UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	BUILDING ENGINEERING
SUBJECT	INNOVATIVE TECHNOLOGIES AND MATERIALS FOR BUILDING ENGINEERING
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20915-Attività formative affini o integrative
CODE	15997
SCIENTIFIC SECTOR(S)	ING-IND/22
HEAD PROFESSOR(S)	VALENZA ANTONINO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**VALENZA ANTONINO** Monday 15:00 16:00 Stanza 319 Edificio & 3 piano Wednesday 15:00 16:00 Stanza 319 Edificio & 3 piano Thursday 9:00 10:00 Stanza 319 Edificio & 3 piano

DOCENTE: Prof. ANTONINO VALENZA

TEACHING METHODS	Front lessons; exercises in class; visits to the Laboratory of Materials of DICAM.
ASSESSMENT METHODS	Oral examination. The interview is aimed at determining the student's ability to process the knowledge gained by using them to solve problems and the ability to express the teaching content using a technically correct language. The vote is expressed in thirtieths with possible praise, according to the scheme reported at the botton on the degree program i.e. "Metodi di valutazione"
LEARNING OUTCOMES	Knowledge and understanding Knowledge regarding: - new types of materials with particular reference to composite - the correlation between the properties and the various types of materials - the life cycle assessment of materials The understanding regarding: - the interpretation of the properties of materials - the choice of the most suitable methods to choose the materials - identification and methods of materials characterization - the understanding of the most significant characteristics of the materials Applying knowledge and understanding The skills transferred to the student are: - the interpretation of the experimental tests - modeling of the behavior of a composite material under particular stress states - the design of the rolling sequence for specific application purposes. Making judgements - the student will have acquired the ability to choose and apply the most suitable to the structure designed material. - the student will be able to make the choice of the most suitable technology for the realization of the functional artifact to the project, individually evaluating the effectiveness of the different solutions. Communication - The student will have acquired the ability to communicate and express issues involved with innovative materials for application in the construction industry. - The student will be able to hold conversations on topics related to the choice of the most suitable materials to the project and with less environmental impact, of exploring ideas and offer solutions to specialists and non-specialists. Learning skills - Based on the information obtained, the student will be able to learn from sources from the scientific literature and keep abreast of new techniques and new materials for use in building systems. - During the course, the student will be directed in order to gain awareness of the importance of a permanent update to the maintenance of a good level of knowledge and professionalism.
EDUCATIONAL OBJECTIVES	The course aims to provide the knowledge on materials and innovative technologies in the building systems sector
PREREQUISITES	Basic knowledge about metallic, polymeric, ceramic materials and binders Definition capabilities of the amorphous state and the crystalline state Knowledge on the constitutive behavior of the brittle and ductile materials Understanding of spectroscopic analysis of the structure of materials
SUGGESTED BIBLIOGRAPHY	- Micheal F. Ashby, Hugh Shercliff, David Cebon, Materiali. Dalla scienza alla progettazione, Casa Editrice Ambrosiana. - Dispense didattiche su argomenti ed esercizi svolti a lezione, fornite nel corso dello svolgimento dell'insegnamento.

SYLLABUS

Hrs	Frontal teaching
6	The atomic structure. Chemical bonds: strong bonds and weak bonds. Covalent bond. Ionic bond. Metallic bond. Van der Waals forces. The crystalline structure and amorphous state
4	Classification of materials. Creating a database with all the characteristics of the materials
12	Composite materials. Micromechanics. Macro mechanics. Lamination theory. Sandwich structure
4	Criteria for selection of materials. Asby diagram. Materila Index
5	Shape factor. Multiple choice.
4	Alveolar materials Natural materials
10	Materials and Sustainability LCA
4	heat storage wall

Hrs	Practice
6	Determination of the main material properties
10	Determination of stiffness matrices in composite laminates
4	Calculation of sandwich structures

Hrs	Practice
6	Index of the material for rigid and lightweight materials. plate beam tie.
6	Calculation examples of LCA