



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura		
ACADEMIC YEAR	2018/2019		
MASTER'S DEGREE (MSC)	ARCHITECTURE AND BUILDING ENGINEERING		
SUBJECT	SCIENCE AND TECHNOLOGY OF MATERIALS		
TYPE OF EDUCATIONAL ACTIVITY	C		
AMBIT	50672-Attività formative affini o integrative		
CODE	06328		
SCIENTIFIC SECTOR(S)	ING-IND/22		
HEAD PROFESSOR(S)	VALENZA ANTONINO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	80		
COURSE ACTIVITY (Hrs)	70		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	3		
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	Atomic structure Chemical bonds Chemical equilibrium Electrochemistry
LEARNING OUTCOMES	<p>Knowledge and understanding</p> <p>Knowledge regarding:</p> <ul style="list-style-type: none">- new types of materials with particular reference materials for the construction- 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 Mix Design design.. <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	<p>The oral examination, during which the student will be invited to answer on questions related to the developed program and practical cases related to the treated themes, will be finalized to the evaluation of the level reached as it regards:</p> <ul style="list-style-type: none">- knowledge of the treated themes- competence in the practical application to specific cases of such concepts- ability of expression and technical language- abilities of synthesis and data processing. <p>Besides the student will be valued on the exercises, conducted during the course, both for the final result reached and for the quality of the share and the run of knowledge developed.</p> <p>Therefore the general evaluation it will be furnished by the average among the two components of evaluation of the oral test and the exercises it turn.</p> <p>The minimum evaluation of 18/30 corresponding to the minimum knowledge of the concepts exposed during the course, sufficient capacity of exposition and linking between the disciplines.</p> <p>The maximum of 30/30 corresponding to excellent exposition and knowledge of the concepts exposed during the course linking between the disciplines.</p> <p>The evaluations from 18 to 30 will take into account progressively increasing the level of knowledge and competence acquired on the topics dealt with.</p>
EDUCATIONAL OBJECTIVES	The course aims to provide knowledge about the structure, properties' and technological applications of the main types of materials currently used in the construction industry
TEACHING METHODS	Front lessons; exercises in class; visits to the Laboratory of Materials of DICAM.
SUGGESTED BIBLIOGRAPHY	Smith "Scienza e Tecnologia dei Materiali" McGraw-Hill Rossetti "Calcestruzzo" McGraw-Hill

SYLLABUS

Hrs	Frontal teaching
4	The water: alkalinity, hardness, properties and methods of analysis, treatment
2	crystalline structure of metals: crystalline lattices and unit cells. real crystal structures: point defects, line and surface
2	Ferrous alloys: steels and cast irons. Production of crude steel and cast iron. State diagram Fe-C: Transformations peritettica eutectic and eutectoid. TTT diagrams

SYLLABUS

Hrs	Frontal teaching
4	Plastics, thermosetting and thermoplastic polymers: structure, properties' and applications
4	Ceramic Materials: structure, properties 'and applications, The Brick: property' chemical and physical properties of clays. The manufacturing process and properties' end of the bricks. Brick-environment interactions Glass: structure, properties' and applications
4	Composite Materials: Structure, properties' and applications
6	Air binders: lime plaster. The hydraulic binders. Portland cement: production, setting and hardening, properties' end. The Portland cement-environment interactions, the causes of incompatibility 'between the Portland cement and the historic walls. secondary and thaumasite ettringite. The blended cements as an alternative to Portland cement: pozzolan cement and concrete blast furnace. Mix design.
4	Durability of materials
Hrs	Practice
4	Calculation of the hardness of water, determination of physical and chemical processing
4	Determination of crystal lattices and calculating the density
4	Calculation of the composition of the phases of a steel through the use of state diagram Fe-C
12	Mechanical characterization of materials: static tensile and compressive tests, hardness tests, impact tests, fatigue and creep. Determination of the elongation resistance and rigidity 'for various types of materials
4	Calculation of a glass softening temperature
4	Determination of loads in a structure in composite material
8	Mix design examples