

Degree course:	LM4_Architettura quinquennale c.u
Course code:	SAR 10
Lecturer:	Francesca Giglio
Course name:	Materials for Architecture
Disciplinary area:	B
Disciplinary field of science: ICAR	CEAR-08/C
University credits – ECTS:	6
Teaching hours:	60
Course year:	1°
Semester:	2°
Monodisciplinary course: YES/ NO	YES
Integrated course / Laboratory (Specify the name of the integrated course / laboratory)	NO

CONTENTS

1_DESCRIPTION

The Course contributes to the definition of the General and Basic Knowledge foreseen for the 1st and 2nd years of the Master's degree course and represents a preliminary Discipline for the Material Culture, Technical Control and Construction of the Architectural Design, in line with the training objectives of the Master's degree course, using the project as a "specific" form of interpretation and reconfiguration of the architectural, material and object aspects and the technological and environmental culture of the design (art 5 Master's degree course Teaching Regulations).

Operationally, its contents and articulation are aimed at the critical analysis of the material constitution of the building, in line with the specific objectives of the Master's degree course related to the adequate knowledge of the physical problems, technologies and function of buildings, making them comfortable and responsive to the new challenges of climatic factors (art 2 Master's degree course Teaching Regulations).

The Course belongs to and deepens the contents of the disciplinary scientific group of Technological and Environmental Design of Architecture, with reference to the knowledge, methods and tools for the planning, design, implementation, management and decommissioning of interventions at different scales.

The contributions of the Course contribute to innovation in the training of the Architect Designer, where Building Materials and Technologies of production and use, represent the central element of the realization of the architectural artifact in the realization of Environmental Transformation

Processes. Within the training, the Course assumes a pre-eminent and cross-cutting supporting position with respect to all the other disciplines that make up the Area and the broader domain of Design.

2_COURSE PROGRAMME

The Course is placed within the evolutionary processes of Technological and Environmental Design of Architecture, innovating in content, with respect to the processes of transition and decarbonization in response to the emerging needs arising from the human-artefact relationship and technology in its material and digital components. The issues related to reducing the consumption of natural resources and waste, involves construction and material innovation, in line with the increasingly present principles of sustainability and circular economy, both with respect to the evolution of construction systems and the use of materials with low environmental impact, recycled content and recyclable. To these needs, for about two decades building production, in order to respond to increasingly advanced regulatory targets in terms of performance, has been placing on the market materials, products, and components that have profoundly changed the concept of traditional materials, proposing innovative, sustainable, efficient materials and technological solutions.

On the whole, Materials for Architecture is the captivating locution that outlines the scenario of disciplinary culture within which the Training Path is articulated, which outlines and declines the bed of design intelligence that, from time immemorial, governs the process through which the Thought of Architecture becomes Built. A reservoir of knowledge and know-how that structures the body of choices that the Project must take, so that its Form, hypothesized, conquers concreteness.

The correlations with the other disciplines of the I year, are strongly transversal for the purpose of technical control of the project, through theoretical and experimental insights on the aspects of environmental sustainability and material and building innovation for the design.

As such, the discipline will address the following issues and educational aims, with respect to the expected outcomes described below, through the following assumptions:

- 1) Investigating the Materials Technologies, identifying such study with the Culture of Awareness, the knowledge of the means, their production cycle and their place in the realization process of the final good;
- 2) To consider as a priority: the study of the relationships existing between the Architectural Organism, its components as structured sets of interacting parts and the Contexts, Socio-Technical and Natural characteristics;
- 3) To define a path of knowledge of the material characteristics, in relation to the problems of stability, protection and durability that building parts are called upon to fulfill;
- 4) To construct an approach to material and technical choices, related to the consideration of environmental characters, evaluating the character of their impact, considering the life cycle of materials, from their production to their use, to their disposal;
- 5) To construct a *forma mentis* where the formal aims of Architecture are not distinguished from the possibility of realizing them through Materials, their characteristics and language.

The experimentation will consist of the Verification of the Year and will cover partial evaluations (for each Cycle of Study defined in the typology of Formative Activities) and the evaluation of the papers produced during the training and enclosed in a Personal Book and related to the in-depth study of the following themes developed during the three Cycles of Study, specified in the typology of Formative Activities:

1. Monographic Studies on Construction Materials

2. the Building/Environment Relationship
3. the Building/Soil Relationship
4. the Building/Structure Relationship
5. Construction and Site Aspects

3_EXPECTED RESULTS

In relation to the topics covered, in order to be able to detect the degree of preparation of the Students, articulated according to what is defined at European level, through the five Dublin Descriptors related to each other:

Knowledge and understanding

The student during the Course will acquire knowledge and critical skills on theoretical and experimental aspects related to Materials for Architecture within the context of material innovation, closely related to environmental and constructive sustainability for the project.

Applying Knowledge and Understanding

The Student, on the basis of the technical/constructive information deepened during the Course and the application of the in-depth investigation methodologies, will acquire the ability to autonomously and critically elaborate the problematic aspects of the architectural artifact and its relationship with the environmental and climatic context as a "specific" form of interpretation and reconfiguration of the architectural, material and object aspects and the technological and environmental culture of the project.

Making Judgements

The Student, on the basis of the theoretical insights and exercises in progress, will acquire a critical ability to read, compare and evaluate the technical/construction information related to the construction production of building materials and the aspects inherent to the saving of resources; environmental impacts and the reduction of harmful emissions; all through a critical, unified reading of the behavior of the architectural artifact reread as a Building Organism.

Communication Skills

The Student, on the basis of the required work, through monographic studies on the physical and productive innovation of materials and the graphic works related to the constructive evolution of technical elements, will acquire the ability to organize the same works, according to a logical deductive path, to be publicly exhibited in the examination.

Learning Skills

The Student at the end of the Course will acquire skills in analytical methods of investigation and evaluation, useful for his or her own self-study on evolving topics such as the field of Construction Materials and Building Systems.

Students, therefore, are required to carry out exercises and partial verifications, according to the teaching schedule. To support these activities, Teaching Materials will be provided - in advance - with specific Bibliographies, Bibliographical Sheets, Cognitive Sheets, Anthological Materials, etc.

SPECIFIC COURSE OBJECTIVES

In order to achieve the expected results for the proposed course program and experimentation, the educational offerings articulated in the different activities pursue the following Training Objectives:

- Qualifying Training Objectives:

The theoretical aspects addressed contribute to the Formative Profile from curricular experiences as per the Manifesto (EU Architect), using the project as a "specific" form of interpretation and reconfiguration of architectural, material and object aspects and the technological and environmental culture of the project

- Specific Training Objectives:

The Course, with reference to the theoretical and experimental aspects addressed, contributes to innovation in the training of the Architect Designer, through the study and analysis of the evolution and experimentation of Building Materials and the production and use technologies, understood as central elements of the Realization of the Architectural Artifact in relation to the control of Environmental Transformation Processes.

ACCESS REQUIREMENTS

Materials for Architecture, being a teaching placed in the first year, does not require prerequisites. The course provides all the necessary knowledge and tools to be able to tackle the topics of the indicated topics

TEACHING METHODS

1_ COURSE STRUCTURE AND TEACHING

Lectures (Classroom Hours/Year): 45

Exercises (Classroom Hours/Year): 15

Course Frequency will be ascertained and evaluated through three Cycles of Study in Semester II:

- a Formative and Orientation Cycle (from the 1st to the 3rd Week of Activities)

Material Culture and Design Culture

- a Knowledge Cycle of the Behavior of Materials in Use (4th to 7th Weeks of Activity)

Materials Science as a Knowledge Support

- a Cycle of Information on Technical-Constructive Elements (8th to 12th Weeks of Activity)

The Construction of Architecture

Material Culture and Design Culture.

Definitions, classifications, and historical systematization of materials, utilization techniques, and factors of production; critical principles and references to the processuality of design and construction:

- materials culture and design culture: relationships between matter and form;
- materials in the history of architecture;
- materials and evolution of production factors;
- knowledge of materials as a constitutive factor in the building process;

Materials Science as a Knowledge Support

Materials Science as an indispensable Knowledge support for understanding their behavior and use in construction; relationship between construction principles and design choices; references to demanding and performance goals and principles of eco-sustainability:

- materials information pathways;
- the nature of materials;

- the "quality" of building materials; the objectives of environmental well-being and eco-sustainability of choices; analysis and comparisons of alternative construction solutions (classifications, characteristics, performance; from the conforming technical solution to the building element);
 - the physical-technical problems of the confined environment; environmental conditioning for human well-being;
 - the physical behavior of building materials, in relation to environmental requirements;
 - low-impact, reuse, recycling materials and technological solutions;
 - building materials in comparison (classifications, characteristics, performance);
- The Cycle will conclude with tests and other checks on the levels of acquisition achieved.

The Construction of Architecture

Relationships between housing reasons, materials, construction techniques, and architectural form; appropriate technologies, problems of durability, reliability, and maintainability:

- the building organism as a system of functions;
- the constituent elements of the building organism;
- the construction process;
- other classifications of the building apparatus, with reference to industrialized processes;
- the construction process (workability of the material; ways and means of achieving construction)
- Design criteria, taking into account functional, durability and conservation requirements

In Conclusion of the Training Activities, partial and final, a Final Workshop is planned, to be held in the first Week of the Final Trial and Examination Activities, scheduled for the Academic Year (between May 20 and 24, 2024).

2_ AUTONOMOUS LEARNING OF THE STUDENT

Considering the ratio for each ECTS = 25 hours (10 hours frontal/15 hours by the Student)

Students, on the recommended texts, should study the topics covered in the lectures and summarize them through:

- Personal Elaborations that summarize the bibliographic insights with the graphic elaborations, photographic documentations, summary and summary sheets;
 - Intermediate Verifications for each Cycle of Study;
 - Preparation for the Final Examination;
- all, for a total of 90 hours

ASSESSMENT METHODS

In relation to the topics covered in the three Cycles, Students are required to carry out exercises and partial verifications, according to deadlines to be specified. To support these activities, in advance, they will be provided with Teaching Materials, with specific Bibliographies, Bibliography-Type Sheets, Knowledge Sheets on Technological Systems, anthology material, etc., which, later, will be specified.

Mode of conducting the examination: Theory/Practice.

The following examinations (midterm and final) are expected:

- Intermediate review on the program on lectures and seminars with special reference to theoretical aspects of building materials (between May 12 and 16, 2025, teaching available)
- Final Verification Final Review/ WORKSHOP with special reference to graphic works on construction elements produced during the year (between May 19 and 23, 2025, Workshop)

- Final Year Verification (Final Examination).

The Verification of the Year, aimed at certifying the 6 CFUs provided, will consist of an Examination Talk, a reconsideration of the Part Evaluations, and an Evaluation of the Works Produced during the Year, summarized in writings, graphs, photographic documentation, etc., enclosed in a Personal Book. The Book will be a kind of Portfolio, produced at the direction, containing indications of the Training Path followed. More in detail, it is assumed that it can be articulated according to the following structure:

- Notes, with Summary Sheets, Comparison Tables and Charts, according to the specific index-guides.
- Monographic Studies on the Materials Studied: It is envisaged the production of Fact Sheets on the materials investigated referring to the evolution of the material in the History of Architecture; evolution of production factors; relations between matter and form; quality of the material; physical behavior of the material in relation to environmental needs; ecological character of the material: energy flows and cycles of matter.
- Graphic elaborations with drawings, comments and annotations; using official graphic conventions and concerning the theoretical deconstruction of a theoretical building.

The elaboration of various technical alternatives is expected, with particular reference to innovative and technical/constructive aspects deduced from manuals and the production sector.

The work will be individual and, in part, produced in the classroom as indicated in the verifications.

RECOMMENDED TEXTBOOKS

- Baratta A.F.L. (2020), *Materiali per l'Architettura*, CLEAN Edizioni, Napoli
- Campioli A. Lavagna M. (2013) *Tecniche e Architettura*, Novara 2013, Citta Studi Edizioni
- Giachetta A. Novi F. Raiteri R (2019) *La costruzione dell'idea, il pensiero della materia. Riflessioni sul Progetto di Architettura*, Roma, Franco Angeli Editore
- Pellizzari A. Genovesi E. (2021) *Neomateriali 2.0 nell'economia circolare*, Edizioni Ambiente
- Puglisi V., Cazzaniga M. (2022), *Costruire un edificio. Tecniche, sistemi e materiali costruttivi*, Maggioli Editori, Santarcangelo di Romagna

- Reference Sitography:

- www.edilportale.com
- www.infobuild.it
- www.materialdesign.it
- www.materially.eu
- www.matrec.com