UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2020/2021
MASTER'S DEGREE (MSC)	ANALYSIS AND ENVIRONMENTAL MANAGEMENT
INTEGRATED COURSE	CHEMISTRY OF ENVIRONMENT AND NATURAL SUBSTANCES - INTEGRATED COURSE
CODE	19796
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	CHIM/12, CHIM/06
HEAD PROFESSOR(S)	ORECCHIO SANTINO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	ORECCHIO SANTINO Professore Associato Univ. di PALERMO FONTANA GIANFRANCO Ricercatore Univ. di PALERMO
CREDITS	9
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**FONTANA GIANFRANCO** Tuesday 14:30 16:30 viale delle scienze ed. 17. Studio docente. **ORECCHIO SANTINO** Tuesday 08:00 10:00 Studio Prof. Orecchio, Ed. 17, Viale delle Scienze, Palermo

DOCENTE: Prof. SANTINO ORECCHIO

PREREQUISITES	Numerical calculations and stochiometry
LEARNING OUTCOMES	Knowledge and ability to understand The knowledge and skills of understanding of Environmental Chemistry students will be oriented to the acquisition of theoretical and experimental competences, with particular reference to: aquatic chemistry, analytical methods of environmental matrices, interpretation and evaluation of data from monitoring. In addition, the student must possess knowledge on integrated processes occurring in the environment and the influence that human activities exert on the different environmental matrices. Applying knowledge and understanding. The student, at the end of the course, will have to possess application competences for the monitoring of various environmental matrices by field and laboratory instruments; In particular, the student, based on specific acquired knowledge, integrated with experiences in the classroom and simulation of laboratory activities, should be able to propose, chemical environmental monitoring plans. In particular, the student must be able to define the major chemical characteristics of an environmental matrix, in particular water, in terms of composition, reactivity and treatment. Making judgments The student will develop skills on scientific approach to sampling and monitoring, evaluation and interpretation of experimental data; safety in the laboratory and in the field; In particular, on the basis of knowledge acquired, supplemented by laboratory (or simulations) and field activities, the student must be able to carry out the evaluation of the quality of the environment and to coordinate the environmental monitoring of the main quality parameters. Independent judgment is made through the experience achieved through exercises, the production of processed and reports, etc. Enable communication The student must be able to explain the basic concepts of environmental chemistry, integrating them with the concept of the natural cycle (or biogeochemistry) and pollution of the various environmental compartments. The course is aimed to provide the basic concepts for the definition of the chemical composition and characteristics of natural ecosystems (water, air, soil, sediment, organisms). The concepts will be developed in view of biogeochemical cycles, in order to define the environmental pollution processes. The course will provide the analytical basis for the monitoring of the different environmental matrices.
ASSESSMENT METHODS	The final exam consists of a written test and a short dissertation. The test consists of at least 15 questions, including multiple choice tests and numerical exercises, in addition, in some it may be required to discuss a topic covered during the course. Each question is assigned a vote, shown next to the question. The sum of the votes of all the questions is equal to 30/30. The final exam mark will be given by the average of the score obtained in the test and that relating to the discussion of the dissertation that can take place before the task. In any case, passing the exam is conditioned by having obtained an assessment of at least 18/30 in the written test and 18/30 in the dissertation. In the event that it is not possible to carry out exams in presence, the exam will consist of an oral test during which the student may be asked to solve problems relating to the topics covered during the course. In this case, the score starting from the score of 18/30 will be awarded when the skills of the subject are at least elementary, up to the score of 30/30 with possible honors, as the skills are excellent.
TEACHING METHODS	Lessons, numerical exercises, laboratory activity

MODULE
CHEMISTRY OF NATURAL SUBSTANCES

Prof. GIANFRANCO FONTANA

SUGGESTED BIBLIOGRAPHY	
PAUL M. DEWICK – Chimica, Biosintesi e Bioattivita' delle Sostanze Naturali – PICCIN	
AMBIT	21017-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	51
COURSE ACTIVITY (Hrs)	24
EDUCATIONAL OBJECTIVES OF THE MODULE	
Objectives of the course are the knowledge of the three main metabolic pathways secondary, the link with the primary metabolism and the recognition of the main secondary metabolites. Addressing from the biochemical point of view complexity of the evolution of ecosystems. Analyzing biodiversity a different levels of organization (from genetic to specific and environmental).	

SYLLABUS

Hrs	Frontal teaching
2	Introduction and objectives of the course. Primary and secondary metabolism.
4	Metabolic Acetate Pathway. Biogenesis of fatty acids. Biogenesis of unsaturated fatty acids Polyunsaturated fatty acids. Branched fatty acids. Polypropionates and macrolide antibiotics. Essential fatty acids and biogenesis of prostaglandins
4	Polyketides. Cyclication mechanisms of polyketidic chains. Synthesis of secondary aromatic metabolites
4	Pathway of mevalonic acid. Biogenesis of isopentenyl units which is a dimerization mechanism. Monoterpenes. Sesquiterpenes. Diterpenes. Triterpenes. Tetraterpenes. Upper terpenes.
4	Plant sterols. Corticosteroids and hormones
6	Biogenesis of aromatic compounds: shikimic acid pathway. Biogenesis of Benzoic Acids. Biogenesis of aromatic amino acids. Cinnamic acid and cinnammyl alcohol

MODULE
ENVIRONMENTAL CHEMISTRY

Prof. SANTINO ORECCHIO

SUGGESTED BIBLIOGRAPHY	
Appunti di lezione, Materiale fornito dal docente S.E.Manahan – Chimica dell'Ambiente- Piccin	
AMBIT	50571-Discipline chimiche
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56

EDUCATIONAL OBJECTIVES OF THE MODULE

The course is aimed to provide the basic concepts for the definition of the chemical composition and characteristics of natural ecosystems (water, air, soil, sediment, organisms). The concepts will be developed in view of biogeochemical cycles, in order to define the environmental pollution processes. The course will provide the analytical basis for the monitoring of the different environmental matrices.

SYLLABUS

Hrs	Frontal teaching
5	Phases of an environmental research (monitoring purpose, parameters, accuracy, etc.)
5	Sampling (water, sediments, etc.) In natural environments
6	Preparation of samples for analysis
8	Types of waters (surface, underground, marine, etc.), And their chemical and physical properties. Water chemistry. • Chemical and physical characteristics • Temperature, Salinity, Conductivity, pH, • Carbonates, Bicarbonates, calcium, magnesium, chlorides, sulfates, nitrates, nitrites, ammonia, dissolved oxygen; oxygen demand (BOD, COD, Kubel, TOC), oils and fats, surfactants.
2	Heavy metals
3	Micro organic pollutants (PAHs, pesticides, etc.)
4	Analytical methods (volumetric, gravimetric and instrumental) for water, sediemnts, soils, air, etc
2	Critical evaluation ot the analytical results of waters, soils, sediments.
5	Water treatments

Hrs	Workshops
16	Water analysis