COURSE OUTLINE

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	NATURAL RESOURCES AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	**630018**	**SEMESTER**	**2st**
COURSE TITLE	NATURAL HAZARDS AND CATASTROPHES		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	3
Essays		2
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	3	5

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background
PREREQUISITE COURSES:	Geonevironment and Infrastructure works or Geoenvironment
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek - English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The goal of the course is to understand the natural processes and mechanisms that shape the earth and govern the geoenvironment and the natural hazards. Students will be able to assess the environmental hazards and risks and proceed with environmental and natural hazard planning and prevention measures.

The students will comprehend that the geoenviroment of Greece is characterized by intense relief, variability of rocks and the tectonic deformation that result in a complex and variable pattern that control the geographical distribution and the intensity of natural catastrophes.

Students will be able to assess when a natural process, becomes a catastrophe. In addition, they will study several natural hazards such as earthquakes, floods, landslides, frost hazards, volcanic eruptions and tsunami. Particular emphasis will be given to seismic hazard, since Greece is the most seismogenic country in Europe where almost 40% of the total seismic energy is released. Students will learn how to identify active faults, how they relate to earthquake recurrence and their importance for planning and the seismic code regulations. Finally, students will be able to develop hazards maps for all types of geohazards in a GIS platform.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Project planning and management

Respect for difference and multiculturalism

Adapting to new situations *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *……*

Respect for the natural environment
Working in an interdisciplinary environment
Decision-making
Project planning and management
Search for, analysis and synthesis of data and information, with the use of the necessary technology
Working independently

3. SYLLABUS

1. Environmental Changes, Natural Catastrophes and the Geological Time Scale, Humans and Geological time scale, Geochronology, Natural catastrophes – evolution of species, Anthropocene,
2. Natural Catastrophes
Natural processes- Natural Catastrophes, Economic costs, vulnerability, losses per hazard, Insurance and Reinsurance, Major natural catastrophes in Europe and Greece, Disaster management and Earthquake Catastrophe models, GIS applications and hazard maps.
3. Earthquakes
Geodymanic processes, Tectonic Geomorphology, Seismic landscape,
Earthquake types, Seismicity distribution in Greece, active faults, seismogenic layer and surface ruptures, empirical relationships among fault length, fault type and displacement, slip-rates and recurrence intervals, damage distribution around faults, Differential Interferometric synthetic-aperture radar and deformation mapping (DInSAR), Earthquake geology and paleoseismology, seismic cycle and probabilities (time independent, time dependent and conditional), Seismic code and Eurocode 8, Neotectonic maps, microzonation studies and planning against geological hazards, developing high spatial resolution seismic hazard maps based on geological data and fault slip-rates,
4. Volcanoes
Volcanic eruptions, Climate, Volcanic Explosivity Index, Hellenic Volcanic
5. Floods
Damages and water depth, Flood types and flood hazard in Greece, Nature-based Solutions- NbS, Floods and Holocene deposits, Alluvial fans, Flood hazard mapping
6. Tsunami
Tsunami sources, wave propagation and bathymetry, study and tracing paleotsunami in recent geological sediments
7. Landslides, factor controlling sliding phenomena, Multi-criteria analysis for landslide hazard mapping, constraints and the value of fieldwork data.
8. Forest Fires, forest fire mapping, Action plans for forest fire prevention, Best practices in wildfire prevention
9. Frost hazard maps. Factors that control frost phenomena, Remote Sensing and frost hazard mapping
10. Resilience and the example of the city of Athens

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to Face Usage of Lab equipment
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Powerpoint presentations Web applications
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Final Project (100%) including: - presentation - oral examination

Activity	***Semester workload***
Lectures	36
Project	50
Fieldtrip	8
Homework	31
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

- Related academic journals:
1) Geomorhology
2) Journal of Structural Geology
3) Tectonophysics
4) Engineering Geology
5) Quaternary International
6) Natural Hazards and Earth System Sciences
7) Geology
8) Quaternary Science Reviews
9) Earth and Planetary Science Letters
10) Nature Communications, Geoscience, Scientific Reports
11) Remote Sensing
12) Geoderma
13) Journal of Geophysical Research
14) Sedimentology
15) Natural Hazards
16) Geophysical Journal Internatioinal
17) Marine Geology
18) The Geneva Papers on Risk and Insurance