

### 1.1.1 Geotechnical Earthquake Engineering

#### GENERAL

<b>SCHOOL</b>	Engineering		
<b>ACADEMIC UNIT</b>	CIVIL ENGINEERING		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	FEQ013	<b>SEMESTER</b>	9th
<b>COURSE TITLE</b>	Geotechnical Earthquake Engineering		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>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</i>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Specialization Course		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>			

#### LEARNING OUTCOMES

<p><b>Learning outcomes</b> <i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul>
<p>Upon successful completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> <li>• Recognize, understand and evaluate the basic soil and structural parameters related to the seismic behavior of geotechnical constructions.</li> <li>• Distinguish and comprehend various cases of seismic loading of geotechnical structures and calculate the respective stress and internal loading parameters.</li> <li>• Study shallow foundations, pile foundations and retaining structures under seismic loading based on the existing code regulations.</li> <li>• Synthesize solutions based on the knowledge acquired during the lessons, evaluate the requirements of the problem at hand, justify and support the proposed solutions and compare and choose the most appropriate approach between different alternatives.</li> </ul>
<p><b>General Competences</b> <i>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?</i></p> <p><i>Search for, analysis and synthesis of data and</i> <span style="float: right;"><i>Project planning and management</i></span></p>

<i>information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> ..... <i>Others...</i> .....
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- The course contributes to the following skills:
- Search, analysis and synthesis of data and information, with the use of the necessary technology
  - Decision-making
  - Working independently
  - Team work
  - Working in an interdisciplinary environment
  - Project planning

**SYLLABUS**

Study, analysis and design of geotechnical structures under seismic loading. Topics related to the seismic loading of soil, shallow foundations, pile foundations, retaining structures and other geotechnical constructions are examined, based on literature methods and the existing code regulations.

Content of theory lectures and application exercises:

- Soil characteristics and parameters during the soil dynamic response (based on experimental data, literature relationships and code provisions).
- Review of technical seismology and soil dynamics topics.
- Seismic design of shallow foundations.
- Seismic design of deep foundations (pile foundations).
- Seismic design of retaining structures.
- Seismic design of other geotechnical constructions (slopes, underground structures).
- Special cases of seismic soil loading - liquefaction.

**TEACHING and LEARNING METHODS - EVALUATION**

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face to face.	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software.	
<b>TEACHING METHODS</b> <i>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.</i>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	26
	Practice/exercises	26
	Practice/exercises	30
	Individual study	48

<p>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</p>	<p>Course total (26 hours workload per ECTS credit)</p>	<p><b>130</b></p>
<p><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Written final examination including:</p> <ul style="list-style-type: none"> <li>• Theoretical knowledge and judgment questions on course subjects</li> <li>• Solving problems-exercises</li> </ul> <p>Written assignment (compulsory) which includes:</p> <ul style="list-style-type: none"> <li>• Processing and solving exercises-problems</li> <li>• Assessment of understanding key concepts of the course</li> </ul>	

## ATTACHED BIBLIOGRAPHY

- [In Greek] Πιτιλάκης Κ. (2010), "Γεωτεχνική Σεισμική Μηχανική", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-226-8
- Kramer S.L. (1996), "Geotechnical Earthquake Engineering", Prentice-Hall, ISBN: 978- 0133749434
- [In Greek] Γκαζέτας Γ. (1996), "Εδαφοδυναμική και σεισμική μηχανική", Εκδόσεις Συμewών, ISBN: 978-960-7346-44-0
- [In Greek] Αναγνωστόπουλος Χ., Χατζηγwγος Θ., Αναστασιάδης Α., Πιτιλάκης Δ. (2012), "Θεμελιwσεις- Αντιστηρίξεις και Γεωτεχνικά Έργα", Εκδόσεις Αϊβάζης, Θεσσαλονίκη, ISBN: 978-960-549-000-3
- [In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5
- [In Greek] Κωμοδρόμος Α.Μ. (2019), "Θεμελιwσεις, Αντιστηρίξεις: οριακή ισορροπία – αριθμητικές μέθοδοι (2η έκδοση)", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-952-8
- [In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0