UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	BUILDING ENGINEERING
SUBJECT	ARCHITECTURAL ENGINEERING AND TECHNOLOGICAL INNOVATION
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50354-Architettura ed urbanistica
CODE	17092
SCIENTIFIC SECTOR(S)	ICAR/10
HEAD PROFESSOR(S)	CORRAO ROSSELLA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	142
COURSE ACTIVITY (Hrs)	83
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CORRAO ROSSELLA** Thursday 9:00 11:00 Dipartimento di Architettura (ex DPCE), Ed. 8, piano secondo, Stanza Docente n.35

DOCENTE: Prof.ssa ROSSELLA CORRAO

TEACHING METHODS	Lectures, Practical classes, Guided Tours
ASSESSMENT METHODS	Written and Oral examination; Graphic design project description. Test assessment (on paper). The test intends to measure students' knowledge, skill, aptitude and ability to write by using technical words in relation to the specific topics of the discipline. The test will be administered on paper in a confined area (class) and will require students to perform a set of cognitive abilities in order to demonstrate the consciousness of the discipline. Tests will be defined through open questions which will encourage students to freely answer by exploiting their synthesis capacities and the information acquired during the teacher's lessons. The length of time for the test is about 2 hours. Oral examination. The interview is aimed to evaluate the knowledge acquired by the students and their ability to solve problems. Moreover, the ability to speak about technical questions specifically related to the discipline, by using technical terms will be evaluated too. Graphic design project description. The description of the design tables will allow to appraise the abilities developed by the students to work in team with the aim to develop a technologically complex project , through correct drawings (plants, fronts, sections) and details, preliminarily selected in accordance with the teacher. The final mark is out of 30, eventually "cum laude", in accordance to the scheme reported at the bottom of the degree program homepage, i.e. "Metodi di valutazione"
LEARNING OUTCOMES	Knowledge and ability of understanding: - Knowledge of existing relationships among different technological unities that constitute the building system and among the single elements and functional layers that characterize the technical elements of the technological system; - Knowledge of the relapses in the building sector of the technical innovations related also to other sectors (mechanical, chemical and so on); - Knowledge of buildings as systems of spatial elements with different characteristics derived from the performance of innovative technical elements used to build them, particularly for the building envelope; - Conceptual, methodological and operational knowledge useful to understand the complexity of contemporary design that allow the construction of meaningful contemporary, innovative and energy efficient buildings; - Ability to detect specific relationships among structure, function and shape of buildings, as well as their technological, functional and distributive complexities and knowledge of technical innovations related to the building system. Ability to apply knowledge and understanding - Ability to analyse buildings selected as case studies in order to understand the different functional elements/layers that can be used for the construction of technical elements related to different technological units classes; - Knowledge and understanding of materials used for the construction of functional elements/layers and their mutual relations; - Ability to adopt a “dynamic” design approach in order to define the internal structure of technical elements. Independent judgment At the end of the course, students will be able to: - evaluate the performance of technical elements, in relation to connoting requirements derived from the analysis of users’ needs, building typologies, technical innovations also related to the technology transfer; - validate the technical solutions offered by building companies/industries to solve specific design problems with the aim to save energy and to preserve the building environment, by exploiting the opportunity to test them in the field of practical classes activities, thinking about the professional field; - acquire an independent and critical ability to judge in order to easily interact with different professionals by exploiting the opportunity to design in the field of the practical class, by simulating the activities that will be usually performed during the professional life. Communication ability During practical classes, students will develop multimedia presentations related to the case studies assigned by the professor in order to communicate to colleagues useful information about the technologies used by designers (architects/engineers) with the aim to solve specific problems (environmental/ functional/and so on). These multimedia presentations will be related to short reports that will allow students to acquire the ability to communicate -also in a written way- technical information about specific subject.

	Learning Ability The professor will try to develop the learning abilities of students through different urges: - suggestion of handbooks, technical/scientific journals, videos; - site visits –if it is possible- or to the building companies/industries; - using Internet for searching technical information; - -design of buildings and/or details related to one or more technical elements. This last activity will be developed by using "trial and error" method, with the aim to allow students to "learn by doing"; by solving problems; by using the innovation applied to the building sector.
EDUCATIONAL OBJECTIVES	- to guarantee knowledge and abilities for the development of whole buildings in relation to: technology, structure, environment, users' needs, indoor comfort, energy consumption, technology innovation; - to know configuration, conformation and distribution of buildings as derived from users' needs and the characteristics of technical elements used to design them; - to deeply know technical-scientific, methodological, operational aspects of Architectural Engineering and Innovation and to be able to use them to identify/ define/solve complex problems that require an interdisciplinary approach
PREREQUISITES	Computer-aided Design (CAD); Computer-aided Manufacturing (CAM); Drawing shadows; Structural/Building Typologies; Building Materials; Design Techniques and building production; Principles of Architectural Design; Principles of History of Contemporary Architecture
SUGGESTED BIBLIOGRAPHY	- Corrao, Rossella, Forme e Funzioni degli Elementi Tecnici nell'Architettura Contemporanea, Alinea Editrice, Firenze, 2007. - Deplazes, Andrea, Constructing Architecture. Materials, Processes, Structures. A Handbook, Birkhäuser, Basilea, 2005. - Staib, Dörrhöfer, Rosenthal, Components and Systems. Modular Construction. Design, Structures, New Technologies, Birkhäuser, Berlino, 2008.

SYLLABUS

Hrs	Frontal teaching
2	Technology evolution: Technical Innovation and Contemporary Architecture
2	Technology evolution. The relapses of information revolution on the technology design
2	Technology evolution. New building materials
2	Technology evolution. Principles of Bio/Eco Architecture
2	Technology evolution. Sustainable Building Envelopes
1	Building System. Environment System
2	Building System. Technology System
1	Building System. Legislation
6	Needs, Requirements, Performance. Expressive, Functional, Technical potentialities of innovative building materials in relation to users' needs
6	Building Technology System classification. Technological units: structure, closing, internal partition, external partition, equipments, building envelope, etc. Possible solutions.
4	Functional elements/layers of building technical elements. Functions, materials and relations among technical elements will be analysed. Performance behaviour of the technical elements will be analysed by putting them in relation to the users' needs (comfort, safety, usability, management, appearance, integrability, environmental protection)
4	Assembly systems among different technical elements. Mechanical connections among functional elements/ layers of technical elements: building forks for tensile structures; connections for cladding façade systems, for truss, for glass structures, for curtain walls...
2	Innovative Materials and Technologies for buildings. Composite marble panels
2	Innovative Materials and Technologies for buildings. Translucent cement
2	Innovative Materials and Technologies for buildings. BIPV - Building Integrated Photovoltaics products
2	Innovative Materials and Technologies for buildings. BIV - Building Integrated Vegetation products

Hrs	Practice
8	Analysis of a contemporary building and of its technological and environmental system
10	Analysis of a complex building assembly system that connects different building technical elements
10	Design of a building (and/or a Microarchitecture) starting from the analysis of specific requirements
13	Design of an innovative technical element for the energy efficiency of the building envelope