UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura
ACADEMIC YEAR	2021/2022
SECOND CYCLE (7TH LEVEL) COURSE	ARCHITECTURE FOR THE SUSTAINABLE PROJECT IN THE BUILT ENVIRONMENT
SUBJECT	TECHNIQUES FOR THE SUSTAINABLE RECOVERY OF ARCHITECTURE
TYPE OF EDUCATIONAL ACTIVITY	B, C
AMBIT	50396-Discipline tecnologiche per l'architettura e la produzione edilizia| 20875-Attività formative affini o integrative
CODE	21638
SCIENTIFIC SECTOR(S)	ICAR/10
HEAD PROFESSOR(S)	CAMPISI TIZIANA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	8
INDIVIDUAL STUDY (Hrs)	128
COURSE ACTIVITY (Hrs)	72
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CAMPISI TIZIANA** Tuesday 14:30 15:30 Ufficio del docente, stanza n.37 del Dipartimento di Architettura (d'ARCH), edificio 8, scala F4, piano secondo, Scuola politecnica

DOCENTE: Prof.ssa TIZIANA CAMPISI

PREREQUISITES	Knowledge and application of survey techniques and technical-architectural drawing; previous knowledge of architectural history and technical architecture and/or architectural technology; -Knowledge of the technical characteristics of basic and traditional materials: natural stone, brick, wood, iron and different metals, mortars, resins and organic materials, composites;
LEARNING OUTCOMES	Knowledge and understanding The student will acquire full historical-technical competence in the field of protection and recovery of the existing architectural heritage and awareness of the main problems that pertain to this professional field. In particular, the student, aware of the various levels of intervention, from maintenance to restoration, to restructuring, will be able to identify the causes, forms and effects of deterioration and disruption, and will have a wealth of conceptual, methodological and operational knowledge available to him. will allow to understand the role and professional opportunities for the Master Architect in the field of restoration and conservation of buildings. In detail, the knowledge will concern: more frequent applications and main technical characteristics of the materials of historical architecture and those for the most advanced recovery; technical and construction elements of traditional building; recognition of the most frequent forms of deterioration and damage; regulatory aspects relating to building recovery and conservation of historical architecture; documents necessary for the survey of existing buildings and for the recovery project. The understanding will concern: interpretation of the causes that produce the most frequent deteriorations and failures; choice of the most suitable methods to solve specific functional, technological-constructive and static problems; identification of new functions compatible with the characteristics of the analyzed building; choice of intervention techniques to be adopted, with particular attention to those aimed at sustainability. The student: - will know the specificities of the recovery process compared to the new one; - will know traditional technologies, will be able to analyze the residual performance of the existing building and elaborate a pre-diagnosis relating to the causes of deterioration and instability of the building; it will intervene by applying sustainability parameters applied to the recovery project. Ability to apply knowledge and understanding Through the illustration of several emblematic examples and case studies - also with interventions by external professionals and, if possible, technical visits - and through the carrying out of a design exercise, the student will be encouraged to develop a specific ability to apply the methodologies and of the investigation and intervention techniques gradually acquired with respect to the different environmental, morphological, typological and technological-constructive situations. In particular, the design exercise is organized in such a way as to put the student in a position to deal with a concrete professional case that will cross the geometric and constructive survey of the building, the phases of the analysis of the pathologies, the study of the interventions and the project functional at the level of final design with various executive insights. A case study will be chosen in coordination with other first year courses of the same CdL relating to the historic center of Palermo and which focuses on a complex with a strong architectural and urban value that allows for very broad design variations. The skills transferred to the student concern: - the acquisition of full historical and technical expertise in the field of protection and recovery of the existing architectural heritage and awareness of the main problems that pertain to this field of work; - the ability to interpret the various issues through the illustration of different case studies; - design exercise organized in such a way as to put the student in a position to deal with a concrete professional case; - ability to transfer on a graphic basis the activities for the knowledge of the artifact, the preparation of the geometric and constructive survey, the analysis of pathologies and instabilities, the technical-constructive concepts related to the recovery project; - the interpretation of the most recurrent structural problems of historical buildings; - ability to identify the appropriate interventions of the functional project at the final design level, with various executive investigations; - the design of innovative and sustainable technological interventions on the existing building. The student, after following the aforementioned teaching, will know:

	- analyze the existing building and the context in which it is inserted in order to identify the most appropriate uses for the abandoned building; - design a sustainable technological recovery intervention on the building and detail scale. Autonomy of judgment At the end of the course, the student will have developed a specific critical ability in identifying the most suitable technical solutions in relation to the different situations in the field of restoration and conservation of buildings. Above all through the illustration of case studies he will be led to understand, by analogy and differentiation, how the themes object of the design in existing buildings and in ancient contexts do not lend themselves to standardized solutions, but rather require an autonomous capacity in interpretation of phenomena and choice of solutions. At the same time he will understand his own specific professional profile with respect to the plurality of skills that are required to address the issues of intervention in the existing building stock in an integrated form. The student will acquire the ability to choose and apply the most suitable verification criteria and / or intervention project in relation to the various problems in the field of restoration and conservation of buildings. The student will be able to critically choose known and innovative components and materials for recovery, compatible with the existing ones and based on sustainable design criteria in building recovery. The student will be able to make the choice of the recovery project in compliance with current regulations, but also in compliance with the historical and aesthetic value of the building, independently assessing the effectiveness of the various design solutions. Communication skills During the lectures and seminar activities the student is encouraged to interact in order to develop his skills for comparison on general and specific topics. The student is asked to present, by stages of progress, the experiments conducted during the design exercise, and therefore to critically argue the results of the analysis activity and discuss the solutions that are being adopted. The student will have acquired the ability to communicate and express problems related to the functional and constructive consistency of the buildings under study, as well as mastery of design in the field of sustainable technologies applied to building restoration. The student will be able to adopt from time to time the communication tools deemed most effective in a modern interpretation of the profession, as well as suitable specially defined graphic representations, multimedia presentations and three-dimensional modeling developed with the most updated graphic rendering programs. Learning skills The student will be directed to understand how the theoretical and conceptual foundations and the regulatory complex of the discipline should be progressively updated with respect to the debate around the recovery and conservation interventions. On the basis of the knowledge acquired, the student will be able to learn more from sources in the scientific literature and update himself on new techniques and new materials used in technologies for the recovery of historical architecture. During the course the student will be directed in order to gain awareness of the importance of a permanent update for maintaining a good level of knowledge and professionalism. The student is able to independently conduct research on techniques, materials and case studies, critically extracting information useful for the development of the sustainable recovery project. In addition, learning skills related to: - design interventions to improve the energy performance of traditional architecture; - suggesting interventions for the improvement of traditional architecture through the principles of bio-architecture; - verify the sustainability of the rehabilitation project; - collaborate in the planning of recovery interventions; -contribute to the implementation of bottom-up local development practices through reuse and territorial, environmental and social regeneration in the urban environment; - knowing how to use reuse as an element of the aggregation process of different subjects; - pursue the goal of reuse, recycling, feasibility of projects with local materials and skills.
ASSESSMENT METHODS	

	The exam will consist of an oral test that will focus on the discussion of the topics covered by the Lessons and the Design Exercise; During the exam, the student must demonstrate: - knowledge about how apply the theoretical contents of the course and the exercise; -knowledge about how apply compatible and sustainable recovery intervention methodologies according to the regulations and legislation for rehabilitation interventions on existing buildings; - knowledge about how use an appropriate technical language and knowledge about how motivate individual choices related to the specificity of architectural recovery. Evaluation criteria Oral examination. The evaluation is expressed using evaluation expressed in thirty, with possible honors. The exam will focus on verifying the quality of the critical synthesis of the course contents and the design documents drawn up by the student during the course, from analysis to the project. The exam will tend to recognize the student's ability to analyze the characteristics and criticalities of the historic building assigned, to propose suitable solutions for redevelopment, recovery and enhancement, to respond correctly to questions that the exam Commission deems to ask, as well as the ability to express himself/herself with an appropriate language on the topics under consideration. The oral exam consists of examining the analysis and design documents of a historic architecture, and an interview, aimed at ascertaining the possession of the disciplinary skills and knowledge required by the course. The questions, specially prepared to test the expected learning outcomes, will tend to verify: a) the knowledge acquired; b) processing skills, c) possession of adequate exhibition skills. a) As regards the verification of knowledge, the ability to establish connections between the contents (theories, models, tools, analysis and project drawings, etc.) object of the course will be required. b) As regards the verification of processing skills, at least one of the following three objectives will be indicated: b1) provide independent judgments on the disciplinary contents; b2) understand the applications or implications of the same within the framework; b3) place the disciplinary contents within the professional, technological or socio-cultural context of reference. The maximum score is obtained if the verification ascertains full possession of the following aspects: the ability to judge capable of representing the main aspects of the discipline; a mastery in the ability to represent ideas and/or solutions within the professional, technological or social-cultural context of reference. c) As regards the verification of the exhibition skills, there is a minimum evaluation in the case in which the candidate demonstrates a language property that is just adequate to the professional context of reference, while the maximum evaluation can be achieved by those who demonstrate full mastery of the sectoral language.
EDUCATIONAL OBJECTIVES	The course aims to develop in the learner a thorough and critical knowledge of the problems and methodologies of project development in sustainable building rehabilitation interventions. The topics of the didactic module will focus on the choice of intended use based on the real predisposition of the building, the definition of the quality objectives of the recovered architectural artifact, the quality control of the project, the development of technological design with the use of sustainability principles, in order to ensure the quality levels connected with compliance with the requirements characterizing the intended use. The theoretical contents of the teaching and the critical verification of the same will be deepened through the specific exercise. It will be emphasized how the technological-structural problems of monuments and historical buildings involve, first of all, the ability to read the architectural organism and to face its complexity, underlining in an indelible way, the need to establish new connections between the resistant structure and plant of the building, between design and future modification.
TEACHING METHODS	Learning modalities The teaching methodology uses an investigation system that is useful for understanding the buildings in their physical consistency and for deepening the complex relationship between analysis, design and possible execution steps. This relationship is broken down into stages of implementation which, according to a serial learning logic, passes through the choices of the most appropriate materials and construction systems, of the bearing structure and of the articulation of spaces and functions.

	The didactic commitment unfolds from a reflection about the techniques, forms and languages of architecture, in order to to reach the goals of the best conservation of the existing historical heritage, addressing the issue of updating traditional techniques and innovation in materials and building components with concrete examples. Some reflections will be initiated with the students regarding the topics presented during the lessons and the performance of the individual exercises of the year, articulated in intermediate deliveries, collective and individual reviews, final delivery. Didactic tools The lessons will provide the student with general and in-depth knowledge regarding the construction of historical architecture; an updated framework of the most usual technical procedures regarding interventions on existing buildings and the regulations governing the matter. The lectures, exercises and educational visits will provide the student, through the study of typical cases, field surveys and a design exercise on an existing building, a knowledge of diagnostic techniques and interventions necessary for the recovery and use of the historical buildings.
SUGGESTED BIBLIOGRAPHY	- Desogus G., Riqualificare, integrare, sostituire - il miglioramento della prestazione energetica del patrimonio costruito, EdicomEdizioni, Monfalcone, 2018 - J. Gaspari, Trasformare l'involucro. La strategia dell'addizione nel progetto di recupero. Tecnologie per la riqualificazione sostenibile del costruito, Edicom 2012 - Ferrante A., Adeguamento, adattabilità, architettura – teorie e metodi per la riqualificazione architettonica, energetica e ambientale del patrimonio edilizio esistente, Bruno Mondadori, Milano, 2012 - Wallnofer D., Tramonte Silvano U., Benessere e sostenibilità nel recupero edilizio; Hoepli 2019 - Landolfo R. (cur.) Losasso M. (cur.) Pinto M. R. (cur.), Innovazione e sostenibilita' negli interventi di riqualificazione edilizia. Best practice per il retrofit e la manutenzione, Alinea editore, 2013 - P. Davoli, Il recupero energetico ambientale del costruito. Maggioli editore 2010 - Gulli R., Recupero sostenibile del patrimonio costruito in ambito sismico, Edicom editore, 2014 - Dispense didattiche fornite dalla docenza su argomenti svolti a lezione.

SYLLABUS

Hrs	Frontal teaching
2	Typologies of historical buildings and characters. Specificity of architectural recovery: fundamental definitions and basic notions. Historicized concepts of ordinary and extraordinary maintenance, recovery and requalification, rehabilitation and adaptation. Intended use between conservation and modification: emblematic examples of recovered architecture in order to determine the intended use based on their own vocations and the territory. Types of compatibility and types of adjustment in the intervention; decision-making choices in the design and construction phase.
8	Traditional construction materials and technical elements of historical architecture for the sustainable recovery of architecture: - Natural stone, artificial stone, metal materials, wood, etc. - Masonry, floor and roof floors, pushing construction systems (arches and vaults), finishing construction systems, etc.
4	Preliminary analysis and pre-diagnosis necessary for the definition of sustainable recovery interventions. Technological design of recovery interventions: decay and instability, durability of the works, residual performance, identification of compatible and compliant technological solutions.
8	Innovative materials for the sustainable recovery of architecture. Trend lines of innovation in the construction sector. Choice of materials and construction techniques, guided by eco-sustainability criteria. Sustainable materials in terms of nature, origin and recyclability or possibility of disposal of raw materials and energy consumption and emissions related to the production process and logistics. Use of traditional construction methods, with the support of modern technologies, and natural materials, not resulting from the processing of polluting chemicals, guaranteeing both human and environmental well-being. Construction systems derived from traditional ones, of which they retain the main aesthetic and functional characteristics, made more efficient in terms of energy saving thanks to the integration of insulating materials, windows and finishes produced with modern technologies. Innovative materials and techniques for the recovery of load-bearing masonry construction systems; Innovative materials and techniques for the recovery of wooden construction systems; Innovative materials and techniques for the recovery of construction systems in reinforced concrete; Innovative materials and techniques for the recovery of metal construction systems; Case studies on architecture relating to the use of innovative construction materials / techniques.

SYLLABUS

Hrs	Frontal teaching
2	Project qualification and control: spatial functional aspects, physical environmental aspects, technological aspects. Internal environmental quality and energy efficiency Retrofit, design and maintenance. Construction techniques and plant integrations for the sustainable recovery of architecture
6	Examples and case studies of recovery building yards Functional recovery interventions Technological recovery interventions Interventions aimed to improve the energy performance of the architecture to be recovered. Interventions aimed at defining strategies for Design for all Integrated design, tools for assessing and verifying the sustainability of the construction
2	Technical regulations and architectural recovery

Hrs	Practice
20	Preliminary identification of the case study. Analysis of the context, also in relation to the historical evolution of the building. Geometric-constructive survey of the building unit, with identification of the material, technical and geometric complexity of the environments and of the different parts that make up the building. Residual performance analysis and regulatory checks
20	Final / executive project for the sustainable recovery of the architectural artefact under investigation, with refurbishment compatible with the original characteristics and design insights in the construction, structural and plant engineering fields. Construction details and cost forecast of the planned works