

## Corso offerto per il dottorato in

### ***Civil, Chemical and Environmental Engineering Program, curriculum in Structural and Geotechnical Engineering, Mechanics and Materials***

a.a. 2024/2025

**1. Title:                   EXPERIMENTAL TESTING OF MATERIALS AND STRUCTURES.**

#### **2. Short Program**

##### **General issues**

Testing materials and structures. What is the strength of a material? Directly measured and derived quantities. Control schemes of a test: force and displacement control, Calibration of a test. Reduced scale testing. The concept of precision. Error theory (basics).

##### **Equipment**

Load and Displacement sensors. Data acquisition. Universal testing machines.

##### **Material testing - Concrete**

Fresh concrete (in situ tests). Hardened concrete (from 3 days to 12 months). Existing structures: NDTs and MDTs. Combined methods. Other tests/methods (thermography). Critical discussion of the procedures. Case study.

##### **Material testing - Masonry**

NDTs: sonic tests, rebound hammer, georadar. MDTs: flat jacks, core drilling, endoscope. Compression tests (axial) of brickwork. Diagonal compression test: in situ and in Lab tests. Case study.

##### **Structure testing – Static tests**

Aims and scope. Experimental setup. Technology. Designing the test. Data processing. Load tests on slabs. Theoretical estimation of the displacements. Acceptable-vs-failed tests. Load tests on bridges. Case study.

##### **Structure testing – Dynamic tests**

Aims and scope. Experimental setup. *Electric measures*: sampling and aliasing. Technology. Designing the test. Data processing. Case study.

#### **Appendix: The collapses that changed Structural Engineering.... and some others**

This Appendix has the form of 4 seminars (2hours/each) discussing relevant structural collapse case studies (and minor ones):

- Silver Bridge (built 1928 – collapsed 1967) and the Bridge Management Systems
- Hyatt Regency Walkway – Kansas City, 1981: the worst disaster in USA till 9.11 and other case studies
- Collapse of a steel warehouse
- Structure-excavation interaction: a case study

#### **3. Course organization**

The course is hold in English by means of theoretical lessons in class 2.5 hours long/each. Students may access the facilities that are discussed in the course and may

use them in the Laboratory. If possible, they will take part in some identification campaign that is periodically performed by the Laboratory.

**4. Teacher:** Prof. Antonio Brencich

**5. Length and Credits:** 40 hours, 6 credits

**6. Activation of the course and teaching period**

The course begins at the beginning of January 2025 and ends by the end of February 2025.

Students are requested to register through a mail message to: [brencich@dicca.unige.it](mailto:brencich@dicca.unige.it)

**7. Limit for registering:** beginning of the course

**8. Final test:** Oral only, in the date requested by the student.