



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2021/2022		
MASTER'S DEGREE (MSC)	GEORISK AND GEORESOURCES		
SUBJECT	PALEO-OCEANOGRAPHY AND PALEOCLIMATOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	C		
AMBIT	21015-Attività formative affini o integrative		
CODE	17066		
SCIENTIFIC SECTOR(S)	GEO/01		
HEAD PROFESSOR(S)	INCARBONA ALESSANDRO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	90		
COURSE ACTIVITY (Hrs)	60		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	INCARBONA ALESSANDRO Tuesday 14:00 15:00 studio docente		

DOCENTE: Prof. ALESSANDRO INCARBONA

PREREQUISITES	Not mandatory
LEARNING OUTCOMES	<p>1)Knowledge and comprehension Paleontology, geochemistry, geophysical methodologies, on which paleoceanographic and paleoclimatic reconstructions are based. The knowledge of mechanisms and forcings that drive climate change at orbital and suborbital scale and that impact ecosystems. Case studies for Mediterranean Sea and Oceans in the late Quaternary.</p> <p>2)Applying knowledge Interpretation of paleontological, geochemical and geophysical data used for paleoceanographic and paleoclimatic reconstructions.</p> <p>3)Autonomy of judgment Comparison of different datasets for paleoceanographic and paleoclimatic reconstructions.</p> <p>4)Communication skills Adoption of an appropriate language and comment on paleoceanographic and paleoclimatic events.</p> <p>5)Learning ability Understanding of specialistic literature.</p>
ASSESSMENT METHODS	The examination will include: 1) The discussion of a scientific paper on paleoceanographic issues, with a special focus on methodologies. 2) Two questions on paleoceanographic and paleoclimatic topics, to evaluate the adoption of a appropriate language and the interplay among issues.
EDUCATIONAL OBJECTIVES	Understanding of methodologies, results and conclusion of scientific papers on paleoceanographic and paleoclimatic issues. Understanding of needed geochemical, geophysical and micropaleontological analysis for paleoceanographic and paleoclimatic research.
TEACHING METHODS	Lectures and laboratory with paleoceanographic and paleoclimatic parameter calculations.
SUGGESTED BIBLIOGRAPHY	<ul style="list-style-type: none"> •Ruddimann, W.F., 2001. Earth's Climate — Past and Future, W.H. Freeman and Company, New York, USA, 1-465. Tutte le edizioni, ISBN:9781429255257 •Hillaire-Marcel, C., De Vernal, A., 2007. Proxies in Late Cenozoic Paleoceanography, Elsevier, Amsterdam, 1-843. Tutte le edizioni, ISBN: 9780444527554

SYLLABUS

Hrs	Frontal teaching
2	Introduction to Climate evolution. The Snowball Earth Theory.
2	Paleocene/Eocene Thermal Maximum.
2	The Middle Pleistocene Transition.
4	Methodology. Oxygen and carbon stable isotopes.
4	Paleothermometers. Alkenones. Mg/Ca. SST reconstructions by planktonic foraminifera.
2	Paleoproductivity estimates by coccoliths and Ba/Al. Physical properties and elemental proxies.
4	The Mediterranean thermohaline circulation. Surface circulation and meso-scale gyres. intermediate and deep-water formation. Atmospheric patterns that affect the Mediterranean circulation.
2	Primary productivity in the Mediterranean Sea. Distribution of nutrients. Seasonal variability in the water column.
2	Climate reconstructions in the sedimentary records with a special focus on Quaternary Sea Surface Temperatures. Suborbital climatic variations in the Atlantic Ocean, in the Mediterranean Sea and in other sites of the Boreal Hemisphere.
2	The last glacial suborbital variations in ice cores. Comparison between Greenland and Antarctica records. The Salt Oscillator hypothesis.
2	Suborbital climate changes during the last glacial in continental records, with special emphasis on vegetation patterns. Suborbital climatic variations during interglacials. Suborbital climatic variations before Termination II.
2	Productivity variations and sapropelic layers in the eastern Mediterranean Sea.
2	The evidence of the anthropogenic global warming by paleoclimatic records. The Anthropocene.
Hrs	Practice
8	Productivity variations in Quaternary sediments. Comparison between geochemical and micropaleontological methods. productivity estimates by the coccolithophore species <i>Florisphaera profunda</i> in sediment cores or core tops.
4	Estimate of the error associated to countings of <i>F. profunda</i> in sediment cores and of primary productivity values.

Hrs	Workshops
4	Orbital and suborbital climate changes during the Quaternary. Age models reconstruction in sediment cores.
4	Sedimentation rate estimates and stratigraphic resolution.
8	Paleoceanographic and paleoclimatic data compilation.