



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2018/2019		
MASTER'S DEGREE (MSC)	GEOLOGICAL SCIENCES AND TECHNOLOGIES		
SUBJECT	CYCLOSTRATIGRAPHY AND STRATIGRAPHIC CORRELATIONS		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50566-Discipline geologiche e paleontologiche		
CODE	19217		
SCIENTIFIC SECTOR(S)	GEO/01		
HEAD PROFESSOR(S)	CARUSO ANTONIO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	98		
COURSE ACTIVITY (Hrs)	52		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	CARUSO ANTONIO Monday 9:00 11:00 Stanza del Docente presso il plesso di Biologia Animale di via Archirafi 18, piano terra		

PREREQUISITES	The knowledge of the basic concepts of stratigraphy, paleontology and geology is required
LEARNING OUTCOMES	<p>Knowledge and understanding skills</p> <p>Acquiring useful knowledge for the correlations of stratigraphic successions even at great distances through the use of geological and palaeontological records. The student will learn to understand how sedimentary sequences are controlled by local and global geological factors, and will understand how stratigraphic sequences and pelagic sediments are strongly influenced by the climatic oscillations induced by astronomical cycles that directly modify solar irradiation and indirectly the atmospheric circulation and the oceanic currents. These climatic oscillations are at the base of the modern cyclostratigraphy. Part of the course will focus on the movements of the tectonic plates and their impact on the climate of the planet, with alternating greenhouse with Icehouse. During this part of the course, the earth's magnetic reversals will be widely discussed, and the latter, together with bio-events, will allow large-scale correlations and to place events on the chronostratigraphic scale.</p> <p>In addition, part of the course will focus on the Salinity Crisis which during the Messinian affected the Mediterranean Sea. In fact, it will discuss all the techniques for correlating evaporitic sequences by using cyclostratigraphy. Finally, through tutorials with some software, they can work on geological records by acquiring the most important techniques for drawing and to correlate lithological logs.</p> <p>Such knowledges will allow the student to have a complete view of how the earth system is quite complex and how many factors contribute to its evolution.</p> <p>Ability to apply knowledge and understanding</p> <p>Ability to recognize and organize, using the geochronology and chronostratigraphic scale, the most important phases of the geological history, including how climate changes and major geological events have changed the planet. Additionally, the student will use correlation techniques through lithological records useful in petroleum research.</p> <p>Judgment autonomy</p> <p>The student will be able to critically evaluate and correlate different and distant successions among themselves and determine how different climatic phases of the planet history have had an impact on different sedimentary environments and biological assemblages, also causing massive mass extinctions. They will also be able to understand the climatic history of the planet and the impact of climate in stratigraphic successions.</p> <p>Communicative Skills</p> <p>Ability to expose how to apply techniques and to correlate stratigraphic sequences, and how to use the multidisciplinary techniques. In addition, capabilities will be developed to understand how climate change has affected Earth's history.</p> <p>Learning Skills</p> <p>Ability to link observations with the evolutionary history of life on the planet to a single cognitive framework and to correlate stratigraphic successions, even distant from each other, with the ability to consult specialized literature.</p>
ASSESSMENT METHODS	<p>The exam consists of an oral test of approximately 45 minutes, during which the student will be asked not less than 10 questions pertaining to the entire program of the course. Each question with a full and correct answer has a 3 point rating, but with a score of 0 to 3 points in relation to the correctness and completeness of the answers. The exam is considered to be overcome with a total score of 18/30. The threshold of sufficiency will be reached when the student shows knowledge and</p> <p>Understanding the topics at least in the general guidelines and having minimum application competencies. It should also have exhibits and arguments that will enable the knowledge of the examiner to be transmitted. When, on the other hand, the student is able to interact with the examiner, and when his / her knowledge and appraisal skills are more and more detailed in the discipline, the more the evaluation will be positive. A 24/30 vote will be used to assess a candidate's average preparation.</p>
EDUCATIONAL OBJECTIVES	The goal is to create specialists capable of working in petroleum exploration, mining societies as well as in specialized research centers to study the planetary climate evolution
TEACHING METHODS	Lectures (40 h), Laboratory (12 h). Twelve hours of laboratory work can be devoted to two excursions to apply the knowledge gained during lessons and exercises (if CIST funds allow it)
SUGGESTED BIBLIOGRAPHY	W. F. Ruddiman: Earth's Climate: Past and Future altre letture

	<p>Alfonso Bosellini. Introduzione alle Rocce Carbonatiche (capitolo sulle rocce pelagiche)</p> <p>Raffi e Serpagli, Introduzione alla Paleontologia. UTET (Capitolo sulla Stratigrafia, capitolo 8)</p> <p>Appunti forniti dal Docente durante il corso</p>
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SYLLABUS

Hrs	Frontal teaching
2	Concepts of oceanography, ocean circulation, circulation in the Mediterranean and physical chemical parameters of water. Impact of climate change on circulation
2	Stratigraphic concepts, Litostratigraphy, Formation, Member, Group and Series
3	Biostratigraphy, biozones and how utilise bio zones for the stratigraphic correlations
4	Cronostratigraphy, stage stratotypes, stratotypes of the Neogene and examples of Mesozoic successions. Principles of correlation
4	Magnetostratigraphy, the paleomagnetism in the geological record
4	Methods of radiometric dating, with particular attention to the use of C14 and stratigraphic correlations
4	Astronomical cycles and their impact on sedimentary environments. Lithological cycles and their correlation with astronomical curves.
2	Separation of the Pangea supercontinent. Climate warming during Mesozoic.
2	The PETM (Paleocene / Eocene Thermal Maximum) the warming phase (Greenhouse) of the Paleocene / Eocene boundary
2	Impact of tectonic on climate. The uplift of the Isthmus of Panama and consequences on atmospheric and oceanic circulation of the Atlantic Ocean.
2	Climate change during the Neogene. The great glaciations and isotopic curves. Glaciations and Interglacial Pleistocene Phases. Marine Isotopic Stage, Ice cores in Greenland and Antarctica (GISP -GRIP). Correlations between marine sediments and ice cores
3	Dansgaard-Oeschger events, Heinrich. The last glacial period (LGM); The Younger Dryas event.
4	Messinian Salinity Crisis in the Mediterranean Area and correlations between the various successions. From the pre-evaporitic to the crisis
2	Messinian Salinity Crisis in the Mediterranean Area and correlations between the various successions. Upper gypsum and the return to normal marine conditions during the Zanclean
Hrs	Workshops
2	From radiometric dating to calendar age and age models, Using Recalibration Software (CALIB 7.1)
2	Stratigraphic logs and software correlations (Canvas, excel) and spectral analysis software. Analyseries
2	Didactic excursion aimed at carrying out field activities to correlate lithological cycles of the Falconara and Monte Gibliscemi sections, in order to apply the knowledge gained during the course. In the case that the financial support will not be available, these activities will be carried out in the laboratory.
2	Cyclostratigraphic correlations through PC and specific software using Laskar's astronomical solutions. Case examples: the succession of Falconara-Gibliscemi (Tortonian / Messinian) and Scala dei Turchi (near Capo Rossello) and Eraclea Minoa for the Plio / Pleistocene
4	Didactic excursion aimed at carrying out field activities to correlate lithological cycles of the Scala dei Turchi ed Eraclea Minoa (Plio/Pleistocene) sections, in order to apply the knowledge gained during the course. In the case that the financial support will not be available, these activities will be carried out in the laboratory.