UNIVERSITY OF CAGLIARI
SCHOOL OF SPECIALISATION IN ARCHITECTURAL AND LANDSCAPE HERITAGE
aa.yy. 2022-23 and 2023-24

COURSE INFO

Professors
Antonio Maria Cazzani - Emanuele Reccia
Title of the course
Analysis of structural behaviour and instability of historical buildings
Scientific Disciplinary Sector
ICAR/08
Number of hours
50
Language
English
Objectives of the course
The course has a twofold objective: to provide students with the basic methods and applicative tools for studying the structural behaviour and to assess structural instability of buildings belonging to the historical architectural heritage. The acquired knowledge will be always referred to the study of traditional construction techniques and materials. The learned notions will be oriented toward a correct evaluation of structural behaviour in order to guarantee that restoration and strengthening interventions will be able to combine the necessary requirements of structural safety together with the respect of historical-architectural values.
Any prerequisites
Adequate structural skills obtained during a degree in Architecture are required: the minimum essential contents are those taught in courses of Statics, Structural mechanics, Structural analysis of historical architecture. The course is preparatory to: Strenghtening of historical constructions.
Topics and contents of the course
Basic concepts for understanding the behaviour of masonry material, both in relation to the *regola dell'arte* and to modern approaches for structural analysis. Discussion of mechanisms of collapse of masonry walls - and related verification methods - and of structural schemes of arches, vaults and domes under vertical loads - and related possible collapse mechanisms, with the aim of providing a complete understanding of the behaviour of the entire masonry building. Methodologies and tools for the mechanical interpretation of instability and cracks in historical buildings, also with reference to non-destructive tests for the mechanical characterization of materials and structures. The topics will be framed in technical regulations and applied to the case studies assigned to learners during the School's activities.
Methods of examination
The exam is intended to verify, by means of an oral interview, the acquisition by the students of methodologies and skills proposed during the course and, by means of a practical laboratory test, the capacity to apply concepts and tools which are necessary for the development of a structural project in the field of restoration.
Essential bibliography
M. Como*, Statics of historic masonry constructions*, Springer, Berlin 2013. J. Heyman, *The stone skeleton*, CUP, Cambridge 1995. S. Mastrodicasa, *Dissesti statici delle strutture edilizie*, Hoepli, Milano 1978. A. Giuffrè, *Lettura sulla meccanica delle murature storiche*, Edizioni Kappa, Roma 1991.

Further bibliographical information
J. Heyman, *The masonry arch*, Ellis Horwood, Chichester 1982. L. Galano, M. Betti, *Elementi di statica delle costruzioni storiche in muratura*, Società Editrice Esculapio, Bologna 2019. A. Borri, L. Bussi, *Archi e volte in zona sismica, meccanica delle strutture voltate*, Doppiavoce, Napoli 2011. *Linee guida per la valutazione e riduzione del rischio sismico del patrimonio culturale allineate alle nuove Norme tecniche per le costruzioni* (D.M. 14 gennaio 2008).
Didactic materials
The following will be made available to learners: PDF-formatted course slides; links to in-depth thematic articles published in open access.
External guests
Professor Gabriele Milani, Department of Architecture, Built Environment and Construction Engineering, Technical University of Milan: seminar activity on recent developments of analysis and modeling of masonry structures.