

COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	Department of Civil Engineering		
LEVEL OF STUDIES	UNDER GRADUATE		
COURSE CODE	2307537	SEMESTER	7
COURSE TITLE	Foundation Engineering		
INDEPENDENT TEACHING ACTIVITIES <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>	WEEKLY TEACHING HOURS	CREDITS	
Lectures	3	3	
Laboratory	3	3	
	6	6 (total)	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background</i> , <i>special background</i> , <i>specialised general knowledge,</i> <i>skills development</i>	Specialized course		
PREREQUISITE COURSES :	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO	YES (In English for ERASMUS students)		

ERASMU S STUDEN TS	
COURSE WEBSITE (URL)	http://vplace.teipir.gr/LotusQuickr/2307537/Main.nsf/h_RoomHome/7b13c2700572dfe0c2257c0a0061132d/?OpenDocument

(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 specific course is not only an introduction in foundation engineering but also provides deep knowledge on issues concerning the application of National and International codes (Eurocodes)

Upon completion of the course, students will have:

1. To have the ability to analyse and design shallow footings, rafts and special foundations using analytical and numerical methods in accordance with EC7
2. Be able to assess the loaded behaviour of single piles and pile groups including settlement prediction for both short term and long term conditions.
3. Have a proven critical ability to discuss and interpret practical issues related to geotechnical construction.

More specifically, students will be able to:

1. Derive bearing capacity coefficients for shallow footings and various deep foundations.
2. Analyse and design shallow and deep foundations to EC7 including predicting deformations and soil-structure interaction.
3. Develop awareness about current issues pertaining to geotechnical risk management, health and safety in subsurface construction
4. Be aware and apply Eurocodes and especially those related to foundation engineering

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

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

Project planning and management

Respect for difference and multiculturalism

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

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Others...

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1. Search, analysis and synthesis of data and information, using the necessary technologies. Especially: coupling data and different kind of technologies and systems' needs for the design of foundation systems, preparation of a feasibility study for the implementation i.e. design, supervision and construction of a foundation.
2. Adapting to new situations: uncertainty quantification of soil materials and

foundation modeling, in situ problems, software evolution concerning numerical methods on geotechnical engineering.

3. Autonomous work: Knowledge of regulations, specifications and ethical issues when developing design development and innovation.
4. Teamwork: Ability for dialog, self- esteem and commitment to reach an agreement along with team project assignments.

(3) COURSE CONTENT

Theory

1. Introduction to foundation design
2. In situ soil tests and measurements.
3. Soil pressures under foundations.
4. Bearing capacity of shallow foundations - general
5. Bearing capacity of shallow foundations towards EC7
6. Safety Factors in Foundation Design.
7. Shallow Foundation settlements
8. Limiting values of structural deformation and foundation movement
9. Deep foundations – Introduction
10. Bearing capacity of deep foundations
11. Deep foundation settlements
12. Group of piles – bearing capacity and settlements
13. Foundations: Selection of Type and other structural issues.

Laboratory

The lab is concerning the following paragraphs

1. Pre-Choice of the appropriate kind of foundation
2. General description of empirical, analytical and numerical methods concerning foundation calculations
3. Model analysis for the foundation design
4. Numerical methods in foundation design – General
5. Numerical methods in foundation design – Software use I
6. Numerical methods in foundation design – Software use II
7. Modern generalized applications concerning the total foundation design

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<ul style="list-style-type: none"> • Teaching using ICT, • Laboratory Education using ICT, • Communication and Electronic Submission 	
TEACHING METHODS <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</i>	Activity	Semester workload
	Lectures	26

<p><i>workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>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</i></p>	Laboratory exercises	39
	Practical exercises	13
	Homework for exercises	22
	Homework for case studies	20
	Personal study	30
	Total	150
<p>STUDENT PERFORMANCE EVALUATION</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 examination: 60%</p> <p>Laboratory exercise: 40%</p> <p>Optional job preparation and presentation of up to 24%, less than the proportion of written examination</p>	

(5) ATTACHED BIBLIOGRAPHY

<ol style="list-style-type: none"> 1. Joseph E Bowels, "Foundations Analysis and Design", Foundas books (in greek) 2. S. Kostopoulos, Geotechnical construction: Analysis and design, Ion publishing group, 2009, (in greek) 3. Anagnostopoulos, A, Papadopoulos, V., "Shallow Foundations", (in greek) 4. Barnes G.E., (2005), «Soil mechanics», Klidarithmos books, (in greek) 5. Prof. G. Kavvadas, Educational material site http://users.ntua.gr/kavvadas/, http://mycourses.ntua.gr/document/document.php?cmd=exChDir&file=%2F%C4%C9%C1%CB%C5%CE%C5%C9%D3 6. Anagnostopoulos, A, Papadopoulos, V., Kavvadas M., Notes to Eurocode 7, TC of Greece Seminar, http://library.tee.gr/digital/m2464/m2464_ec7_not.pdf (in greek) 7. Anagnostopoulos, A, Eurocode 7, Part 1: Geotechnical Design, Structure, Principles and consequences, 2009, 2009, TC of Greece Seminar, http://library.tee.gr/digital/m2464/m2464_ec7_1.pdf (in greek) 8. M. Kavvadas, Applications to EC7, (EN 1997), 2009, TC of Greece Seminar, http://library.tee.gr/digital/m2464/m2464_ec7_2.pdf (in greek) 9. EAK 2000, http://www.oasp.gr/userfiles/EAK2000.pdf (in greek) 10. EKΩΣ 2000, http://www.oasp.gr/userfiles/EKOS2000.pdf (in greek) 11. G.Bouckovalas, Educational material, http://users.ntua.gr/gbouck/academics.shtml 12. A. Verruijt, Soil Mechanics, (http://geo.verruijt.net/software/SoilMechBook.pdf)

13. B. Das, Advanced Soil Mechanics, 2013 (4th edition)
14. B. Das, Principles of Foundation Engineering, 2011, (7th edition)
15. J.E. Bowles, Foundation Analysis and Design, 2001, (5th edition)
16. C. Liu, J. Evett, Soils and Foundation SI (6th Edition)