COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΓΕ0902**	**SEMESTER**	10ο
COURSE TITLE	EARTHQUAKE GEOTECHNICAL ENGINEERING		

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**
	4	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Specialized general knowledge & skills development
PREREQUISITE COURSES:	Soil Mechanics I & II Soil Dynamics Foundations & Retaining Structures Computational Geotechnical Engineering
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
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*

Basic knowledge is provided on the principles of geotechnical seismic engineering. The course includes the use of numerical analysis codes for the simulation of soil and rock materials during seismic loading.

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

Upon completion of the course, the students can investigate the response of soil or rock under seismic loadings.

(3) SYLLABUS

Elastic response spectra. Propagation of seismic waves in soil and rock materials. Seismic design of geotechnical structures against seismic waves and permanent ground and rock mass displacements. Examples of seismic design of geotechnical structures (tunnels, dams, bridges). Examples of seismic design of geotechnical structures (fuel pipelines, retaining walls, wind farms, geothermal infrastructure). Slope stability analyses for earthquakes. Amplification of ground seismic motion with analytical closed form solutions or numerical analyses. Liquefaction of geotechnical materials. Measures to address the consequences of liquefaction and methods of improvement. Microzonation studies of seismic hazard. Examples from the Greek terrain. Case studies using numerical analysis programs.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, communication with students

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

Activity	*Semester workload*
Lectures	56
Study	52
Preparation for examinations	19
Examinations	3
Course total	*130*

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.*	Assessment is conducted through a semester-project and an oral exam in Greek. Through the exam the student's ability to apply the topics taught in the course is assessed.

(5) **ATTACHED BIBLIOGRAPHY**

-Suggested bibliography:

1. Day, R.W., (2012), Geotechnical earthquake engineering handbook, McGraw Hill, New York.
2. Kamalesh Kumar, (2008), Basic Geotechnical Earthquake Engineering, New Age International (P) LIMITED, Publishers, New Delhi.
3. Kramer, S., (1996), Geotechnical Earthquake Engineering, Prentice Hall, NJ.
4. Towhata, I., (2008), Geotechnical Earthquake Engineering, Springer-Verlag Berlin Heidelberg.
5. Pitilakis, K., (2010) Geotechnical Earthquake Engineering, Ziti Ed., Thessaloniki (in Greek).

- Related academic journals:

1. Soil Dynamics and Earthquake Engineering