



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	ARCHITECTURE FOR THE SUSTAINABLE PROJECT IN THE BUILT ENVIRONMENT
INTEGRATED COURSE	CONSERVATION AND CONSOLIDATION OF BUILDINGS - WORKSHOP - INTEGRATED COURSE
CODE	21630
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	ICAR/09, ICAR/19
HEAD PROFESSOR(S)	CUCCHIARA CALOGERO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	CUCCHIARA CALOGERO Professore Associato Univ. di PALERMO VENTIMIGLIA GASPARE Professore Associato Univ. di PALERMO
CREDITS	10
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	<p>CUCCHIARA CALOGERO Tuesday 12:00 14:00 Presso stanza del docente. Edificio 8 Dipartimento di Ingegneria 2° piano Thursday 12:00 14:00 Presso stanza del docente. Edificio 8 Dipartimento di Ingegneria 2° piano</p> <p>VENTIMIGLIA GASPARE Wednesday 14:00 17:00 Stanza 128 (edificio 14, corpo a C, 1° piano) - si invitano gli studenti a contattare il docente tramite e-mail per confermare la propria presenza.</p>

DOCENTE: Prof. CALOGERO CUCCHIARA

PREREQUISITES	Basic knowledge of: Continuum mechanics of elastic systems; De-Saint Venant beam theory; Structural analysis methods
LEARNING OUTCOMES	<p>KNOWLEDGE AND UNDERSTANDING Knowledge regarding:</p> <ul style="list-style-type: none">- Strength characteristics of brick masonry wall;- Seismic behavior of masonry buildings;- Existing masonry buildings. Diagnostic investigation of masonry structures;- Assessing the seismic vulnerability of masonry buildings;- Analysis of masonry arches and vaults;- Foundation Failure. Strengthening of the foundation;- wooden floors;- Design for Composite Concrete Slab and Wood Beams.- Diagnostics and preliminary cognitive investigations.- Restoration techniques. <p>APPLYING KNOWLEDGE AND UNDERSTANDING The skills transferred to the student are:</p> <ul style="list-style-type: none">- The design of the structural elements- Prediction of structural behaviour;- Interpretation of the structural behaviour in order to identify required local and global verifications.- Ability to study historical architecture by diagnosing defects and identifying suitable restoration techniques. <p>MAKING JUDGEMENTS</p> <ul style="list-style-type: none">- The student will have acquired the ability to choose and apply the most suitable verification and/or design criteria.- The student, as a consequence of the ability acquired in the evaluation of structural safety, will be able to give self-reflections on the effectiveness of the different design solutions. <p>COMMUNICATION</p> <ul style="list-style-type: none">- The student will be able to communicate and express problems concerning the static and dynamic behavior of architectural buildings of a historical nature.- The student will be able to hold conversations on topics related to the structural safety and the planning and design of interventions of consolidation or structural reinforcement, to envisage ideas and offer solutions to both specialists and non-specialists. <p>LEARNING SKILLS The student, on the basis of knowledge gained in the structural field, will developed the learning skills necessary to continue his engineering studies with autonomy.</p>
ASSESSMENT METHODS	<p>a) Oral examination with discussion of work of structural rehabilitation and restoration prepared during the course. The interview is aimed at determining the student's ability to process the knowledge gained finalized to problem solving and the ability to express the course topic using a technically correct language.</p> <p>b) The evaluation is expressed out of thirty according to the following scheme:</p> <p>29-30 (with possible honors) if the evaluation is excellent, with excellent knowledge of the topics and language properties, good analytical skills and application of knowledge to solve the proposed problems.</p> <p>26-28 if the assessment is good, with clear command of the arguments, full ownership of language and critical ability to apply the acquired knowledge to solve the proposed problems.</p> <p>21-25 if the assessment is fair, with basic knowledge of the main topics, fair language properties, acceptable ability to apply the acquired knowledge.</p> <p>18-20 for sufficient evaluation, with minimal knowledge of the main topics and elementary ability to independently apply the acquired knowledge.</p>
TEACHING METHODS	Lessons, Laboratory

MODULE
STRUCTURAL CONSOLIDATION OF BUILDINGS

Prof. CALOGERO CUCCHIARA

SUGGESTED BIBLIOGRAPHY

Michele Vinci. Metodi di calcolo e tecniche di consolidamento per edifici in muratura. Dario Flaccovio Editore
Rodolfo Antonucci. Restauro e recupero degli edifici a struttura muraria. Maggioli Editore
Materiale didattico fornito dal docente

AMBIT	20875-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	55
COURSE ACTIVITY (Hrs)	70

EDUCATIONAL OBJECTIVES OF THE MODULE

The purposes of this didactic module consist in providing professional skills concerning the conservative recovery of masonry buildings and architectures of historical interest, in compliance with the current regulations for the protection of historical buildings. In particular, the training objectives consist in providing students with the skills to evaluate the resistance capacity of structures, with particular regard to seismic actions and the ability to design any compatible and reversible structural reinforcement interventions.

SYLLABUS

Hrs	Frontal teaching
2	Reminder of structural mechanics
2	Strength characteristics of brick masonry wall
3	Seismic behavior of masonry buildings
8	Existing masonry buildings. Diagnostic investigation of masonry structures.
8	Assessing the seismic vulnerability of masonry buildings
3	Analysis of masonry arches and vaults
4	Foundation Failure. Strengthening of the foundation
3	wooden floors
2	Design for Composite Concrete Slab and Wood Beams
Hrs	Workshops
35	Earthquake Resistant Design and Rehabilitation of Masonry Structures

MODULE DIAGNOSTICS AND INTERVENTION THERAPIES

Prof. GASPARE VENTIMIGLIA

SUGGESTED BIBLIOGRAPHY

Ventimiglia G. M., Le indagini diagnostiche per il restauro dell'architettura storica, dispensa didattica.
Musso S. F., Tecniche di restauro, Utet, 2013.
Altri materiali didattici saranno forniti dal docente / Other teaching materials will be available to students.

AMBIT	20875-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	55
COURSE ACTIVITY (Hrs)	70

EDUCATIONAL OBJECTIVES OF THE MODULE

The restoration, reuse and maintenance of ancient architectures are some of the most relevant purposes of contemporary society, and they also attract the interest of the international scientific community. The historical architectures preserve the stratified traces of our culture and the didactic path of the "Laboratorio di conservazione e consolidamento degli edifici" intends to provide students with the fundamental knowledge that is necessary for the analysis of buildings, the diagnosis of the state of conservation and the project of intervention therapies in order to remedy the forms of degradation and instability of materials and structures.

The integrated didactic modules that make up the Laboratorio therefore deal with some of the critical issues of the restoration of monuments, such as the problems of structural consolidation of buildings, instrumental diagnostics, and intervention techniques on site.

In order to preserve and maintain traditional masonry buildings, students will acquire the skills necessary to evaluate the resistance capacity of structures with particular regard to seismic actions, and propose reinforcement interventions that are compatible with the characteristics of historic buildings, limiting their invasiveness. In addition, the training course intends to provide the notions useful for developing the analysis of historical architectures, the processing of the diagnosis of defects and the purpose of intervention therapies to remedy the forms of degradation and instability affecting materials and structures. In particular, the didactic module "Diagnostica e terapie d'intervento" aims to transmit the fundamental knowledge to plan and carry out diagnostic investigations, preferring those of a non-destructive or minimally invasive character, through the use of more current tools and operating methods in order to draw up an effective diagnosis to support construction site interventions for the conservation of architectural heritage. The discussion is supported by the exposure of diagnostic applications carried out in the context of conservation sites.

Students will learn to orient themselves among the possible choices by focusing attention on the restoration techniques most compatible with materials and construction systems and in accordance with the criteria of 'potential reversibility', 'distinguishability' and 'minimal intervention'.

SYLLABUS

Hrs	Frontal teaching
2	Diagnostic investigations for the restoration of monuments, critical aspects. Regulations and classification of diagnostic investigations.
2	Ground investigations: methods and application examples.
5	Indirect on-site diagnostic investigations. Thermography: methods, tools and examples of applications.
5	The radar survey: methodology, tools and examples.
4	Sonic or ultrasonic investigations: method and applications.
4	Direct or minimally invasive investigations on site: methods and examples. Seismic investigations, humidity measurements, sclerometric tests, resistographic investigation, tests with flat jacks.
3	Collection and sampling of materials of historical architecture. The laboratory investigations.
1	The techniques of restoration, introduction and critical issues.
5	The pre-consolidation techniques. Cleaning methods.
5	Consolidation methods.
3	Methods of protection.
1	Reintegration techniques. Systems for dehumidification.
Hrs	Workshops
30	Drafting of a restoration project of historical architectures with particular reference to structural rehabilitation, planning of diagnostic investigations and conservation techniques.