



Course: CONSOLIDAMENTO DELLE STRUTTURE IN C.A.		Teaching Language: Italian
SSD (Subject Areas): CEAR-07/A		CREDITS: 9 CTU
Course year: II	Type of Educational Activity: B	
Teaching Methods: in-person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Description of knowledge process of existing structures based on the current code provisions. Methods of investigation for determining material properties and structural detailing in existing structures. Analysis of the design methods based on previous code provisions and practice. Determination of structural detailing via simulated design. Fundamentals of performance-based approach for the seismic assessment of existing structures. Basic concepts regarding the response of elements/structures not designed according to modern seismic engineering. Methods of linear and nonlinear, static and dynamic analysis for the seismic assessment of existing structures. Principles of spectral approach for the assessment of the seismic demand and capacity. Fundamentals of linear and nonlinear modelling aimed at the seismic assessment of existing structures. Capacity models for the assessment of ductile and brittle behaviour of existing members. Modelling and assessment of damage to nonstructural elements. Methods for the assessment of the seismic capacity and determination of safety level. Retrofit strategies. Classification of interventions: local interventions, global interventions with partial upgrading, global intervention with full upgrading. Fundamentals and design approaches for retrofit strategies: (i) neutralization of brittle failures for the increase of strength and displacement capacity up to the first ductile failure; (ii) increase of displacement capacity only; (iii) reduction of displacement demand. Application of techniques based on the use of traditional or innovative materials and technologies. Project exercise regarding the retrofit of a reinforced concrete building including knowledge process, modelling, safety assessment before retrofit, design of retrofit, safety assessment after retrofit.		
Objectives: The main objective of the course is showing the scientific, theoretic, and experimental sources of code prescriptions, in order to make students able to consciously and critically apply them. With special reference to the course syllabus, first, the knowledge of an existing structure process is analysed in terms of evolution of code provisions, consequent typical features and critical aspects of existing structures built in different ages, aims and methods for investigating geometry, materials and structural detailing of existing buildings. Then, methods for seismic structural analysis are presented, including linear and nonlinear methods. This is aimed to make the students be able to perform nonlinear modelling, with a lumped plasticity approach, of a tridimensional reinforced concrete structure and to analyse it by adopting pushover analysis. Also, this is aimed to make the students able to consciously apply these analytical tools and correctly understand their results. Analyses' results in terms of demand must be compared with capacity limits. So, the course also focuses on capacity models for reinforced member elements under flexure and shear. This is done to make students able to perform the assessment of strength and displacement capacity of members, also considering the interaction between displacement demand and consequent damage with degrading capacity measures. Finally, potential strategies and techniques for retrofitting existing reinforced concrete buildings are discussed. This will allow students learning how to choose the more adequate strategy and the more efficient technique based on the outcomes of the safety check performed after nonlinear analysis. This is also to highlight pros and cons of the strategies and techniques proposed by literature and codes. To achieve all the above goals, theoretical lectures are associated with practical lectures in which the concepts at the basis of code provisions and code provisions themselves are practically applied and the outcome of this application is discussed and critically analysed.		
Propaedeuticities: none		
Is a propaedeuticity for: none		
Types of examinations and other tests: Oral test		