



ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

INGEGNERIA STRUTTURALE E GEOTECNICA (STRUCTURAL AND GEOTECHNICAL ENGINEERING)

CLASS LM-23

School: Polytechnic and Basic Sciences

Department: Structures for Engineering and Architecture

Didactic Regulations in force since the academic year 2024-2025

Course: Design and retrofit of r.c. constructions	Teaching Language: English
SSD (Subject Areas): ICAR/09	CREDITS: 9
Course year: II	Type of Educational Activity: TAF-B (Caratterizzanti la classe LM-23)
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course is focused on general principles and detailed procedures for the design of new reinforced concrete (r.c.) buildings and for the assessment and retrofit of existing r.c. buildings, with emphasis on seismic action. First, methods of analysis for r.c. buildings under seismic action are illustrated, starting from the fundamentals of the dynamics of structures. Then, the nonlinear response of Single Degree Of Freedom structures is discussed, introducing the q-factor approach. The conceptual design of r.c. buildings under seismic action is introduced. Then, Performance-Based Earthquake Engineering concepts are illustrated, for seismic design at different Limit States. Modern earthquake engineering principles, based on the capacity design approach, are introduced as seismic design rules. Capacity models for single structural members are discussed. Then, the detailed seismic design procedure is illustrated. A project on the design of a r.c. frame building is assigned to the students. Then, the assessment and retrofit of existing r.c. buildings is taught, starting from the typical features and critical aspects of “non-conforming” (with current code provisions and design practice) structures. Methods of analysis for existing buildings are discussed. Fundamentals of the nonlinear static (pushover) analysis method are illustrated, too. Basic principles of linear and nonlinear modelling are discussed, as well as specific issues related to capacity models for the assessment of strength and displacement capacity of non-conforming r.c. elements. Finally, strategies and techniques for retrofitting existing r.c. buildings are discussed,	

with traditional or innovative materials and technologies. During the course, reference is made to seismic technical codes, with specific reference to Eurocodes.

Objectives:

This course strives to provide knowledge of the basic concepts regarding the fundamental principles of earthquake engineering and understanding of the modern approach to the seismic design of new r.c. buildings and seismic assessment and retrofit of existing r.c. buildings. The students should be able to analyse simple moment-resisting frame r.c. structures, for design of new buildings, defining the actions and the structural model, applying a method of analysis, and carrying out safety checks at the Limit States of interest, complying with technical code provisions. The students should also be able to understand the nonlinear response of an existing r.c. building under seismic action, to perform linear and nonlinear modelling, analysis, and safety checks, and to design an adequate retrofit program.

Propaedeuticities:

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Is a propaedeuticity for:

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Types of examinations and other tests:

The exam will consist of an oral test, focused on the theoretical discussion of the issues analysed during the course, including the discussion of the project.

WARNING: when compiling the Annex, it is essential to remember that it must be exactly the same as in the SUA (Annual single form of the Degree Program). If you wish to make any changes, you must consider that this action entails a change of Didactic Regulations or, if the field to be changed is RAD (University Didactic Regulations), of CdS detail sheet.