental rights of equality between men and women, the promotion of human rights and the values of a culture of peace and democratic values.

Specific skills

CE1. Understand the biological, geological, chemical, physical and mathematical foundations necessary for the development of professional activity.

CE2 Describe, quantify and evaluate the natural resources of a territory and determine its resilience.

CE3 Use and apply analysis tools to inventory resources and represent their spatio-temporal distribution in territorial information systems. .

CE5 Identify abiotic and biotic processes, both ecological and socio-economic, as well as the degradation processes that affect natural systems and resources.

CE7 Analyze and interpret the effect of disturbances and changes that may result from global change and, in particular, climate change, on natural systems and the affected risks

CE8 Apply the necessary conservation and restoration techniques for the improvement of natural resources and / or systems depending on the degree of alteration of an ecosystem.

CE10 Integrate global change in the planning and orderly use of resources to ensure the sustainable use of natural heritage, in particular species and ecosystems, their conservation, restoration and improvement and prevent the net loss of biodiversity.

CE12 Design, execute and monitor projects, plans and programs for the conservation and restoration of biodiversity and geodiversity in all kinds of ecosystems through the application of appropriate technologies.

CE13 Demonstrate knowledge of environmental policy and local, regional, state, community and international legislation currently in force, as well as its application in the framework of nature conservation.

Own competences obtained through the subject

1. Recognize the main types of risks that affect the territory and measure the magnitude of potential damage to exposed populations

2. Relate the magnitude of the episodes with their temporal frequency with the inclusion of historical information

3. Interpret thematic cartography of potential risk zoning prepared by the competent bodies and draw up their own

4. To simulate in a basic way with numerical models the dynamics of natural and anthropic processes and to

evaluate the uncertainty of the results

5. Assess and identify risk situations related to spatial planning, urbanization and construction of road infrastructure and others

6. Prepare work and studies for potential risk analysis and determination of measures for prevention and action in the event of an emergency

7. Assess the impact on natural hazards of the predicted scenarios of climate change and anthropogenic activities, with special emphasis on land uses

Learning outcomes

Know the environmental characteristics of the high mountains

Understand human interference in natural dynamics at various scales

Reflect on natural resources and their evolution

Ability to properly manage resources

Ability to work in the field of physical geography, and in particular in the study of water processes

Knowledge of regional and global environmental risks

Knowledge of the main elements and processes related to water in Catalonia, the Iberian Peninsula and the Mediterranean region

Identify the areas most at risk of flooding

Characterize global climate change and its local repercussions

Subject contents

BLOCK I: INTRODUCTION

Concept of risk and main factors involved (danger, exposure, vulnerability)

Classification of risk types

The concept of risk in today's society. Costs of natural disasters.

Evolution of the concept of risk and natural disasters throughout history (myths and religion). The Lisbon Earthquake

The risks to climate change and global change

BLOCK II: HAZARD ANALYSIS

Risks of internal geodynamics

Volcanism

Seismic risk and earthquakes

Risks of external geodynamics

Punctual mass movements

Karst regions

Geotechnics: subsidence and subsidence, expansiveness of clays

Coastal strip: landslides and tsunamis

Meteorological risks

Droughts

Heat and cold waves and wind storms

Avalanche

Floods

Dam regulation and flow routing. Hyperconcentrated flows. Torrential flows

Biological risks

Pests and epidemics

BLOCK III: TOOLS FOR RISK ANALYSIS AND PREVENTION

Concept of structural and non-structural measures

Historical information and background of the episodes: sources, heuristics, hermeneutics

Risk frequency analysis. Time series analysis. Extreme value distribution functions. Analysis of stationary and non-stationary systems.

Risk zoning and mapping. Risk maps. Spatial planning

Climate teleconnections

Legislation on risks, emergencies and self-protection

BLOCK IV: ACTION MEASURES AND EMERGENCY ASSESSMENT

Forecast and alert systems

Prediction and monitoring systems

Civil protection systems. Territorial organization and competencies. Emergency action plans. Preparation of action plans

Psychology applied to emergency crises

BLOCK V: ANALYSIS OF CASE STUDIES

Flood camping "Las Nieves" in Biescas (Huesca, 1996)

The break of the Vajont dam (Alps of Italy, 1963)

The floods of 1982 in Catalonia and Valencia

Eruption of the Nevado del Ruiz and lahar d'Armero (Colombia, 1985)

Methodology

The training activities of this subject are the following:

- Theory classes divided into master classes and discussion seminars to explain
 - a) the fundamentals of risks and the tools of analysis and action on emergencies (prevention, crisis and rehabilitation) (Blocks I to IV)
 - b) real cases on recognized catastrophic situations (Block V)
- Classroom practices with mapping of natural, technological and anthropic risks
- Practices with models of simulation of fluvial floods and of frequency of extreme phenomena
- Review of regional and state emergency plans for different types of risk
- Workshop to visit areas affected by the risk of flash floods (Ondara, Sion and Corb river basins)
- Workshop to visit areas affected by landslides and slope stability problems (Trempt basin) (optional)
- Invited conferences (optional) of professionals working in official centers in activities related to natural and anthropogenic risks

Development plan

The subject is initially considered with face-to-face monitoring of theoretical and practical activities in the classroom. Therefore, the participation and follow-up of the classes and the activities related to them will be valued

Classes based on the presentation and discussion of real catastrophe cases (Block V) will be located after the theoretical explanations of the type of risk or related risks.

External activities will be proposed for visiting workshops in some well-studied type areas for certain types of risk (Ondara, Trempt basin).

Students will have to carry out individually a practical work consisting of the writing of an analytical study on a risk in the peninsular or European territory or on an emergency plan for application in case of real situation of risk. For the realization of the works will have of sessions of tutorship of the professors of the asignatura. The work will be presented in writing in the final section of the semester and there will also be an oral public presentation in class in a short format.

Information on data protection in the audiovisual register in the subject Natural Hazards

In accordance with current regulations on the protection of personal data, we inform you that:

- The organisation responsible for the recording and use of the image and voice is the University of Lleida - UdL (contact details of the representative: General Secretariat. Plaza Víctor Siurana, 1, 25003 Lleida; sg@udl.cat; contact details of the data protection officer: dpd@udl.cat).

- The recorded images and voices shall be used exclusively for teaching purposes.
- The recorded images and voices shall be saved and preserved until the end of the current academic year, and shall be destroyed in accordance with the terms and conditions specified in the regulations on the preservation and disposal of administrative documents of the UdL, and the documentary evaluation tables approved by the Generalitat de Catalunya (<http://www.udl.cat/ca/serveis/arxiu/>).
- The voices and images are considered necessary to teach this subject, and teaching is a right and a duty of the teaching staff of the Universities, which they must exercise under academic freedom, as provided for in article 33.2 of the Organic Law of Universities (Ley Orgánica de Universidades) 6/2001, of December 21. For this reason, the UdL does not need the consent of the students to register their voices and images with the sole and exclusive purpose of teaching in this particular subject.
- The UdL shall not transfer the data to third parties, except in the cases strictly provided for by the Law.
- The student can access their data; request correction, deletion or portability; object to its processing and request its limitation, as long as it is compatible with the purposes of teaching, by writing to dpd@udl.cat. You can also submit a complaint to the Catalan Data Protection Authority, via a mail to its website (<https://seu.apd.cat>) or other non-electronic means.

Evaluation

The evaluation of the subject can be face-to-face, non-face-to-face or mixed.

The evaluation of the concepts acquired is based on the weighted grade of the following evaluation activities:

- Written test on basic knowledge of the subject (with a weight of 40% in the global note)
- Attendance and participation in the proposed activities and delivery of the 5 finished and coherent classroom practices (20%)
- Individual practical work on the specific analysis of a risk in the territory or on action plans in case of emergency (40%)

Evaluation	Pes de la nota en el total
Written theoretical exam	40%
Delivery of practical exercises and reports	20%
Practical report on a real case of flood risk analysis	40%

Students who combine their degree with a full time job have the right to ask for alternative assessment within 5 days after the beginning of the semester.

If plagiarised material is detected, we will apply what is established in the 'Regulations for the Assessment and Grading of Student Learning in UdL Bachelor's and Master's Degrees'

Bibliography

GENERAL REFERENCES

Ayala-Carcedo, F.J. & Olcina, J. (2002): Riesgos naturales. Ariel Ciencia, Madrid, 1512 p.

Balasch, J.C. (2017): Les inundacions a Catalunya: el coneixement actual, la informació del passat i escenaris futurs. XXIII Jornades de Meteorologia Eduard Fontseré. Associació Catalana de Meteorologia (ACAM) Barcelona,

24-26 novembre de 2017, pp. 121-127

Beven, K & Hall, J. (eds.) (2014): Applied Uncertainty Analysis for flood Risk Management. Imperial college Press

Benito, G. & Díez Herrero, A. (2004): Riesgo Naturales y Antrópicos en Geomorfología. VIII Reunión Nacional de Geomorfología (Vol. II). Sociedad Española de Geomorfología - CSIC Centro de Ciencias Medioambientales, Madrid, 543 p.

Bonachea, J.; Bruschi, V.M.; Fernández-Maroto, G.; Remondo, J.; González-Díez, A.; Díaz de Terán, J.R. & Cendrero, A. (2014): Geomorphic Hazards in Spain. In Gutiérrez, F. & Gutiérrez, M. (eds.): Landscapes and Landforms of Spain. Springer Sciences, pp. 319-345.

Calvo García-Tornel, F. (2001): Sociedades y territorios en riesgo. Ediciones del Serbal, col·lecció La Estrella Polar nº 31. Barcelona, 186 p.

Díez Herrero, A.; Lain, L. & Llorente, M. (eds.) (2008): Mapas de peligrosidad por avenidas e inundaciones. Guía metodológica para su elaboración. Serie Riesgos Geológicos/Geotecnia nº 1. Instituto Geológico y Minero de España, Madrid, 190 p.

French, R.H. & Miller, J.J.(eds.) (2012): Flood Hazard Identification and Mitigation in Semi- and Arid Environments. World Scientific, Singapore, 224 p.

Galindo, I.; Lain, L & Llorente, M. (eds.) (2008): El estudio y la gestión de los riesgos geológicos. Instituto Geológico y Minero de España, Madrid, 208 p.

O'Connor, J.E; Grant, G.E.and Costa, J.E. (2002): The Geology and Geography of Floods. In House, P.K.; Webb, R.H.; Baker, V.R. & Levish, D.R. (eds.): Ancient floods, Modern Hazards: Principles and Applications of Paleoflood Hydrology. Water Science and Application Volume 5. American Geophysical Union, pp. 359-385

Ruiz-Bellet, J.L.; Balasch, J.C.; Tuset, J.; Barriendos, M.; Mazón, J. & Pino, D. (2015): Historical, hydraulic, hydrological and meteorological reconstruction of 1874 Santa Tecla flash floods in Catalonia (NE Iberian Peninsula). Journal of Hydrology, 524: 279-295.

Smith, K. & Ward, R. (1998): Floods. Physical Processes and Human Impacts. J. Wiley, Chichester (UK), 382 p.

MAPS OF INSTITUT CARTOGRÀFIC I GEOLÒGIC DE CATALUNYA (ICGC) ON NATURAL HAZARDS

"Mapa geològic de catalunya 1:25.000. Geotrell VI. Mapa per a la prevenció dels riscos geològics"

"Mapa de zones d'allaus de Catalunya 1:25.000"