



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
<b>ACADEMIC YEAR</b>	2023/2024		
<b>MASTER'S DEGREE (MSC)</b>	BIODIVERSITY AND ENVIRONMENTAL BIOLOGY		
<b>INTEGRATED COURSE</b>	PALEO-DIVERSITY AND PALEO-ENVIRONMENTS - INTEGRATED COURSE		
<b>CODE</b>	23327		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	GEO/01, BIO/08		
<b>HEAD PROFESSOR(S)</b>	SINEO LUCA	Professore Ordinario	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	SINEO LUCA	Professore Ordinario	Univ. di PALERMO
	CARUSO ANTONIO	Professore Ordinario	Univ. di PALERMO
<b>CREDITS</b>	6		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	2		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<b>CARUSO ANTONIO</b> Monday 9:00 11:00 Stanza del Docente presso il plesso di Biologia Animale di via Archirafi 18, piano terra		
	<b>SINEO LUCA</b> Thursday 12:00 14:00 Studio - Via Archirafi 18 - Dip. STEBICEF - Biologia animale e Antropologia		

<b>PREREQUISITES</b>	To fully understand the contents of the course, the student must have knowledge of evolutionism, zoology and systematic botany and ecology; the concepts of formal and population genetics, as well as comparative anatomy, stratigraphic geology and general paleontology are also useful. The course aims at training a Plio-Pleistocene paleoecologist with knowledge of Hominid and human evolution.
<b>LEARNING OUTCOMES</b>	<p>The integrated course offers specialized preparation in the field of the evolution of living beings in the Plio-Pleistocene, with particular regard to the interactions between geo-ecological changes and the evolution of hominids, humans and non-human primates, in full coherence with the holistic imprint of the curriculum. The student will understand the mechanisms that regulate the planet's climate and how astronomical cycles can modify the climate and atmospheric circulation by influencing sedimentation. The discussion will allow the student to learn the use of stable isotopes and marine Isotopic Stages (MIS), useful for large-scale correlations. Furthermore, a part of the course will be focused on the movements of the tectonic plates and on the evolution of the Rift Valley, the cradle of hominid evolution. In this part the magnetic reversals of the Earth's field will be discussed, with particular regard to the Plio-Quaternary chrons useful for chronostratigraphic correlations. The Plio-Pleistocene fossil sequence of hominids and accompanying faunas will be analyzed in its main lines.</p> <p>Knowledge and understanding: acquisition of knowledge and skills for the use of advanced tools in the field of paleoecological and paleontological studies and human ecology. And in particular the student will acquire the ability to interpret a morpho-functional evolution in relation to ecological parameters and to frame them in a chrono-stratigraphic system; ability to recognize and understand the geological time scale, using the geochronological and chronostratigraphic scale of the Plio-Quaternary interval, the succession of events that include the major climatic oscillations. Furthermore, the student will use correlation techniques through lithological, geochemical and paleomagnetic records thanks to the use of software.</p> <p>Making judgements: the student must be able to evaluate the implications of knowledge in the professional and research fields. The student will be able to evaluate and determine how the different climatic phases of the planet's history, which occurred during the Plio-Quaternary, influenced paleodiversity and paleoenvironments, influencing migrations, extinctions and colonization of new areas.</p> <p>Communication skills: ability to present the results of studies in a critical and clear way, using appropriate scientific terminology. The student will improve his display skills in the context of stratigraphic successions, as well as a greater knowledge of interdisciplinary techniques useful for the correlation of biological and geological events. Finally, the capabilities for understanding the Earth's climatic variations and their impact on evolution will be developed.</p> <p>Learning: ability to update by consulting scientific publications specific to the sector. Ability to acquire knowledge using the teaching and learning tools provided during the course of study. The hours of exercise and the field activities will be used to acquire the ability to manage tools and technologies useful in the profession of evolutionary biologist. In particular, indications will be given on the use of: optical microscope with transmitted and direct light, electrophoresis, biometry using calipers and laser scanning, basic topography and excavation techniques. For the morphometry part, image analysis and procrustean analysis programs will be used. Ability to link observations with the evolutionary and paleoclimatic history of the planet in a single cognitive framework, with the ability to correlate even distant stratigraphic successions using specialised literature.</p>
<b>ASSESSMENT METHODS</b>	<p>The integrated course provides for an assessment in the form of a final oral exam possibly preceded by one or more oral and/or written tests in progress, agreed with the learners. During the final oral exam of the integrated course, the theoretical and practical knowledge of the learner will be evaluated and his/her critical ability on the topics will be evaluated. He will have to demonstrate that he has independent judgment regarding the discipline, understand the evolutionary and phylogenetic implications of the same, evaluate the importance of the knowledge and their applicability in the professional field.</p> <p>The vote in the various tests will be the result of the critical evaluation of the specific preparation and of the ability to explain and reasoned synthesis of the arguments. The evaluation of the exams will be structured as follows:</p> <p>Excellent (30-30 cum laude) - excellent knowledge of the subjects, excellent ownership of language, good analytical skills; the student knows how to apply the knowledge acquired to answer the questions posed.</p> <p>Very Good (27-29) - good command of subject matter and full ownership of language; the student is able to apply the knowledge to answer questions proposed questions.</p> <p>Good (24-26) - basic knowledge of the main topics, fair property</p>

	<p>of language, with limited ability to autonomously apply knowledge to the solution of the proposed questions.</p> <p>Satisfactory (21-23) - the student does not have full command of the main ones program topics; lack of self-application skills acquired knowledge, satisfactory language skills.</p> <p>Sufficient (18-20) - minimum basic knowledge of the main topics of the program, reduced but acceptable language properties, technical language, very little or no ability to independently apply knowledge acquired.</p> <p>Insufficient --- the student does not possess an acceptable knowledge of contents of the topics covered in the program.</p>
<b>TEACHING METHODS</b>	The integrated course consists of 6 CFUs organized in two modules of 3 credits. Exercise and field activities are carried out in the module.

<p style="text-align: center;"><b>MODULE</b>  <b>CLIMATE VARIATIONS AND BIODIVERSITY</b>  <i>Prof. ANTONIO CARUSO</i></p>	
<b>SUGGESTED BIBLIOGRAPHY</b>	
W. F. Ruddiman: Earth's Climate: Past and Future Appunti forniti dal docente	
<b>AMBIT</b>	20879-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	47
<b>COURSE ACTIVITY (Hrs)</b>	28
<b>EDUCATIONAL OBJECTIVES OF THE MODULE</b>	
<p>The student will understand the mechanisms that control the Earth's climate and how astronomical cycles can modify the climate and atmospheric circulation by influencing sedimentation. The discussion will allow the student to broaden his knowledge on the use of stable isotopes and Marine Isotopic Stages (MIS) proposed by Shackleton, useful for large-scale correlations. Furthermore, a part of the course will be focused on the movements of the tectonic plates and on the evolution of the Rift Valley, the cradle of hominid evolution. In this part the magnetic reversals of the Earth's field will be discussed, with regard to the Plio-Quaternary chrons useful for chronostratigraphic correlations.</p> <p>This knowledge will allow the student to have a complete picture to understand how the Earth system has evolved influencing paleodiversity and allowing the migration of many systematic groups, including hominids, from Africa to Asia and Europe</p>	

## SYLLABUS

Hrs	Frontal teaching
2	Concepts of stratigraphy, chronostratigraphy, the stratotypes, the gssps, the stratotypical successions of the Neogene with particular examples on the intervals of the Pliocene-Pleistocene-Holocene
2	Concepts of plate tectonics, opening of the Atlantic Ocean and the Rift Valley. The cradle of hominid evolution (the Rift Valley)
2	Magnetostratigraphy, paleomagnetism in the stratigraphic record and its use for correlations. The chrons of the Plio-Quaternary. The Olduvai Valley and the Finding of Lucy
3	Astronomical cycles and their impact on climate, sedimentary environments and palaeobiodiversity. Lithological cycles and their correlation with astronomical curves impact on biota
3	Climate evolution during the Plio-Pleistocene in Africa, the monsoon regime and the climate impact on fauna and flora
2	Climatic variations during the Neogene. The great Glaciations and the isotope curves. The Great Glaciations and the Interglacial phases of the Pleistocene. I Marine Isotopic Stage, Ice cores in Greenland and Antarctica (GISP –GRIP). Correlations between marine sediments and ice cores
2	Climatic oscillations and evolution of organisms, some examples
Hrs	Workshops
6	Laboratory exercises with chronostratigraphic maps, analysis of isotopic curves useful for large-scale correlations.
6	Laboratory exercises for activities on the successions of Scala dei Turchi, Eraclea Minoa and Monte San Nicola Gela (StratoTypes of the Plio/Pleistocene). In the event that funds are not available for the excursion, the exercise will be developed in the laboratory with papers and conceptual models

**MODULE**  
**ANTHROPOLOGY AND HUMAN EVOLUTION**

*Prof. LUCA SINEO*

**SUGGESTED BIBLIOGRAPHY**

Manuale di Antropologia. A cura di L. Sineo & J. Moggi Cecchi. Utet 2022  
Processes in Human Evolution - Ayala & Cela-Conde. Academic Press  
Human Evolution. Langdon. Springer 2022

<b>AMBIT</b>	20879-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	47
<b>COURSE ACTIVITY (Hrs)</b>	28

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The course provides an up-to-date examination of Neogene fossils of human and non-human primates, with particular attention to the Plio-Pleistocene period. The analysis of paleobiogeography and morphologies will allow to define times and ways of the evolutionary scenarios of the different lineages.

Part of the course will be dedicated to the evidence of the development over geological time of the anatomical features correlated with the different types of locomotion and with encephalization.

As a corollary of the morphological evolution, some evaluations about the psychic and cultural evolution of the hominids

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
4	Palaeobiogeography and chronology of human and non human Neogene's primates
8	The evolution of the anatomical districts in relation to locomotion and posture. The role of the ecological changes in the development of the species. Sympatry and hominoid species.
4	Genus Homo: development, coevolution, coalescence and introgressions in the lineages. A multidisciplinary approach.
<b>Hrs</b>	<b>Practice</b>
12	Exercises in Palaeoanthropology and Evolution