



Universitat de Lleida

DEGREE CURRICULUM  
**ENVIRONMENTAL RISKS**

Coordination: BALASCH SOLANES, JOSE CARLOS

Academic year 2021-22

## Subject's general information

<b>Subject name</b>	ENVIRONMENTAL RISKS			
<b>Code</b>	101163			
<b>Semester</b>	2nd Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	Degree	Course	Character	Modality
	Bachelor's Degree in Geography	3	COMPULSORY	Attendance-based
<b>Course number of credits (ECTS)</b>	6			
<b>Type of activity, credits, and groups</b>	<b>Activity type</b>	<b>PRAULA</b>	<b>TEORIA</b>	
	<b>Number of credits</b>	1	5	
	<b>Number of groups</b>	1	1	
<b>Coordination</b>	BALASCH SOLANES, JOSE CARLOS			
<b>Department</b>	ENVIRONMENT AND SOIL SCIENCES			
<b>Teaching load distribution between lectures and independent student work</b>	Els 6 crèdits corresponen a una càrrega docent de 150 hores distribuïda com segueix:  60 hores de classe presencials 90 hores de treball autònom			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			
<b>Language</b>	Català  Moltes lectures i treballs recomanats en la bibliografia estan publicats en anglès.			
<b>Distribution of credits</b>	Els 6 crèdits es distribueixen entre 5 de teòrics (25 classes de teoria i seminaris) i 1 de pràctic (5 classes de pràctiques dirigides).  El conjunt dels temes docents es comparteix en 5 blocs amb el percentatge següent:  Bloc I. Introducció 10% Bloc II. Anàlisi de la perillositat 45% Bloc III. Eines per a l'anàlisi del risc i la prevenció 15% Bloc IV. Mesures d'actuació i per pal·liar les emergències 10% Bloc V. Anàlisi de casos reals 20%			

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

## 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 according to the legal framework.

## Competences

*CB2* Apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study.

*CG1* Assess the mechanisms of interaction of society with the environment

*CG3* Characterize the spatial diversity of the territories

*CE1* Manage and use the methods and techniques of analysis and interpretation of statistical sources

*CE4* Handle topographic cartography information

*CE11* Acquire the habits of analysis of geographical data in order to proceed to their orderly and reasoned presentation, either by means of an oral presentation or a written report

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

*CT5* Acquire essential notions of scientific thinking

### 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

## Biological risks

Forest fires

Pests and epidemics

## Technological risks

Risk of leakage and contamination of chemicals

Risk of nuclear and radiological leakage

## Anthropogenic risks

Mass attacks and terrorism

Armed conflicts

Radiological, chemical and biological warfare (NBQ)

## 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)

The Chernobyl Accident (Ukraine, 1986) and Fukushima (Japan, 2011)

## 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
- Individual research project on risk analysis
- 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 (Trempe 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

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If the epidemiological circumstances require it and so the authorities establish it, the teaching will be virtual (on line) with theoretical and practical classes through videoconference with the platform of the virtual campus.

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

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

A contingency plan is established in the event of not being able to enhance the external field trips which will consist of preparing a virtual tour via videoconference where the technical stops of the visit will be explained and illustrated in detail, trying to replace everything. real experience possible.

Students will have to carry out individually a practical research work (project) 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 Environmental 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 completed and correct classroom practices (20%)
- Individual practical research work (project) 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
Writwd theoretical exam	40%

Delicvery of practical exercises and reports	20%
Practical research project 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. For information, please send an e-mail to [academic@lletres.udl.cat](mailto:academic@lletres.udl.cat) or ask for information at the Faculty's office (Secretaria de la Facultat de Lletres).

## Bibliography

### GENERAL REFERENCES

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### MAPS OF INSTITUT CARTOGRÀFIC I GEOLÒGIC DE CATALUNYA (ICGC) ON RISKS

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



