

# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2019/2020
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
	MAGGIO ANTONELLA Professore Associato Univ. di PALERMO MARIA
CREDITS	9
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
TERM (SEMESTER) ATTENDANCE	2° semester Not mandatory
TERM (SEMESTER) ATTENDANCE EVALUATION	2° semester Not mandatory Out of 30
TERM (SEMESTER) ATTENDANCE EVALUATION TEACHER OFFICE HOURS	2° semester Not mandatory Out of 30 MAGGIO ANTONELLA MARIA
TERM (SEMESTER) ATTENDANCE EVALUATION TEACHER OFFICE HOURS	2° semester   Not mandatory   Out of 30   MAGGIO ANTONELLA MARIA   Monday 12:00   13:00 Studio del docenteViale delle Scienze edificio 17 - piano 0 - Studio 0/D28
TERM (SEMESTER) ATTENDANCE EVALUATION TEACHER OFFICE HOURS	2° semester Not mandatory Out of 30 MAGGIO ANTONELLA MARIA Monday 12:00 13:00 Studio del docenteViale delle Scienze edificio 17 - piano 0 - Studio 0/D28 ORECCHIO SANTINO

## 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.
ASSESSMENT METHODS	The final exam consists of a written test containing at least 15 questions, some of which are multiple choice, in some are asked to discuss a topic treated during the course and some require the numerical solution of a problem. Ad each question is assigned a value (shown next to the question). In addition, the final vote will be assigned based on the valuation of classroom discussion of a topic agreed with the teacher during the course. To pass the exam you need to pass the written test with at least 18/30.
TEACHING METHODS	Lessons, numerical exercises, laboratory activity

## 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 final exam consists of a written test containing at least 15 questions, some of which are multiple choice, in some are asked to discuss a topic treated during the course and some require the numerical solution of a problem. Ad each question is assigned a value (shown next to the question). In addition, the final vote will be assigned based on the valuation of classroom discussion of a topic agreed with the teacher during the course. To pass the exam you need to pass the written test with at least 18/30.

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	
40	Envbironmental chemistry	
Hrs	Workshops	
16	Water analysis	

## MODULE CHEMISTRY OF NATURAL SUBSTANCES

Prof.ssa ANTONELLA MARIA MAGGIO

SUGGESTED BIBLIOGRAPHY		
PAUL M. DEWICK – Chimica, Biosintesi e Bioattivita' de	elle 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 secondary, the link with the primary metabolism and the main secondary metabolites. Addressing from the bloch	main metabolic pathways recognition of the emical point of view	

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