



## EXPERIMENTAL CHARACTERISATION, CERTIFICATION AND HEALTH MONITORING OF STRUCTURES

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	ICAR/09 (CONSTRUCTION TECHNIQUES)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	CIVIL ENGINEERING
Curriculum	Strutturistico
Year of study	2°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	52 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	PAVESE ALBERTO (titolare) - 5 ECTS FURINGHETTI MARCO - 1 ECTS
Prerequisites	Knowledge of the basic elements of theory and design of the courses and Structural Dynamics courses is required with special reference to the behavior of systems with multiple degrees of freedom.
Learning outcomes	The course aims to address one of the most important issues in structural engineering field, namely the use of experimental tests as a tool for the characterization of materials, existing structures and structural elements. The main experimental techniques used in the characterization and evaluation of buildings and bridges will be presented and the application areas will be analyzed with particular reference to diagnostics and testing.
Course contents	<ul style="list-style-type: none"><li>• Classification of experimental techniques</li><li>• Transducers: physical quantity-electrical quantity conversion</li></ul>

	<ul style="list-style-type: none"> <li>• Sensors and instruments for measuring physical quantities (deformometers, velocimeters, accelerometers, potentiometers, LVDT, load cells, etc.)</li> <li>• Acquisition of data produced by sensors (analog-to-digital conversion, quantization)</li> <li>• Non-destructive testing for reinforced concrete and masonry structures (sclerometer, pacometer, ultrasonic, goeradar, x-rays, flat jacks, MASW, SONREB, etc.)</li> <li>• Destructive testing on structural elements and structures (outline)</li> <li>• Static and dynamic health monitoring of buildings, bridges, dams, tanks, etc.</li> <li>• Postprocessesing of the acquired experimental data and extraction of response parameters of the structures subjected to predefined and random loads</li> <li>• Introduction to back analysis and structural identification</li> <li>• Multi-level structural diagnostics</li> <li>• Use of experimental technique in the testing and validation of structures</li> <li>• Application to case studies</li> </ul>
<b>Teaching methods</b>	<p>Lectures focused on the theory of experimental techniques, transducers, data acquisition and data postprocessing.</p> <p>Lectures focused on the inverse analysis of structures and diagnosis of damage.</p> <p>Laboratory lecture aimed at the application of experimental techniques to some case studies (non-destructive testing, health monitoring, use of software for data postprocessing and extraction of mechanical parameters);</p>
<b>Reccomended or required readings</b>	<ul style="list-style-type: none"> <li>• Dynamics of Structures, R.W. Clough, J. Penzien</li> <li>• Norme Tecniche per le costruzioni D.M. 17 Gennaio 2018</li> </ul>
<b>Assessment methods</b>	Written / practical test focused on verifying the learning of theoretical and applicative aspects
<b>Further information</b>	Laboratory visits are planned to attend tests on structural elements and full-scale structures
<b>Sustainable development goals - Agenda 2030</b>	<a href="#">\$Ibl legenda sviluppo sostenibile</a>