



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2023/2024
MASTER'S DEGREE (MSC)	ENVIRONMENTAL ANALYSIS AND MANAGEMENT
SUBJECT	ENVIRONMENTAL DECONTAMINATION
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	21017-Attività formative affini o integrative
CODE	22541
SCIENTIFIC SECTOR(S)	CHIM/02
HEAD PROFESSOR(S)	LAZZARA GIUSEPPE Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	LAZZARA GIUSEPPE Monday 11:00 12:00 studio del prof. Giuseppe Lazzara (1/B16) viale delle scienze pad. 17 Wednesday 11:00 12:00 studio del prof. Giuseppe Lazzara (1/B16) viale delle scienze pad. 17

DOCENTE: Prof. GIUSEPPE LAZZARA

PREREQUISITES	They are required basic knowledge of chemistry. Basic concepts for chemical equilibrium.
LEARNING OUTCOMES	Knowledge and understanding Critical acquisition of the fundamentals of chemical-physics for decontamination (principles and experimental methods). Ability to use the language and the specific terminology of the discipline. Applying knowledge and understanding Capacity to select and apply the mathematical tools to expose the basic principles and to solve problems of decontamination based on physico-chemical approach. Making judgments To be able to extract and evaluate the information obtained from the experimental results, and evaluate the reliability of data. Communication skills Knowing how to explain in clear and strict terms, with the help of features and / or diagrams. Learning ability The student at the end of the course should have the tools to deal with and understand advanced topics in chemical-physics for decontamination
ASSESSMENT METHODS	The final examination aims at assessing not only the candidate knowledge and his ability to apply it to real situations (not necessarily mentioned during the course) but also the possession of the properties of scientific language and exposure abilities . The commission invites the student to discuss a theme based on his/her choice and then continues with questions about other topics. 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 aim of the course is to provide an in-depth knowledge of the basic principles of physical chemistry for a quantitative treatment of aspects related to environmental decontamination. The use of new methodologies and complex equipment for the study of these processes will be discussed and deepened. The experiences in the laboratory will be useful to stimulate the ability to analyze scientific data.
TEACHING METHODS	The course will be given in the second semester of the academic year. It is based on lectures and lab practice.
SUGGESTED BIBLIOGRAPHY	Surfactant-Enhanced Subsurface Remediation: Emerging Technologies. di David A. Sabatini (a cura di), Robert C. Knox (a cura di), Jeffrey H. Harwell (a cura di) . ISBN: 0841232253. Ed. American Chemical Society 1995. Appunti forniti dal docente.

SYLLABUS

Hrs	Frontal teaching
6	Introduction of the course. Thermodynamics and spontaneity of chemical and physical processes.
6	Physico-chemical parameters, gibbs free energy and applicative importance in the study of processes.
6	Physical chemistry of large surface systems.
8	Surface tension, contact angle, wettability: principles and experimental methods.
8	Solutions and Gibbs isotherms. Surfactants: principles and thermodynamics of micelle formation.
6	Adsorption phenomena and their control
Hrs	Workshops
12	Study of physico-chemical properties of micellar systems.