



UNIVERSITÀ DEGLI STUDI DI PALERMO

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| DEPARTMENT | Scienze della Terra e del Mare | | |
| ACADEMIC YEAR | 2020/2021 | | |
| 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

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| 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 | <p>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.</p> <p>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.</p> <p>MAKING JUDGMENTS Ability in identifying interactions between the basic concepts , in order to critically evaluate environmental equilibrium processes and provide solutions in analytical procedures.</p> <p>ABILITY OF COMMUNICATION Being able to explain the basic concepts with appropriate scientific language.</p> <p>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,</p> |
| ASSESSMENT METHODS | <p>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:</p> <p>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)</p> <p>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)</p> <p>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)</p> <p>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)</p> <p>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)</p> |
| EDUCATIONAL OBJECTIVES | Applying the concepts of analytical chemistry to environmental systems |
| TEACHING METHODS | frontal lessons laboratory lessons |
| SUGGESTED BIBLIOGRAPHY | <p>I seguenti testi sono consigliati in alternativa per tutti gli argomenti del corso:</p> <p>Skoog, West, Holler, Crouch. Fondamenti di Chimica Analitica – Edises</p> <p>Harris – Fondamenti di Chimica Analitica – Zanichelli</p> <p>Bird - Cann Chimica Ambientale - Zanichelli</p> <p>Le analisi chimiche ambientali - Materiale didattico fornito dal docente</p> |

SYLLABUS

| Hrs | Frontal teaching |
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| 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 |
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| 8 | Determination of analysis and sampling 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 |
| 12 | Preliminary concepts of sampling procedures and chemical analysis: approaches to sampling (random and systematic) - definition of the population to be sampled - sampling plan, sampling tools and chemical analysis. Water sampling procedures - sampling errors Chemical analysis: chemical - physical parameters of water - non-metallic inorganic constituent - determination of nitrogen compounds, phosphorus - ample preparation and procedures for determining classes of polluting compounds (organic and inorganic substances) |
| 10 | Electroanalytical techniques for the environmental analysis (conductimetry, potentiometry, voltammetry) – Reference and measure Electrodes. Spectroscopic techniques (UV-VIS) for the environmental analysis |
| Hrs | Workshops |
| 8 | 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 |
| 6 | Determination of the salt content of natural water through 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 and phosphorus compounds in natural water. Data processing and report |