SYLLABUS

1. Course description

Degree:	**Environmental Sciences**
Course:	**Natural Hazards**
Department:	**Physical, Chemical and Natural Systems**
Year:	**2015-16**
Term:	**Fall**
ECTS credits:	**4.5**
Course:	**3rd year**
Type:	**Basic**
Language:	**English**

Course Model:	**C1**
a. Basic learning (EB):	**50 %**
b. Practical learning (EPD):	**50 %**

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2. Lecturers

2.1. Coordinator: Dr. Manuel Díaz Azpiroz

2.2. Teachers	
Name:	**Manuel Díaz Azpiroz**
School:	**Experimental Sciences**
Department:	**Physical, Chemical and Natural Systems**
Area:	**Internal Geodynamics**
Category:	**Senior Lecturer**
Office hours	**To be defined**
Office	**22.02.13**
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Phone:	**954348351**

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3. Objectives and previous requirements

3.1. Main objectives

At the end of the course, the students should be able to:

- Identify potential natural hazards that can affect an area.
- Map an area in terms of probability of occurrence and possible consequences of different natural processes.
- Write a report oriented to land-use planning
- Understand and use the main monitor, prediction and warning tools of risk assessment.

3.2. Contributions to the degree in Environmental Sciences

This course is included in a broader Subject called "Environmental Management, Conservation and Planning – Land-use planning". It is related to other geological and non-geological courses that students can follow throughout the degree: Geology (1st), Hydrogeology and Soil Science (2nd), Geographical Information Systems (2nd), Water and Soil Resources Management (3rd), Land-use planning (3rd), Field Geology (4th), Geomorphology (4th), Urban environment management (4th).
The course will focus on the main natural processes that may cause hazards to humans and the environment, what their consequences are and how we can minimise them. A good knowledge of natural hazards occurrence and a real distribution is crucial for land-use planning and improvement of society education and warning. It should provide students with the basis for critically evaluating future approaches to risk assessment.

3.3. Recommendations or previous requirements

No previous requirements are needed. However basic Maths, Physics and Geology skills (acquired through 1st and 2nd years) are strongly recommended.
A moderately high level (minimum of B1 or equivalent) in english skills (reading, listening, writing and speaking) is not mandatory but strongly recommended.
Medium level skills in Excel software is recommended.

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4. Competences

4.1 Degree competences (numbers are the same as in the *Verifica* Report)

1. Understanding of Environmental Sciences knowledge in text book- and specialized book-level.
2. Analysis and synthesis capability
3. Oral and writing communication skills
4. Problems' resolution and decision-making
5. Team work
7. Critical reasoning
9. Self-learning
13. Environmental sensitivity
14. Capacity in applying theoretical knowledge to practical cases
15. Communication skills with both specialist and non-specialist people
16. Development of learning skills needed to assume further studies with a high autonomy level

4.2. Subject competences (Land-use Planning)

- To analyse the relationships between land-use planning and the environment from direct observation or from documents.
- To understand natural hazards, causes, influences, areas and time of occurrence.
- To identify the natural hazards that can potentially affect a certain area
- To understand and use the basic methodology in natural hazards studies.

4.3. Course specific competences (numbers are the same as in the *Verifica* Report)

10. Capability to evaluate, interpret and synthesize elementary geological information.
51. Understand the processes related to natural and technological hazards and capability to elaborate risk assessment planning.

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5. Topics

1.- Introduction: hazard, vulnerability and risk. Natural and technological hazards

2.- Definition, origin and mitigation of Natural hazards

- 2.1. Hazards related to Plate tectonics: Earthquakes, tsunamis and volcanoes
- 2.2. Storms and Flooding
- 2.3. Land instability
- 2.4. Wildfires
- 2.5. Other hazards: coastal, climatic and impacts

3.- Natural hazards analysis: mapping, data acquisition and probability analysis

4.- Risk assessment and civil protection.

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6. Methodology and resources

METHODOLOGY

6.1. Basic learning (EB). 17 hours

These sessions will focus on the basic knowledge regarding natural hazards. Theoretical texts aspects should be read by the students BEFORE each session, so that only the most complex aspects will be specifically analysed in class. Each hazardous process will be analysed via a case study, including problem-solving and discussion. The theoretical aspects of the methods to be used in practical sessions and instructions will be given also in EB sessions.

There will be 17 one-hour EB sessions, which will not follow exactly the order of topics since they comprise both theoretical (sections 1 and 2) and practical aspects (sections 3 and 4). The practical ones will be included whenever is needed for the EPD sessions. A tentative schedule is as follows:

1. Presentation
2. Introduction
3. Tectonic related hazards I
4. Land-use and geological mapping (intro to EPD session)
5. Tectonic related hazards II
6. Slope mapping (intro to EPD session)
7. Land instability I
8. Land instability II
9. Storms and flooding I
10. Data acquisition and probability analysis
11. Storms and flooding II
12. Hazards mapping (intro to EPD session)
13. Wildfires and other hazards
14. Vulnerability and risk mapping (intro to EPD session)
15. Land-use planning
16. Risk assessment and civil protection
17. Summary

Sessions 10, 15 and 16 will be held at a computer room. The other sessions will be held at the ordinary classroom.

6.2. Practical learning (EPD). 17 hours

The students will be arranged into 2-3 people groups for the EPD sessions. Each group is expected to produce a report on natural hazards affecting a selected small area (ca. 10 km^2). This report should include hazard, vulnerability and risk maps with legends and explanations; and a risk assessment written essay. In spite of the group arrangement, each student will be tested individually during a final tutorial. The EPD sessions comprise five two-hour laboratory sessions and a field trip to the area of interest. EPD schedule is as follows:

1. Land-use and geological mapping
2. Slope mapping
3. Hazards mapping
4. Vulnerability and Risk mapping
5. Geographical Information Systems applied to Hazards mappings

6.3 Personal work. 68 hours

Personal work includes reading assignments for EB sessions, constructing the project report on risk mapping and assessment and maintaining a hazard journal. This journal will be produced throughout the course with three significant natural hazards that occur and appear in the media during the term. Students should give, for each event, (1) date and location of the event; (2) source of information; (3) a brief description of the causes and consequences; and (4) a short discussion on what actions could have been taken to minimize negative impacts. The results should be presented in the MoleQla journal format. Outstanding hazard journals will be proposed to be published in MoleQla, the science journal of the Pablo de Olavide University.

RESOURCES

- Media resources
  - Blackboard
  - Power point presentations
  - Movies
  - Web links to related and specialized pages
  - Lab guides
  - Text books from the Library
- Laboratory and field resources
  - Topographic and geological maps
  - Stereoscopic aerial photographs and table stereoscopes
  - DTM-derived cartography (ortho-photographs, shade images, etc.)
  - Geological compasses and hammers
  - Bus on rental

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7. Course grading

First call (January): There are no exams. The final grade is mainly based on the project report, which values up to 7 points (4 points from maps and essay + 3 points from a final individual tutorial), with additional credits from the hazard journal (1.5 points), homework assignment and class participation (1.5 points). A minimum of 1.5 point in the individual tutorial, 2.8 points in the complete project report and 5 points in the total course grading are required for successful course completion.

Second call (July): According to UPO's "Normativa de Evaluación", the final grade is based on the project report (70 %). The remaining 30 % of the grade may correspond to (1) the continuous evaluation grade obtained in the first call or, alternatively, (2) to a theoretical exam. The latter should be explicitly solicited by the student up to ten days before the date of the exam. Otherwise, the first option will be considered.

It is important that you take into account some basic instructions to do a good written report:

1. Use a logical and easily followed organization
2. Write correctly and clearly. Reading after writing usually helps
3. Be accurate and concise
4. Minimize ambiguity and speculation

Academic work submitted by students will have to be original. According to University regulations, plagiarizing or unauthorized collaboration to dishonestly obtain better grades is prohibited and shall lead to fail the call.

8. Textbooks

- Bryant, E.A. (1991) Natural Hazards, Cambridge University Press, 052137295X.
- Chapman, D. (1995) Natural Hazards, Oxford University Press, 0195535642.
- Erikson, P.A. (1999) Emergency Response Planning, Academic Press, 012241540X.
- Glade, T.; Albini, P., Frances, F., Eds. (2001) The Use of Historical Data in Natural Hazard Assessments, Kluwer Academic Publishers, 0792371542.
- Horlick-Jones, T.; Amendola, A.; Casale, R., Eds. (1995) Natural risk and civil protection, Chapman & Hall, 0-419-19970-5H.
- Kehew, A.E. (1995) Geology for Engineers and Environmental Scientists, Prentice Hall, 0-13-303538-7.
- Keller, E.A.; Blodgett, R.H. (2008). Natural Hazards; Earth's Processes as Hazards, Disasters, and Catastrophes, Pearson Prentice Hall, 978-0-13-231864-8.