



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2018/2019
MASTER'S DEGREE (MSC)	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)	147
COURSE ACTIVITY (Hrs)	78
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
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 6 Wednesday 15:00 16:00 Stanza 319 Edificio 6 Thursday 09:00 10:00 Stanza 319 Edificio 6

DOCENTE: Prof. ANTONINO VALENZA

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
LEARNING OUTCOMES	<p>Knowledge and understanding</p> <p>Knowledge regarding:</p> <ul style="list-style-type: none"> - 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 <p>The understanding regarding:</p> <ul style="list-style-type: none"> - 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 <p>Applying knowledge and understanding</p> <p>The skills transferred to the student are:</p> <ul style="list-style-type: none"> - 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. <p>Making judgements</p> <ul style="list-style-type: none"> - 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. <p>Communication</p> <ul style="list-style-type: none"> - 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. <p>Learning skills</p> <ul style="list-style-type: none"> - 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.
ASSESSMENT METHODS	Assessment of learning will be carried out by a written test on the determination of composite material characteristics and by an oral test. Resolving the task will test the behavioral patterns of composite materials. It will be an oral exam. The interview will try to ascertain, through questions posed by similar real cases, the student's ability to choose the most suitable material, the knowledge of his properties as well as his environmental impact. The oral examination will also verify the student's ability to express himself with a technically correct language on the content of the teaching. The ground assessment mainly accounts for the oral test even though the non-passing of the written test will bind the admission to the oral test. The evaluation scheme used is the one in the bulletin board at the bottom of the site of the study site under "Evaluation methods"
EDUCATIONAL OBJECTIVES	The course aims to provide the knowledge on materials and innovative technologies in the building systems sector
TEACHING METHODS	Front lessons; exercises in class; exercises to the Laboratory of Materials of DICAM.
SUGGESTED BIBLIOGRAPHY	<ul style="list-style-type: none"> - 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
4	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
2	Classification of materials. Creating a database with all the characteristics of the materials
4	Criteria for selection of materials. Ashby diagram. Material Index
5	Shape factor. Multiple choice.
12	Composite materials. Micromechanics. Macro mechanics. Lamination theory. Sandwich structure
4	Alveolar materials
8	Materials and Sustainability LCA
3	Lignocellulosic materials

Hrs	Practice
6	Determination of the main material properties
10	Determination of stiffness matrices in composite laminates
4	Calculation of sandwich structures
6	Index of the material for rigid and lightweight materials. plate beam tie.
4	heat storage wall
2	Calculation examples of LCA
4	Examples of design with innovative materials