



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2023/2024
MASTER'S DEGREE (MSC)	GEORISKS AND GEORESOURCES
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)	94
COURSE ACTIVITY (Hrs)	56
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
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	Knowledge of basic concepts related to stratigraphy, paleontology and geology is required
LEARNING OUTCOMES	<p>Acquisition of useful knowledge for stratigraphic correlations through the use of geological and paleontological records. The student will learn to understand how sedimentary sequences are controlled by local geological factors and stratigraphic sequences and pelagic sediments are strongly influenced by climatic oscillations induced by astronomical parameters which directly modify solar irradiation cycles, and how trigger atmospheric circulation and ocean currents. These climatic oscillations are the basis of modern cyclostratigraphy. Part of the course will be focused on the movements of the tectonic plates and their impact on the planet's climate, in which warm phases (Greenhouse) alternate with glacial phases (Icehouse). During this part of the course the magnetic inversions of the earth's field will be extensively discussed, the latter, together with bioevents, allow for large-scale correlations and to place events in the chronostratigraphic scale.</p> <p>Furthermore, part of the course will be focused on the Messinian Salinity Crisis that affected the Mediterranean Sea. We will discuss all the techniques to correlate the evaporitic sequences used in cyclostratigraphy. Finally, through exercises with some software, it will be possible to work on geological records by acquiring the most important techniques for designing and correlating lithological logs.</p> <p>As knowledge will allow the student to have a complete picture to understand how the earth is quite complex and how many factors obtained in its evolution.</p> <p>Ability to apply knowledge and understanding</p> <p>Ability to recognize and organize, using the geochronological scale and the most important phases of geological history, understanding how climatic oscillations and major geological events have changed the planet. In addition, the student will use research techniques through lithological records useful in oil research applications.</p> <p>Autonomy of judgment</p> <p>The student will be able to underestimate and critically correlate very different and distant sequences and determine how the different phases of the planet's history have had an impact on different sedimentary environments causing large mass extinctions. They will also be able to understand the planet's climatic history and the impact of climate stratigraphic successions.</p> <p>Communication skills</p> <p>Ability to explain how to apply the techniques to correlate stratigraphic sequences and how to use multidisciplinary techniques. In addition, skills will be developed to understand how climate changes have affected the history of the Earth.</p> <p>Learning skills</p> <p>Ability to link observations with the planet's life history on the in a single cognitive framework and to correlate stratigraphic sequences even far from each other, ability to consult specialist literature.</p>
ASSESSMENT METHODS	<p>The exam consists of an oral test lasting about 60 minutes, during which the student will be asked no less than 10 questions concerning the entire program of the course. Each question with a complete and correct answer has a rating of 3 points, but with a rating of 0 to 3 points in relation to the correctness and completeness of the answers. The exam is considered passed with an overall score of 18/30. The threshold of sufficiency will be reached when the student shows knowledge and understanding of the topics at least in general lines and having minimal application skills; he must also possess exhibition and argumentative skills that allow the transmission of his knowledge to the examiner. The more, however, the examining with his argumentative and exhibition skills manages to interact with the examiner, and the more his knowledge and application skills go into the detail of the discipline, the more the evaluation will be positive. A 24/30 vote will be used to evaluate an average preparation of the candidate.</p>
EDUCATIONAL OBJECTIVES	The goal is to create specialists capable of working in the field of oil research, in mining companies as well as in specialized research centers to study the planet's climatic evolution
TEACHING METHODS	Lessons 40 hours, 16 hours of laboratory can be devoted to two excursions to apply the principles acquired during the lessons (if CIST funds allow it), otherwise they will be carried out in the classroom through work and software.
SUGGESTED BIBLIOGRAPHY	<p>W. F. Ruddiman: Earth's Climate: Past and Future altre letture Alfonso Bosellini. Introduzione alle Rocce Carbonatiche (capitolo sulle rocce pelagiche) Raffi e Serpagli, Introduzione alla Paleontologia. UTET (Capitolo sulla Stratigrafia, capitolo 8) Appunti forniti dal Docente durante il corso</p>

SYLLABUS

Hrs	Frontal teaching
3	Notions of Oceanography, oceanic circulation, circulation in the Mediterranean and chemical-physical parameters of water. Impact of climate change on marine organisms and circulation
3	Stratigraphy concepts, Lithostratigraphy, Formation, Member, Group and Series
3	Biostratigraphy, types of biozones and use of biozones in stratigraphic correlations
3	Chronostratigraphy, the stratotypes of the planes, the gssp, the Neogene stratotypic sequences and examples of Mesozoic sequences. Principles of correlation
3	Magnetostratigraphy, Paleomagnetism in the stratigraphic record
3	Radiometric dating methods with particular attention to the use of C14 and stratigraphic correlations
8	The astronomical cycles and their impact on sedimentary environments. Lithological cycles and their correlation with astronomical curves.
2	Pangea supercontinent dismemberment. Climate warming during the Mesozoic.
2	The PETM (Paleocene / Eocene Thermal Maximum) the warming phase (Greenhouse) of the Paleocene / Eocene limit
2	Impact of tectonics on the climate. The closure of the Panama Isthmus and its consequences on the atmospheric and oceanic circulation of the Atlantic Ocean.
2	Climatic variations during the Neogene. Glaciations and the isotopic curves. Glaciations and the Interglacial phases of the Pleistocene. The Marine Isotopic Stage, Ice CORE in Greenland and Antarctica (GISP - GRIP). Correlations between marine sediments and ice sheets
2	The Dansgaard-Oeschger events, Heinrich. The last glacial period (LGM); The Younger Dryas event.
2	The Messinian Salinity Crisis in the Mediterranean area and correlations between the various successions. From the pre-evaporitic to the crisis
2	The Messinian Salinity Crisis in the Mediterranean area and correlations between the various successions. The upper Gypsum and the return to normal marine conditions during the Zanclean
Hrs	Workshops
3	From radiometric dating to calendar age and time models. Use of software for recalibration (CALIB 7.1)
3	Logs Stratigraphic and correlations through software (Canvas, Excel) and a software for spectral analysis. Analyseries
2	Cyclostratigraphic correlations by using PC and specific software and the Laskar astronomical solutions. Case examples: the successions of Falconara-Giblicemi (Tortoniano / Messiniano) and Scala dei Turchi (near Capo Rossello) and Eraclea Minoa for the Miocene/Pliocene boundary
4	Didactic excursion aimed at carrying out field activities and to correlate the lithological cycles for the Falconara and Monte Giblicemi successions, in order to apply the knowledge acquired during the course. In the event that financial support for the excursion is not available, these activities will be carried out in the laboratory.
4	Didactic excursion aimed to field activities aimed to correlate the lithological cycles for the successions of Scala dei Turchi and Eraclea Minoa (Miocene/Pliocene and Plio / Pleistocene boundaries) in order to apply the knowledge acquired during the course. In the event that financial support for the excursion is not available, these activities will be carried out in the laboratory.