



UNIVERSITY OF THE AZORES

Summer Course syllabus

Geological Hazards

Duration

21 hours – in door classes

21 hours - filed work

108 hours - study time and assessment tasks

ECTS

6 ECTS

Learning Outcomes

1. Understand the economic and social impact of major destructive geological events and relate them with the dynamics of the Globe.
2. Identify geological hazards associated with volcanic regions.
3. Understand the dynamics of seismic and volcanic phenomena resulting from the performance of geological processes.
4. Understand the variability, intensity and magnitude of various geological hazards.

Syllabus

In this course students will acquire knowledge about the main concepts applied to the study of natural hazards as well as how society is affected by the natural hazards of geological origin. The occurrence of more than one hazard (cascade) is also analyzed for a broader risk assessment. The scale of impacts at local, regional and global levels are exemplified by historical cases. The geological processes associated with each of the hazards are introduced in the light of the various specific points. For each hazard, the trigger mechanisms, the effects caused by the specific vulnerabilities and the associated damages will be analyzed. Students will study the following topics:

1. INTRODUCTION

- 1.1 Natural disasters and history.
- 1.2 Notions on peril and risk
- 1.3 Notions on multirisk

2. GLOBAL TECHTONICS AND MAGAMTISM

- 2.1 The origin of the Earth and its internal structure
- 2.2 Geographical distribution and characterization of plate boundaries
- 2.3 Geographic distribution and geostructural framework of volcanism
- 2.4 The geological cycle and the main types of rocks
- 2.5 Geological background of the Azores archipelago

3. VULCANIC HAZARDS

- 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 Quantification of seismicity
 - 4.3 Paleoseismology and historical seismicity

- 5. DANGER OF LANDSLIDES
 - 5.1 Introduction to landslides
 - 5.2 Triggering mechanisms
 - 5.3 Monitoring and forecasting

- 6. TSUNAMI DANGER
 - 6.1 Introduction to tsunamis
 - 6.2 Mechanisms for triggering
 - 6.3 Paleotsunamis

Learning methodology

In door classes will follow the topics and illustrate the violence of geological hazards and the impacts on human activities. Watching photos and videos as well as testimonies related to important occurrences will students understand the importance of geological risk mitigation.

Field trips will identify various geological hazards, discuss their mechanisms and assess their impact through in-situ discussion.

Assessment

Assessment is based on tests and written works carried out during the course. Papers can be written in Portuguese or English.

Delivered work will not be accepted after the deadline, nor will it be granted the opportunity of examination of appeal without medical certificate.

References

- ABBOTT, P.L. (2008) – Natural Disasters (7th ed.), McGrawHill.
- ALEXANDER, D. (1999) – Natural Disasters. UCL Press. 650 p.
- BELL, F. (2003) Geological Hazards: Their Assessment, Avoidance and Mitigation. Taylor & Francis; 1 ed.
- BRYANT, E. (2005) Natural Hazards. Cambridge University Press.
- DAVIDSON, R. & DAVIS (1997) - Exploring Earth – An Introduction to Physical Geology. PrenticeHall (1ª edição).
- KELLER, E. A., DEVECCHIO, D. E. (2011) Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes Prentice Hall; 3 ed.
- 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.