



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	NATURAL AND ENVIRONMENTAL SCIENCE		
SUBJECT	ANALYTICAL CHEMISTRY		
TYPE OF EDUCATIONAL ACTIVITY	A		
AMBIT	50169-Discipline chimiche		
CODE	16159		
SCIENTIFIC SECTOR(S)	CHIM/01		
HEAD PROFESSOR(S)	PIAZZESE DANIELA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	86		
COURSE ACTIVITY (Hrs)	64		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	3		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	PIAZZESE DANIELA Thursday 10:00 12:00 studio docente via archirafi 26 4° piano		

DOCENTE: Prof.ssa DANIELA PIAZZESE

PREREQUISITES	Structure of the atom (general description and electronic structure); the chemical bonds; quali-quantitative aspects of chemical reactions: atomic and molecular weights, equations balance, nomenclature; mixtures and solutions: concentrations and their units, electrolytes, monoprotic acids and monoprotic bases; definition of buffer solutions.
LEARNING OUTCOMES	KNOWLEDGE AND ABILITY OF COMPREHENSION The course aims at providing the basic concepts for the definition of the composition and chemical characteristics of the aqueous natural systems. The main abiotic parameters in environmental systems will be defined and determined, together with their roles and interactions in environmental and natural processes. The course aims at providing the basic concepts for the definition of the basic concept of uncertainty in chemical measurements, and particular attention will be paid to the quality assurance procedure, and to instrumental analytical techniques, frequently used in environmental monitoring. CAPACITY TO APPLY KNOWLEDGE AND COMPREHENSION Ability to define the main chemical abiotic parameters and the their roles and interactions in environmental and natural processes; ability to determine abiotic parameters using the instrumental techniques and to analytically evaluate the experimental data. MAKING JUDGMENTS Ability in identifying interactions between the basic concepts , in order to critically evaluate environmental equilibrium processes and provide solutions in analytical procedures. ABILITY OF COMMUNICATION Being able to explain the basic concepts with appropriate scientific language. LEARNING CAPACITY The student must be able to apply the concepts of environmental analytical chemistry , demonstrating the ability to synthesize and evaluate environmental issues, through the basic concepts of analytical chemistry,
ASSESSMENT METHODS	The final examination consists of one written test and in an oral examination. The test consists in solving exercises , and on statistical calculation. The oral examination allow us to verify the degree of knowledge of the teaching topics, the possession of the scientific language and the ability exposure. Different ranging of evaluation will be done based on the following considerations: 1) Basic knowledge of topics and ability in processing knowledge for application to Analytical Chemistry. Limited capacity of analysis and exposure of the proposed questions (rating 18-21) 2) Good knowledge of topics and ability in processing knowledge for application to Analytical Chemistry. Good capacity of analysis and exposure of the proposed questions (rating 22-24) 3) Very good knowledge of topics and ability in processing knowledge for application to Analytical Chemistry. Good capacity of analysis and exposure of the proposed questions (rating 25-27) 4) Excellent knowledge of the topics and prompt capacity of knowledge processing for application to Analytical Chemistry. Very good capacity of analysis and exposure of the proposed questions (rating 28-30) 5) Excellent knowledge of the topics, excellent and very smart capacity of processing in order to apply them to Analytical Chemistry. Excellent capacity of analysis and exposure of the proposed questions (rating 30 cum laude)
EDUCATIONAL OBJECTIVES	Applying the concepts of analytical chemistry to environmental systems
TEACHING METHODS	frontal lessons laboratory lessons
SUGGESTED BIBLIOGRAPHY	I seguenti testi sono consigliati in alternativa per tutti gli argomenti del corso: Skoog, West, Holler, Crouch. Fondamenti di Chimica Analitica – Edises Harris – Fondamenti di Chimica Analitica – Zanichelli Bird - Cann Chimica Ambientale - Zanichelli Le analisi chimiche ambientali - Materiale didattico fornito dal docente

SYLLABUS

Hrs	Frontal teaching
2	Introduction to environmental analytical chemistry: the main problems of chemical pollution. The transformations of chemical compounds in and between the different environmental compartments: water-soil-air.

SYLLABUS

Hrs	Frontal teaching
12	Determination of measurement uncertainty: mean, median, variance and standard deviation, typed errors, propagation of the error calculation procedures, the distribution of repeated measures and the Gaussian curve, significance test Identification and determination of the components of uncertainty. Methods and calculations of the analysis of variance
6	Preliminary concepts of sampling procedures in the environmental chemical analysis The volumetric and gravimetric analysis in the determination of the main physical-chemical parameters in natural waters.
12	Electroanalytical techniques for the environmental analysis (conductimetry, potentiometry) – Reference and measure Electrodes. Spectroscopic techniques (UV-VIS) for the environmental analysis. Chromatography
Hrs	Workshops
6	Acquisition of analytical data by means of repeated gravimetric / volumetric measurements: statistics of the experimental data and comparison of the data obtained between the different working groups. Data processing and report
8	Instrumental calibration through electroanalytical measurements: linear regression method. The method of internal standard and of standard additions. Data processing and report
8	Determination of the salt content of natural water through volumetric and electrochemical measurements. Data processing and report
10	Determination of the main chemical-physical parameters of a natural water. Data processing and report Spectroscopic determination of nitrogen compounds in natural water. Data processing and report