



## ALLEGATO 2.1

# REGOLAMENTO DIDATTICO DEL CORSO DI STUDIO INGEGNERIA STRUTTURALE E GEOTECNICA CLASSE LM-23

**Scuola:** Politecnica e delle Scienze di Base

**Dipartimento:** di Strutture per l'Ingegneria e l'Architettura

**Regolamento in vigore a partire dall'a.a. 2026-2027**

<b>Course:</b> Assessment and retrofit of reinforced concrete structures	<b>Teaching Language:</b> English
<b>SSD (Subject Areas):</b> Tecnica delle Costruzioni CEAR-07/A (ex ICAR/09)	<b>CREDITS:</b> 9
<b>Course year:</b> 2	<b>Type of Educational Activity:</b> TAF-B (Caratterizzanti la classe LM-23)
<b>Teaching Methods:</b> in-person	
<b>Contents extracted from the SSD declaratory consistent with the training objectives of the course:</b> The course is focused on general principles and detailed procedures for the assessment and retrofit of existing structures, with emphasis on reinforced concrete buildings under seismic action. First, the typical features, deficiencies and critical aspects of the structural response of existing structures are analysed. Then, the knowledge gathering process regarding geometry, material properties and structural details of existing buildings is discussed. Linear and nonlinear methods of analysis for existing buildings under seismic action are presented, as well as fundamentals of linear and nonlinear structural modelling. Capacity models for structural elements under flexure, shear and axial load are presented, aimed at the assessment of strength and displacement capacity. The performance-based approach to seismic assessment is discussed, also illustrating the comparison between demand and capacity at different Limit States in a spectral framework. Finally, strategies and techniques for retrofitting existing buildings are discussed, with traditional or innovative materials and technologies, illustrating how to choose the more adequate strategy and the more efficient technique based on the outcomes of the safety check performed after the assessment phase. A project exercise is assigned to the students, regarding the assessment and retrofit of an existing building, including knowledge process, modelling, safety assessment before retrofit, design of retrofit, and safety assessment after retrofit.	
<b>Objectives:</b> The student should be able to define a test campaign aimed at achieving a certain knowledge level of an existing structure, to understand the nonlinear response of an existing building under seismic action at the element and at the structural level, with respect to different performance levels, to understand the basic concepts regarding deformation capacity and strength of a structural element, distinguishing the different failure modes, to perform nonlinear modelling and analysis of a structure and safety checks, and to design an adequate retrofit program selecting the most appropriate strategy and technique based on the outcome of the safety checks.	
<b>Propaedeuticities:</b> - <b>Is a propaedeuticity for:</b> -	
<b>Types of examinations and other tests:</b> The exam will consist of an oral discussion on the topics illustrated during theory and practice lectures, as well as on the discussion of the project exercise.	

