COURSE OUTLINE

GEOTECHNICAL HAZARDS: UNDERSTANDING – HAZARD ASSESSMENT – PREVENTION AND PROTECTION MEASURES

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
DEPARTMENT	PREVENTION AND MANAGEMENT OF CRISIS AND DISASTERS: INNOVATIVE TECHNIQUES IN CIVIL PROTECTION		
LEVEL OF STUDIES	ISCED level 7 – Master's or equivalent level		
COURSE CODE	CP05.2	**SEMESTER**	8th Semester
COURSE TITLE	Geotechnical hazards: understanding – hazard assessment – prevention and protection measures		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
	3.0	6.0
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	Greek, English
COURSE OFFERED TO ERASMUS STUDENTS:	YES
COURSE URL:	https://eclass.duth.gr/courses/

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

At the end of the course the student will be able to:

- Understand the fundamental geotechnical hazards and their causes.
- Evaluate and identify susceptible areas and their associated risks.
- Understand both immediate and long-term mitigation measures.
- Recognize the importance of raising awareness and coexistence between local communities and geohazards through appropriate education and preventive measures.
- Be capable of guiding proper practices for communication during hazardous events and promote community resiliencefor rapid recovery.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information, *ICT Use* *Adaptation to new situations* *Decision making* *Autonomous work* *Teamwork* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Project design and management* *Equity and Inclusion* *Respect for the natural environment* *Sustainability* *Demonstration of social, professional and moral responsibility and sensitivity to gender issues* *Critical thinking* *Promoting free, creative and inductive reasoning*
Adaptation to new situations Decision making Working in an interdisciplinary environment Project design and management Respect for the natural environment Promoting free, creative and inductive reasoning	

3. COURSE CONTENT

This course provides an introductory insight into hazards related to soil failures and large ground deformations. It describes the most significant geotechnical hazards, emphasizing earthquakes and their associated or induced phenomena, landslides of soil and rock slopes, rockfalls, large-scale ground movements (soil subsidence, movements of natural and artificial slopes), and more. The course exploits the primary causes of these hazards, failure mechanisms, and key characteristics of their manifestations. Methods for immediate and long-term mitigation, as well as temporary or permanent countermeasures, are recommended. Finally, the significance of effective public education and awareness, clear communication strategies, and empowering local communities is emphasized.

1. Introduction to geotechnical hazards
2. Subsidence – large deformations – dynamic settlements: mechanisms – causes – mitigation measures
3. Fundamentals of earthquake generation mechanisms and parameters affecting seismic motion. Examples from historical events and records.
4. Soil liquefaction under seismic loading: mechanism, susceptibility, impacts, and mitigation measures.
5. Seismic behavior of geotechnical structures: examples and analysis methods.
6. Landslides: the natural phenomenon, classification, terminology, natural and anthropogenic causes.
7. Landslides as a natural hazard and the associated risk.
8. Landslide mitigation: active and passive measures. Examples and applications from landslides in Greece.
9. Rock slope failures: types, mechanisms, causes, consequences, and case studies from Greece and worldwide.
10. Rock slope failure mitigation: passive and active protective measures.
11. Study and investigation of geohazards in relation to spatial scale.
12. Modern methods and tools in geotechnical hazard analysis.

13. Public awareness – education and proactive measures in areas vulnerable to geotechnical hazards.

4. LEARNING & TEACHING METHODS - EVALUATION

<table>
<tr><td>TEACHING METHOD
Face to face, Distance learning, etc.</td><td>Face to face
Distance learning</td></tr>
<tr><td>USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)
Use of ICT in Teaching, in Laboratory Education, in Communication with students</td><td>Use of ICT in Teaching
Use of ICT in Communication with students</td></tr>
<tr><td>TEACHING ORGANIZATION
The ways and methods of teaching are described in detail.
Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.

The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</td><td><table><tr><th>Activity</th><th>Workload/semester</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Essay</td><td>50</td></tr><tr><td>Study</td><td>60</td></tr><tr><td>Examination (essay presentation)</td><td>1</td></tr><tr><td>Total</td><td>150</td></tr></table></td></tr>
<tr><td>STUDENT EVALUATION
Description of the evaluation process

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed</td><td>Student evaluation languages
Greek
English
Method (Formative or Concluding)
Concluding
Essay: Assessed based on the quality of research, critical thinking, ability to analyze and synthesize information, and the application of appropriate solutions.
Essay presentation of Assignment: Evaluated on the ability to present complex topics in an understandable manner, communication skills, and adaptability to questions and feedback.
In-class participation: Assessed based on engagement and the ability to apply learned concepts to practical applications.</td></tr>
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5. SUGGESTED BIBLIOGRAPHY

1. Geotechnical Earthquake Engineering, Steven L. Kramer & Jonathan P. Stewart, 2nd Edition, Taylor and Francis Group, 2024
2. Landslides – Investigation and Mitigation, Eds: Keith Turner & Robert Schuster, National Academy Press, 1996
3. Rock Slope Engineering, Duncan C. Wyllie, 5th Edition, CRC Press, 2017
4. Φυσικές και Τεχνολογικές Καταστροφές, Ευθύμιος Λ. Λέκκας, 2η Έκδοση, Τομέας Δυναμικής, Τεκτονικής & Εφαρμοσμένης Γεωλογίας – Τμήμα Γεωλογίας και Γεωπεριβάλλοντος Ε.Κ.Π.Α., 2000