



COURSE: Soil and Foundation Dynamics

ACADEMIC YEAR: 2016/17

TYPE OF EDUCATIONAL ACTIVITY: Characterizing

TEACHER: Roberto Vassallo

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website:

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Language: Italian/English if foreign students will attend

ECTS: (lessons and tutorials/practice) 6	n. of hours: (lessons and tutorials/practice) 54	Campus: Potenza Dept./School: School of Engineering Program: Master in Civil Engineering; Master in Environmental Engineering	Semester: I
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EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course teaches the fundamentals of soil response in cyclic and dynamic conditions and provides the principles and the methods for their application to the problem of evaluating the free-field Local Site Effects. Fundamentals of foundation design under seismic loading are also taught within the general framework of structural design. The main recommendations of the Italian technical code in the field of geotechnical engineering are analyzed.

Main provided know-how:

Learning the peculiarities of soil response when subjected to dynamic actions, either seismic or not. Understanding the fundamentals of wave propagation and seismology, necessary to characterize the dynamic load. Knowledge of in situ and laboratory tests for soil dynamic characterization.

Main attained abilities (i.e., ability to apply the acquired know-how) will be:

Ability to evaluate the effect of the seismic action on a real subsoil. Ability to carry out an appropriate foundation design under seismic loading within the framework of seismic technical codes, including the planning of geotechnical investigations required for an adequate modelling of soil-structure interaction.

PRE-REQUIREMENTS

Good knowledge of soil mechanics, in particular for:

- constitutive laws
- planning in-situ and laboratory investigations
- laboratory test to estimate soil mechanical properties

Basics of Structural Engineering, in particular for:

- behaviour of frame structures under horizontal loads
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SYLLABUS

Introduction to the role of Soil Dynamics in engineering practice (2 hours);

Fundamentals of Single-Degree-of-Freedom oscillating systems (4 hours);

Fundamentals of Wave Propagation in homogeneous and heterogeneous subsoil (3 hours);

Soil response under cyclic and dynamic conditions: equivalent shear modulus and damping – shear strength and liquefaction – simple constitutive models (3 hours);

Geotechnical characterization of dynamic soil properties: laboratory and in situ tests – main factors affecting constitutive parameters (17 hours);

Seismic load: earthquakes – ground motion parameters – seismic hazard (6 hours);

Analysis of seismic vulnerability: Local Site Effects for an ideal and a real subsoil. Tutorials: Analysis of a case-history: free-field Local Site Effects; foundation design under seismic loading (11 hours).



Basics of structural dynamics; Modal analysis using response spectra; Pseudostatic approach; Italian seismic technical code (D.M. 14.01.2008); Planning geotechnical investigations and foundation analysis according to the Italian Code; Dynamic Soil-Structure Interaction (8 hours).

TEACHING METHODS

Theoretical lessons (42 hours), Project works (12 hours).

EVALUATION METHODS

Oral examination, Discussion of a project work.

The objective of the exam is to verify which level the student has reached relatively to the educational goals specified above.

The exam consists in an oral test in which the teacher will evaluate the student's ability to make links and compare the different aspects dealt with in the course.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

G. Lanzo, F. Silvestri – Risposta Sismica Locale – Hevelius

F. Vinale, C. Mancuso, F. Silvestri – Dinamica dei terreni (in 'Manuale di Ingegneria Civile', Vol. 1) – Zanichelli

S.L. Kramer – Geotechnical Earthquake Engineering – Prentice-Hall

Course handouts available at: <http://oldwww.unibas.it/utenti/vassallo/home.shtml>

INTERACTION WITH STUDENTS

At the beginning of the course, after describing objectives, syllabus and evaluation methods, the teacher makes some educational material available to the students by the website mentioned above. At the same time, the list of the students is gathered, with name, surname, matriculation number, phone number and e-mail address.

Office hours: in Potenza: Monday from 15 to 18, Macchia Romana Campus, Soil Mechanics Laboratory (Laboratorio di Geotecnica), room 4.

Besides, the professor is always available for assisting the students by e-mail or by video-calling.

EXAMINATION SESSIONS (PLANNED)¹

10/01/17, 02/02/17, 02/03/17, 04/04/17, 02/05/17, 01/06/17, 03/07/17, 27/07/17, 05/09/17, 03/10/17, 07/11/17, 05/12/17, 21/12/17

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.