

**Course offered for the PhD program
in Civil, Chemical and Environmental Engineering
Curriculum in Structural and Geotechnical Engineering, Mechanics and Materials
a.a. 2021/2022 (XXXVII ciclo)**

(course is open for participation of students from other PhD cycles or programs)

1. Title

Seismic assessment of historical buildings: modelling, analysis and safety verifications

2. Course Description

3h

- Course introduction
- Classification of the cultural heritage: architectonic and artistic assets
- Damage observation of historical buildings after recent earthquakes
- Safety and preservation of in seismic prone areas: definition of performance levels
- Classification of possible modelling approaches of masonry structures: in-plane and out-of-plane behaviour of masonry walls

4h

- Modelling and analysis of the global response: global modelling or sub-structuring into macroelements.
- Methods of analysis: linear Vs nonlinear; static Vs dynamic
- Basics of pushover analysis and verification in local or global terms (displacement-based assessment). Applicability in the case of irregular structures (in plan or in elevation). Critical issues related to the in-plane stiffness of horizontal diaphragms.
- Applications to relevant typologies: palaces, churches, fortresses

4h

- Modelling and analysis of local mechanisms
- The limit analysis of masonry structures: application to the limit equilibrium of arches and the activation of rocking under seismic actions
- Displacement-based assessment of rocking systems (linear and nonlinear kinematic analysis)
- Floor response spectra for the verification of local mechanisms

4h

- Practical application of global analysis of a complex structure by the macroelement approach
- Practical application of nonlinear kinematic analysis for the verification of local out-of-plane mechanisms

3. Course Organization

The course is made by theoretical lessons (11 hours) and a workshop with application to case studies (4 hours).

4. Teacher

Sergio Lagomarsino, Professor of Structural Engineering, DICCA – University of Genoa

5. Duration and credits

15 hours (3 CFU)

6. Activation mode and teaching period

The course will be held in English, on June-July 2022

7. Deadline for registration

One week before the beginning of the course

8. Final exam

Oral, in the date agreed with the PhD student