



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Fisica e Chimica - Emilio Segrè
ACADEMIC YEAR	2019/2020
MASTER'S DEGREE (MSC)	CULTURAL HERITAGE CONSERVATION AND RESTORATION
SUBJECT	NEW MATERIALS FOR RESTORATION
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50684-Scienze e tecnologie per la conservazione e il restauro
CODE	10239
SCIENTIFIC SECTOR(S)	CHIM/02
HEAD PROFESSOR(S)	MILIOTO STEFANA Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	01900 - GENERAL AND INORGANIC CHEMISTRY
MUTUALIZATION	
YEAR	4
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	MILIOTO STEFANA Monday 14:30 15:30 Stanza 0/C9 - Dipartimento di Fisica e Chimica - Ed. 17 - Viale delle Scienze Wednesday 14:30 15:30 Stanza 0/C9 - Dipartimento di Fisica e Chimica - Ed. 17 - Viale delle Scienze Friday 14:30 15:30 Stanza 0/C9 - Dipartimento di Fisica e Chimica - Ed. 17 - Viale delle Scienze

DOCENTE: Prof.ssa STEFANA MILIOTO

PREREQUISITES	Each student has to be acquired the basic knowledge of Chemistry. In such a way, the student attending to the course will be fruitful.
LEARNING OUTCOMES	Knowledge and ability to understand: Acquisition of new conservation and restoration methods based on the latest materials such as new surfactants systems, gels and nanoparticles. Capacity to apply knowledge and understanding: Capacity 'recognition of the new material useful for the purposes of a specific conservation and restoration problem. Identification and design of possible materials potentially useful to the resolution of a specific conservation and restoration problem. Making judgments: Capacity 'assessment of possible risks for the operator and for the artifact resulting from the use of new materials. Communicative abilities: Acquisition of a specific language for the display and distribution of new materials for conservation and restoration. Learning abilities: Capacity of consultation scientific literature to identify the methodology and potential applicability of a new material.
ASSESSMENT METHODS	The oral exam will try to ascertain the student ability to process the knowledge gained by using them to overcome problems that are placed, and the ability 'to speak with a technically correct language on teaching content. Sara 'also evaluated the ability to apply their knowledge to case studies. Different classes of evaluation will be done based on the following considerations: 1) Basic knowledge of topics and limited capacity of processing knowledge for application to new situations. Sufficient capacity analysis of the proposed phenomena and exposure of the pursued procedure (rating 18-21) 2) Good knowledge of topics and good capacity of processing knowledge for application to new situations. Rather good capacity of analysis of the proposed phenomena and exposure of the pursued procedure (rating 22-24) 3) Very good knowledge of topics and ability in processing knowledge for application to new situations. Good capacity of analysis of the proposed phenomena and exposure of the pursued procedure (rating 25-27) 4) Excellent knowledge of the topics, excellent and prompt capacity of knowledge processing for application to new situations. Very good capacity of analysis of the proposed phenomena and and exposure of the pursued procedure (rating 28-30) 5) Excellent knowledge of the topics, excellent and very smart capacity of processing in order to apply them to new situations. Excellent capacity of analysis of the presented phenomena and and exposure of the pursued procedure (rating 30 cum laude)
EDUCATIONAL OBJECTIVES	The course is aimed at providing the basic knowledge on the use of new generation materials for cleaning and conservation of artifacts. It will then be provided the means for the correct evaluation of the intervention and of the chemical-physical parameters that characterize the material.
TEACHING METHODS	The course will be given in the first semester of the academic year. It is based only on lectures.
SUGGESTED BIBLIOGRAPHY	Uso di tensioattivi e chelanti nella pulitura di opere policrome. Paolo Cremonesi, ed. il Prato. 2003 Alessio Nanni and Luigi Dei Langmuir 2003, 19, 933-938. Emiliano Carretti, Luigi Deia and Richard G. Weiss Soft Matter, 2005, 1, 17–22

SYLLABUS

Hrs	Frontal teaching
4	Practical aspects in the use of surfactants in the restoration: anionic, cationic and non-ionic. Mixtures of surfactants and formulations.
4	Disputes on the use of surfactants: the case of Triton x100, formation of peroxides and residues. Application examples. Use of surfactants as detergents and / or wetting agents: choice and calculation of the concentration of surfactant to be used for the control of residues.
4	W/O and O/W emulsions and their use. Example of microemulsions application of a fresco of the sixteenth century Pozzoserrato, importance of correct choice of the dispersed phase.

SYLLABUS

Hrs	Frontal teaching
4	Elements of rheology: dynamics and kinematics viscosity, Newtonian and non-Newtonian fluids, complex rheological behaviors. Methods for measuring viscosity: Ubbelohde, rotational viscometer, rheometer.
4	The solvent gels from Richard Wolbers: preparation, use of chemical and physical characterization and controversy about their use.
4	New Gels reo-reversible: synthesis, chemical and physical properties (effect of temperature, pH and solvent), comparison with a non-reversible gel.
4	Nanoparticles: definition of nanomaterials. chemical and physical problems in the synthesis of nanomaterials.
4	Homogeneous and heterogeneous nucleation. Electronic Stability Control of nanoparticles: steric effects and depletion potential.
4	The Ferroni-Dini method of desulfation and consolidation of frescoes. Synthesis in homogeneous phase of microparticles.
4	Synthesis in emulsion of nanoparticles. Control of the properties.
4	Applications of nanomaterials for the restoration and preservation of cultural heritage: conservation and restoration of frescoes.
4	Applications of nanomaterials for the restoration and preservation of cultural heritage: paper de-acidification and application to wooden materials.