



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	MARINE BIOLOGY		
SUBJECT	MARINE GEOLOGY AND SEDIMENTOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	C		
AMBIT	20879-Attività formative affini o integrative		
CODE	14430		
SCIENTIFIC SECTOR(S)	GEO/02		
HEAD PROFESSOR(S)	AGATE MAURO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	98		
COURSE ACTIVITY (Hrs)	52		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	AGATE MAURO Monday 12:30 14:00 studio del docente, stanza n°3 al terzo piano del Dip. di Scienze della Terra e del Mare, via Archirafi 20 Friday 12:30 14:00 studio del docente, stanza n°3 al terzo piano del Dip. di Scienze della Terra e del Mare, via Archirafi 20		

PREREQUISITES	high school level knowledge of geography: the motions of the Earth and the Moon, atmospheric circulation, climate zones; general knowledge of mathematics, physics and chemistry derived from the related courses of the three-year degrees
LEARNING OUTCOMES	acquisition of basic and advanced knowledge on geological processes in the marine environment with particular reference to the sedimentary processes and to global and local factors that control them; knowledge and understanding of the most common methods of investigation in the field of marine geology. Ability to apply knowledge and comprehension: ability to apply the acquired knowledge and skills in different fields of work: - to recognize, based on personally worked out or performed by other specialists surveys, marine geological structure of the area in which they will operate; to detect the geological factors that control the evolutionary dynamics; - be able to recognize the specificity of the geological and sedimentological features within the marine ecosystems (especially in neritic and coastal environment) and their interconnections with the biotic features. Autonomous ability to evaluate: Knowing how to choose the most appropriate geological surveys to be carried out as part of a research study or an applied work and be able to independently assess the results and indications coming from marine geological surveys carried out by specialists of the sector; able to assess the implications of the different geological substrates and sedimentary processes in the various marine environments. Communication skills: Ability to relate in a qualified manner with marine geologists and generally with the practitioners operating in the marine environment using the proper scientific language of this very specialized discipline; ability to convey the implications of marine geological studies also to professionals from other fields. Learning ability: To develop students' autonomous ability to understand the overall unified framework of the geological and sedimentary processes working in the marine environment; to enable students to update their own knowledge and geological expertise, through regular consultation of sectoral manuals and scientific publications and attending seminars, specialized courses, Master's Degree
ASSESSMENT METHODS	Both the assessment of understanding skill and degree of learning achieved by the students are checked and valued in progress by carrying out a written test with open questions, as well at the end of the course. The final assessment will be done through a detailed interview to ascertain, in relation to the educational objectives described below, the proficiency achieved by students in every part of the program and paying particular attention to the following aspects: - mastery of the subject and ability to link together the various topics illustrated in the course; - ability to apply independently and critically the acquired knowledge; - ability to use appropriate scientific language, indicative of communication skills acquired by the students. The final evaluation will take into account the outcome of both tests (intermediate and final) by mediating the marks obtained in each of the two tests. The final vote will be expressed in thirty. The 18/30 vote will be given to a preparation (knowledge + skills) considered sufficient: basic knowledge of the topics dealt with, the ability to operate the least of the links between the topics, being able to apply, even if limited, the knowledge gained autonomously and critically, using an appropriate scientific language; higher votes will be given as consequence of better results until the vote of 30/30 (with possible praise) when the preparation will be considered excellent: excellent knowledge of the topics discussed and ease of linkage between them, full capacity to apply autonomously and critically the acquired skills also in field other than those strictly considered during the course, appropriate use of a specific scientific language
EDUCATIONAL OBJECTIVES	Main aim of the course is to illustrate to the students an overview of the geological processes active in the marine environment, particularly in the neritic and coastal environment but also, more generally, in the oceanic environment and endogenous and exogenous dynamics that govern it. The course aims to accompany the student along a process, developed throughout the master's degree, of the overall understanding of the marine environment, offering the tools to relate the biotic processes (illustrated in the other courses of the degree course) and the abiotic ones (the geological and sedimentological ones specifically). The main learning objectives of the course are: to equip students of theoretical knowledge necessary to understand what geological and sedimentary processes are active in the marine environment in which they will operate; to increase in the student the ability to identify the most suitable methods of investigation to be carried out in relation to the specific issues of study to

	address. Thus the following topics will be illustrated: global geological processes that govern the origin and the evolution of the oceans; the main geological and geomorphological features that characterize the seabed; the causes of the sea level changes; the physical and chemical properties of ocean waters; the movements of the oceanic water masses: waves, tides, wind and density driven oceanic circulation; the circulation of currents in the Mediterranean Sea. After outlining the general principles that govern the sedimentary processes and the formation of sedimentary rocks, and the methods of analysis of the sediments, the sedimentary environments of the continental shelf and of the submerged coastal belt will be examined: coasts of submergence, high and rocky coasts, coastal platforms, tidal flats, beaches, splits and barrier islands, coastal dunes, by describing the types of deposits and sedimentary structures that can be formed in the different environments and geological factors that control the evolution: tectonics, morpho-sedimentary processes, waves and currents. With reference to the pelagic marine environments, the salient features of the habitat of deep water corals will be illustrated, especially those present in the Mediterranean Sea. Students will also learn modern investigation methods used in marine geological survey and some examples of analysis and interpretation of the results of such surveys will be illustrated. Finally, some examples of marine geological maps will be illustrated and discussed
TEACHING METHODS	classroom lessons also performed with the help of visual teaching aids (pictures and videos); tutorials on the recognition of sediment samples, granulometric analyzes, reading of nautical and marine geological maps, simulations of the use of computer programs for the processing of seismic acoustic data on the seabed and the mapping of main coastal habitat
SUGGESTED BIBLIOGRAPHY	Stephen Marshak: "La Terra - ritratto di un pianeta". Zanichelli (per la parte sull'interno della Terra) James Kennett: "Marine Geology". Prentice-Hall, 1982 (per la parte di geologia marina ed oceanografia) F. Ricci Lucchi: "Sedimentologia", volume I. CLUE (per la parte di sedimentologia) E. Pranzini: "La forma delle coste". Zanichelli (per il moto ondoso, le maree, gli ambienti costieri) Testi disponibili in versione elettronica: S. Marshak: "Earth, portrait of a planet". Testi consigliati per gli approfondimenti: E. Seibold & W.H. Berger: "The Sea Floor. An introduction to marine geology" – Springer, 1996. A. Bosellini, M. Mutti & F. Ricci Lucchi: "Rocce e successioni sedimentarie" – UTET "Side Scan Sonar Record Interpretation" – Klein Associates, 1985. E. Bird: "Coastal geomorphology". Wiley Davies & Fitzgerald: "Beachs and Coasts". Springer J. Pethick: "An Introduction to coastal geomorphology". Routledge

SYLLABUS

Hrs	Frontal teaching
1	Presentation of the course, the training objectives and the ways to carry out the assessment of the assessment of learning. Short story of the sea floor geological exploration in the oceans
3	Notes on the composition and structure of the Earth's interior: earth enclosures and discontinuous surfaces; the geothermal curve; the isostasy
3	Notes on the main tectonic features and processes; The scale of geological time; Lithospheric plates and plate tectonics
4	sea floor morphology: oceans and enclosed seas; the continental shelf to slope system
4	opening and evolution of the oceanic basins; notes on the Mediterranean Sea geology
8	sea waves, tides, wind driven circulation, density circulation; marine currents in the Mediterranean Sea; eustatic and relative change of the sea level: origin and rate
7	notes on the minerals and the main type of sediments and rocks; the lithogenetic cycle; compositional, textural and structural properties of the main type of terrigenous and carbonatic sediments; evaporitic, siliceous and phosphatic sediments.
4	costal environments: submerges coasts; cliffs and coastal escarpment; coastal platform
5	depositional coasts: beaches, litoral spits, barrier islands; tidal flats; the origin of coastal sediments; sedimentary budget along the coasts
1	deep water corals: geomorphological and oceanographic features, evolution and geographical distribution, scientific interest and habitat conservation

Hrs	Practice
5	analysis of sediments and sedimentary rocks; textural analysis
5	marine geological and geophysical investigations: side scan sonar and multibeam; sampling of the sea bed
2	nautical and geological marine maps lecturing, execution of bathymetric profiles