



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2016/2017		
MASTER'S DEGREE (MSC)	GEOLOGICAL SCIENCES AND TECHNOLOGIES		
SUBJECT	ENVIRONMENTAL GEOCHEMISTRY		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50569-Discipline mineralogiche, petrografiche e geochemiche		
CODE	17200		
SCIENTIFIC SECTOR(S)	GEO/08		
HEAD PROFESSOR(S)	VARRICA DANIELA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	102		
COURSE ACTIVITY (Hrs)	48		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	VARRICA DANIELA Tuesday 15:00 16:00 presso lo studio sito in via Archirafi 36 III piano		

DOCENTE: Prof.ssa DANIELA VARRICA

PREREQUISITES	Basic theoretical-scientific aspects of geochemistry and mineralogy are firmly requested
LEARNING OUTCOMES	By means of the scientific concepts acquired during the course, the student will develop the ability to activate and coordinate surveys aimed at studying the geochemical aspects of natural ecosystems with special emphasis on the natural and anthropogenic processes relevant in determining the stability, movement, and reactivity of elements at the earth surface; The student will be able to independently assess the results of environmental monitoring and the impact of human activities on the environment; Ability to present oral and written topics related to environmental issues with competence and scientific expertise; The expected learning outcomes will be assessed throughout the training program by whole-class discussions. The level and degree of learning will be assessed by final examination.
ASSESSMENT METHODS	The oral test consists in a conversation aimed to assess skills and subject knowledge gained during the course. The pass mark will be reached when the student shows adequate knowledge and sufficient understanding of the concepts discussed during the class. Below this, the examination will be considered insufficient. The more the student shows a property of language and mastery of the subject, the more the assessment will be positive. Examination will be evaluated in thirtieths.
EDUCATIONAL OBJECTIVES	Course objectives are designed to provide students with advanced knowledge of the chemical composition of atmosphere, hydrosphere and lithosphere. Particular attention will be devoted to the distribution of chemical elements in the various geo-sectors and the laws governing their mobility throughout the earth surface.
TEACHING METHODS	Frontal lectures
SUGGESTED BIBLIOGRAPHY	Appunti forniti dal docente. Dongarra' G. & Varrica D. (2004). <i>Geochimica e Ambiente</i> . EdiSes William M. White: <i>Geochemistry</i> (free online textbook)

SYLLABUS

Hrs	Frontal teaching
8	Basic Statistical Principles
6	biogeochemical cycles: nitrogen cycle, phosphorus cycle, sulfur cycle, the carbon cycle.
4	Global warming: the greenhouse effect; ocean acidification; carbon dioxide capture and sequestration
6	Particulate matter: Sources of particulate matter; PM10 and PM2.5; chemical speciation of particulate matter; nanoparticles; physical properties of the earth's atmosphere; Atmospheric lapse rate; atmospheric dispersion of pollutants; Benzene, asbestos, dioxin and radon. Chemical composition and sources of fine particulate matter in urban air.
4	Ocean. Physical and chemical characteristics of seawater. Chemical composition of seawater. Removal Processes .
10	Continental waters:Water-rock interaction. Carbonate dissolution. Chemical weathering of silicate rocks. Gibbsite and Goethite Solubility; Langelier-Ludwig diagram. Chemical composition of rainwater. Eh-pH diagrams and redox equilibria in natural waters. Mineral Composition of Drinking Water.
10	Acidification of Earth. Uranium geochemistry. Environmental exposure and biomonitoring