UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	BUILDING ENGINEERING
SUBJECT	BUILDING MATERIALS' DEGRADATION AND DIAGNOSTICS
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20915-Attività formative affini o integrative
CODE	18553
SCIENTIFIC SECTOR(S)	ING-IND/22
HEAD PROFESSOR(S)	MEGNA BARTOLOMEO Ricercatore Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**MEGNA BARTOLOMEO** Wednesday 15:00 17:00 Nel mio studio, viale delle scienze ed. 6, primo piano stanza 113bis.

DOCENTE: Prof. BARTOLOMEO MEGNA

TEACHING METHODS	Multimedia presentation aided front lessons and exercises; visits to the Laboratory of Materials for Restoration and Conservation 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 bottom of the degree program homepage, i.e. "Metodi di valutazione".
LEARNING OUTCOMES	Knowledge and undestanding: decay factors for wood and stony materials; physico chemical analysis useful in defition of conservation state; understanding the possible results of analysis. Applying knowledge and understanding preparing a proper diagnostic plane by choosing the right analytical technique according to the conservation state; design a proper intervention to reduce the decay factors identified. Making judgements choosing the most suitable and cheap analysis to define the conservation state; choosing the right material according to the conservation state. Communication Ability in communicating with specialist in diagnostic and material decay. Using a proper language to describe decay phenomena, possible causes and solutions. Learning skills Learning from the scientific literature, conferences or courses and keep abreast of new analytical techniques. Going deeper in comprehension of decay phenomena to better understand interaction between environment and materials.
EDUCATIONAL OBJECTIVES	Knowing the most common decay phenomena for wood and stony materials; understanding relationship between environment and conservation state; Knowing the most common analytical thechniques to be used to define the conservation state of a material. Using the acquired knowledges in order to identify the proper analysis to characterize the acting decay phenomena.
PREREQUISITES	Atomic structure, mole and equivalent, periodic table. Chemical bond: covalent, polar, ionic, metallic, coordinate covalent bonding. Intermolecular bonding: Van der Waals, hydrogen bond, dipole-dipole interaction. Constitutive materials for mortars and concrete, binders technology.
SUGGESTED BIBLIOGRAPHY	Stampa delle presentazioni proiettate dal docente disponibile su https://sites.google.com/site/bartolomegna/corsi-universitari/sistemi-edilizi Dispense "Il Legno" e "Le tecniche analitiche" disponibili su https://sites.google.com/site/bartolomegna/dispense L. Bertolini, M. Gastaldi, P. Pedeferri, Introduzione ai Materiali per Architettura, CittaStudi, Novara, 2006 S. Palanti, Durabilita' del legno, Dario Flaccovio, 2009 Chimica Analitica Strumentale, Skoog, Holler, Crouch, EdiSes, 2009

SYLLABUS

Hrs	Frontal teaching
4	Chemical equilibrium, solution properties, water properties, pH.
2	Aggregation states: amorphous and crystalline solids. Relative humidity.
10	Wood: properties and structure. Tree species. Wood structures, ortotropy. Interaction wood humidity. Anatomical defects. Glulam and other wood based materials.
3	Decay phenomena in stony materials: capillarity, soluble salts, wash out, freeze and thaw.
2	Measures of density and porosimetry: helium and liquid porosimetry, mercury intrusion porosimetry.
3	Optical and electronic microscopy: fundamentals of opticals properties of materials, polished cross sections, polished thin sections, SEM and ESEM.
5	Molecular (Raman and FTIR) and elemental (AAS, ICP, XRF, LIBS) spectroscopies
2	X-Ray diffractometry
2	Theraml analysis: TGA, DTA, DSC
2	Chromatographic techniques: ionic chromatography and fundamentals of gas chromatography

Hrs	Practice
4	Properties and characteristics of water solutions.
2	Visit to the laboratory of ionic chromatography
2	Visit to the laboratory of X-Ray diffractometry
2	Visit to the laboratory of Simultaneous Theraml Analysis
4	Visit to the laboratory of optical and electronic microscopy
1	Visit tot the laboratory of Helium picnometry
2	Visit to laboratory of Mercury Intrusion Porosimetry