1.1.1 Soil Dynamics

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΕΩ011	**SEMESTER**	8th
COURSE TITLE	Soil Dynamics		

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	5
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, specialised general knowledge, skills development*	Specialization Course
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

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 aim of the course is the students to understand the basic concepts of the dynamic behavior of soil deposits and to be capable of assessing the seismic soil response at the ground surface taking into account site effects.
Upon completion of the course, the students will be able to:
• be familiar with, understand and assess the basic parameters of soil and seismic ground motion that are related to the seismic wave propagation.
• distinguish and be aware of the critical parameters of strong ground motion that are related to the damage of the physical and human environment (seismic ground shaking of buildings and other structures, seismic loading of networks, soil liquefaction, landslides etc.)
• evaluate the seismic ground motion at the ground surface of a soil deposit for a given time history at the seismic bedrock
• compose solutions through theories that they have learnt using the current design framework

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…*
	…….

- Decision making
- Design of assignments
- student individual project
- promotion of the free, creative and inductive thinking

SYLLABUS

Study of site effects on the propagation of seismic ground motion from the seismic bedrock up to the ground surface. Distinction and assessment of the main parameters of strong ground motion and detection of unfavorable conditions that may take place due to the soil behavior during an earthquake. Assessment and consideration of the above based on the current design framework. Contents of the theory lectures and application exercises:

- Connection with technical seismology and revision of basic concepts of seismic mechanics (characteristics of earthquake disruption, ground motion prediction equations, parameters of seismic motion etc.)
- Deepening on the description and parameters of strong ground motion and assessment of the hazard of seismic events based on them (time histories, Fourier spectra, response spectra, duration of strong ground motion etc.)
- Introduction to site effects and on the concepts of soil dynamics
- Estimation of soil parameters that influence the dynamic response of soil deposit (in situ and laboratory methods, nonlinear soil behavior)
- Evaluation of seismic response of soil deposit. Theoretical approach and use of appropriate software for the estimation of soil response at the ground surface (linear behavior, equivalent linear behavior, nonlinear soil behavior)
- Consideration of seismic ground motion amplification due to site effects in current codes
- Microzonation studies.
- Specific situations of seismic soil behavior and their consideration according to the current codes (influence of 2D-3D phenomena, liquefaction, lateral spreading etc) Presentation of advanced calculation methods using finite element programs.

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*	
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.*	

Activity	*Semester workload*
Lectures	26
Practice/exercises	26
Practice/exercises	30
Individual study	48

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		
	Course total (26 hours workload per ECTS credit)	***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.*	1. Individual project aiming at better understanding the teaching concepts 2. Final written exam at the end of the semester (in Greek language)	

ATTACHED BIBLIOGRAPHY

- [In Greek] Πιτιλάκης Κ. (2010), "Γεωτεχνική Σεισμική Μηχανική", Εκδόσεις Ζήτη, Θεσσαλονίκη, ISBN: 978-960-456-226-8
- [In Greek] Γκαζέτας Γ. (1996), "Εδαφοδυναμική και σεισμική μηχανική", Εκδόσεις Συμεών, ISBN: 978-960-7346-44-0
- Kramer S.L. (1996), "Geotechnical Earthquake Engineering", Prentice-Hall, ISBN: 978-0133749434