

Degree course	Science of Architecture
Course code	
Lecturer	Paolo Fuschi
Course name	Anti seismic design of reinforced concrete and masonry structures
Disciplinary area	Civil Engineering and Architecture
Disciplinary field of science	ICAR/08 Solids and Structural Mechanics
University credits - ECTS	6
Teaching hours	60
Course year	Second
Semester	First

Synthetic description

The course deals with topics aimed at understanding the physical-mechanical behavior of buildings in reinforced concrete and masonry subjected to seismic actions. Students will acquire the knowledge and skills that allows the structural analysis of existing buildings, with particular reference to the problems of territories characterized by a high level of seismicity. The learning route includes the study of the causes of structural degradation/disruption, the interpretation of the incipient cracks as well as of their propagation, the study of the intervention techniques and, in particular, the study of the structural typologies of residential buildings concerning their anti-seismic behavior.

Course entry requirements

Prerequisites: Fundamentals of Statics.

Course programme

Analysis of degradations and local collapse mechanisms in structures made of reinforced concrete or in masonry. Investigations, tests on materials and structural elements in situ and in the laboratory. Understanding of crack propagation. Technical standards for existing buildings. Knowledge levels of a structure. Adaptation, improvement, repair, or local intervention. Design criteria and types of intervention. Materials to be used and in situ techniques of structural elements. Case studies. The fulfillment of the AeDES form, for the evaluation of practicability and damage in post-seismic emergency, and of the CARTIS form for the Typological-Structural characterization of residential buildings.

Expected results

Students are required to possess the ability to recognize the main structural parts within existing buildings or within a new structure. Students should therefore acquire all the necessary skills to define a new structural intervention strategy which, starting from the detected real situation, eventually provides the executive actions following the technical standards focusing on the strength requirements of structures suffering seismic actions.

Course structure and teaching

Lectures (*hours/year*): 40
Exercises (*hours/year*): 20

Student's independent work

Exercises.

Testing and exams

The acquired knowledge will be verified through examinations taking place during and / or at the end of the course. An oral exam is scheduled at the end of the course, during which each student is expected to be prepared on the subjects dealt with in the Course. The oral exam concerns both theoretical, general concepts and a discussion on the applicative work developed along the year which is founded on the compilation of the CARTIS form for a Urban centre chosen by the student as applicative benchmark.

Suggested reading materials

In Italian:

S. Di Pasquale, C. Messina, L. Paolini, B. Furiuzzi- *Nuovo Corso di Costruzioni- Vol. 1-7*. Le Monnier 2009.
G. Menditto, *Fessurazioni nelle strutture*, Dario Flaccovio Editore, 2010.
M. Collepari, S. Collepari, J.J. Ogoumah Olagot, F. Simonelli, R. Troli, *Diagnosi del degrado e restauro delle strutture in c.a.*, Ed.Tintoretto, 2010.
S. Mastrodicasa, *Dissesti statici delle strutture edilizie*. Hoepli, Milano, 2003.
G. Croci, *Conservazione e restauro strutturale dei beni architettonici*, UTET, Torino, 2001.
C. Gavarini, G.C. Beolchini, G. Matteoli, *Costruzioni*, Hoepli, 1992, vol. 2 capitolo 8 pp. 219-256
Norme Tecniche per le Costruzioni: DM 14.01.08; Circ.617 del 02.02.09; D.P.C.M 9.2.11.
Manuale per la compilazione della scheda AeDES. Dip.to Protezione Civile.
Manuale per la compilazione della scheda CARTIS. Dip.to Protezione Civile- ReLuis.

In English:

F. P. Beer, E. R. Johnston, J.T. DeWolf, D.F. Mazurek. *Mechanics of Materials*, McGraw-Hill Education, 7th Edition, 2014.
E.P. Popov. *Engineering mechanics of solids*, Prentice Hall 2nd Edition, 1998.
R. Park, T. Paulay. *Reinforced concrete structures*, New York, London, etc.: Wiley, 1975.
T. Paulay, M.J.N. Priestley. *Seismic design of reinforced concrete and masonry buildings*, New York, Wiley 1992.