SEISMIC GROUND RESPONSE ANALYSIS:
one of the skills of the geologist in the field of earthquake engineering

by

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Objectives of the course

The aim of Earthquake engineering is to protect society, the natural environment, and the man-made environment from earthquakes, by limiting the seismic risk to socio-economically acceptable levels. This scientific field is strongly interdisciplinary, including, for example, the characterization of earthquake sources, the study of waves propagation, the evaluation of seismic hazard and soil amplification effects, structural response and risk analysis. The tremendous costs experienced in recent earthquakes have led to an expansion of its scope to encompass scientific disciplines, including also social sciences (e.g. sociology, political science, economics, and finance).
In the first part of the course, earthquake engineering is introduced with an overview of the different figures involved, highlighting the roles that the geologist plays in this field. The second part of the course is focused on the seismic ground response analysis, which is typically carried out by geologists and engineers within seismic microzonation studies or in the definition of the seismic input for the design or assessment of structures (e.g. buildings, bridges, dams) or geotechnical systems (e.g. tunnels, earth dams).
The course aims at providing to PhD students in Geology (and Engineering) a basic background, the skills and the tools (i.e. software) required to perform the seismic ground response analysis. Practical and research examples, based on real case studies, will be presented and executed during the second part of the course.

Duration of the course

16 hours (5 credits). May 2022: classes on Wednesday and Friday 11:00-13:00. First class May 4th.
The course will be held either in English or Italian according to nationalities of students/researchers.
For information and registration please send e-mail to phd-dsta@unipv.it

Outline of the course

1) Introduction to earthquake engineering.
2) Professional figures involved in earthquake engineering and identification of the roles played by the geologist.
3) Basic concepts of seismology and seismic hazard.
4) Basic concepts of dynamics of structures.
5) Wave propagation and site effects.
6) Nonlinear soil response.
7) Approaches to perform ground response analysis.
8) Scale and uncertainty problems in relation to the objectives of microzonation studies and the definition of seismic input in structural design.
9) Discussion of different case studies with the execution of all the steps required to perform seismic ground response analysis.