



UNIVERSIDADE DOS AÇORES

Academic Syllabus

1. Name of the course

Geological Hazards

2. Working hours/ECTS

Contact hours		Total working hours	ECTS	US Credits
Theoretical	21	150	6	3
Theoretical-practical				
Laboratory				
Seminar				
Field work				
Internship	21	150	6	3
Tutorial				

3. Teachers

Nicolau Wallenstein (DG) and Rui Coutinho (DG)

4. Visiting Professor

Isabelle Sacramento Grilo (University of San Diego, California)

5. Objectives

1. To understand the economic and social impact of major highly destructive geological events and frame them within Earth dynamics.
2. To identify geological hazards mainly those related to volcanic regions; understand the dynamics of seismic and volcanic events as consequence of diverse geological processes.
3. To understand the variability, intensity and magnitude of the different geological hazards.

6. Syllabus

1. INTRODUCTION

1.1 Natural Disasters and History

1.2 Meaning of hazard and risk

1.3 Meaning of multirisk

2. GLOBAL TECTONICS AND MAGMATISM

2.1 The origin of the Earth and its internal structure

2.2 Geographical distribution and characterization of plate boundaries

2.3 Geographical distribution and geostructural framework of volcanism

2.4 The geological cycle and the main rock types

2.5 Geological setting of the Azores archipelago

3. VOLCANIC HAZARD

3.1 Introduction to volcanology

3.2 Volcanic hazards

3.3 Eruptive history

3.4 Monitoring and prediction

4. SEISMIC HAZARD

4.1 Introduction to seismology

4.2 Seismicity quantification

4.3 Paleoseismicity and historical seismicity

5. LANDSLIDE HAZARD

5.1 Introduction to landslides

5.2 Triggering mechanisms

5.3 Monitoring and prediction

6. TSUNAMI HAZARD

6.1 Introduction to tsunamis

6.2 Triggering mechanisms

6.3 Paleotsunamis

7. Demonstration of the syllabus coherence with the curricular unit's learning objectives.

Along this course students will acquire knowledge on the main concepts applied to the study of natural hazards as well as the way in which society is affected by natural hazard of geological origin. The occurrence of more than one hazard simultaneously (*en cascade*) is also discussed in order to allow vaster risk evaluation. The dimension of the impacts at local, regional and global levels is presented through historical events. The geological processes linked to each type of hazard are presented according to specific issues. For each kind of hazard, triggering mechanisms will be analyzed, including the effects *vis-a-vis* specific vulnerabilities and associated damage.

8. Teaching Methodologies

During theoretical classes all the available resources will be utilized in order to stress the dimension and violence of geological hazards and its impacts on human activities. The exhibition of images (photos and videos) and depositions concerning important events will be presented in order to raise awareness about the importance of geological hazard mitigation.

Field trips will enable the identification of several geological hazards and discuss its mechanisms and evaluate its impacts through an on-site approach.

9. Evaluation

Classification will be based on periodic tests and written works, which will take place along the curricular unit duration. Works can be written in Portuguese or English.

Works will not be accepted beyond the established schedule neither a supplementary exam will be performed unless a medical justification is presented.

10. Demonstration of the coherence between the teaching methodologies and the learning outcomes

The resources that will be used along the lecturing of theoretical classes will facilitate the learning process considering that the sketches/photos may illustrate in unique way the concepts and processes to be transmitted, promoting an interesting interaction between the teacher and the students.

During fieldwork classes, students dully oriented by the teachers will observe and discuss several aspects of the different geological hazards allowing the application of the acquired concepts.

11. References

ABBOTT, P.L. (2008) – Natural Disasters (7th ed.), McGraw Hill; 526 pp.

ALEXANDER, D. (1999) – Natural Disasters. UCL Press. 650 p. BELL, F. (2003) Geological Hazards: Their Assessment, Avoidance and Mitigation. Taylor & Francis; 1st Ed.; 656 p

BRYANT, E. (2005) Natural Hazards. Cambridge University Press; 328 p.

DAVIDSON, R. & DAVIS (1997) - Exploring Earth – An Introduction to Physical Geology. Prentice Hall (1st edition); 477 p

KELLER, E. A., DEVECCHIO, D. E. (2011) Natural Hazards: Earth's Processes as Hazards, Disasters and Catastrophes Prentice Hall; 3 ed.; 528 p.

GASPAR, J.L., GUEST, J.E., DUNCAN, A.M., BARRIGA, F.J.A.S., CHESTER, D.K. (eds.) (2015) Volcanic Geology of São Miguel Island (Azores Archipelago), Geological Society of London Memoir, 44; 309 p.

12. Remarks

Course created within the framework of the Study in Portugal Network (SIPN), organized by FLAD, but not exclusive for this programme.