



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	GEORISKS AND GEORESOURCES		
SUBJECT	MARINE GEOLOGY AND COASTAL RISK		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50566-Discipline geologiche e paleontologiche		
CODE	19212		
SCIENTIFIC SECTOR(S)	GEO/02		
HEAD PROFESSOR(S)	SULLI ATTILIO	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	SULLI ATTILIO Wednesday 15:00 - 17:00 Via Archirafi 20 - III piano, stanza 5 - Studio Prof. Sulli		

PREREQUISITES	Knowledge in the basic disciplines (mathematics, chemistry and physics) and in the disciplines that characterize the degree course of study in Geology (paleontology, mineralogy, petrography, geomorphology, geology)
LEARNING OUTCOMES	Knowledge and understanding At the end of the course students should be able to understand fundamental concepts (e.g. seabed morphology, paralic and marine environments), processes (e.g., waves, water circulation) and principles and theories (e.g. actualism, plate tectonics), in each of the specific analyzed topics. This knowledge will be acquired through lectures and field activities. The level and degree of learning will be assessed through exams and intermediate evaluations. Ability to apply knowledge and understanding Students will be able to understand the scientific methods, can improve the critical capacity and the ability to interpret scientific observations. They will also possess suitable knowledges for professional work in the areas of application of marine geology, also in the frame of the marine-coastal hazards, which can be applied in public authorities, institutions, companies, corporations, professional offices. Verification of acquisition of the ability to apply knowledge and understanding will be through graphical tests and practical activities with the use of data processing, as well as synthetic reports both during and at the end of laboratory and field activities. Autonomy of judgement Students will acquire appropriate skills and tools for the collection and interpretation of data in marine geology, for communication and information management. In particular, the graduate will be able to schedule marine geological survey, gathering and formulating hypotheses and models. The autonomy of judgement is acquired through experience gained in field observations, in the writing of papers and reports. Communication skills Students will acquire skills to work in teams, to operate with defined degrees of autonomy and engage promptly in the workplace. Must be able to communicate and interact with a variety of partners, to use computer tools to collect data and information, to possess extensive skills and tools for communication and information management. Such skills are stimulated in addition to individual learning activities, during activities on the field. Verification of achievement of such capacity is through oral and written examination tests where is rated the skill, precision and rigour in the exposition. Ability to learn Through a solid basic training supported by knowledge of experimental and analytical methods to be applied in the laboratory and on the field, students will receive the necessary prerequisites for further aging in higher level courses (masters, PhD). The training acquired will allow them to increase knowledge constantly updating and keeping informed on new developments and scientific methods, with the ability to tackle new areas of work. Learning skills are developed throughout the training with particular reference to the individual study and to the development of individual projects. The acquisition of such capabilities is ensured and checked both with the exam or by autonomous activities and application audits
ASSESSMENT METHODS	Ongoing tests, written paper (physiographic-geological-geophysical study of a submarine region; seismic reflection interpretation), oral examination on arguments of the course. The final mark, expressed in thirtieth, will take into account the ongoing test (10/30), the discussion of the written draft (10/30) and the oral test (10/30). Evaluation is based on the achievement of the objectives (basic knowledge of the topics and link between them, autonomy of judgement, correct use of technical-scientific language), with a scale from elementary (18/30) to excellent (30/30 cum laude)
EDUCATIONAL OBJECTIVES	Physiographic, geological and geophysical features of the marine areas will be analysed. We will study the mechanisms of formation of both active and passive continental margins and the oceans, with reference to global tectonic models. We will address the issues related to the relationship between subsidence, eustatism and sediment supply. Will show the physical and chemical characters of the sea water, surface and vertical circulation of sea water, and the mechanisms that regulate waves, tides and currents. We will frame the main marine environments and sedimentation. The main investigation methods in marine areas will be explained in detail and the geological characteristics of the Central Mediterranean. In addition, basic knowledge of the coastal areas is provided and the issues related to marine hazards, coastal vulnerability (natural or induced) and its defense are addressed as a starting point for its correct management.
TEACHING METHODS	Frontal lessons, Laboratory activities Depending on the resources available to the CIST, part of the laboratory activities will be carried out on the field, as educational excursions
SUGGESTED BIBLIOGRAPHY	

	Kennett – Marine Geology. Prentice Hall Seibold & Berger – The Sea Floor. An introduction to Marine Geology, Springer Verlag Arnulfo & Sulli – Appunti di Geologia Marina
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SYLLABUS

Hrs	Frontal teaching
2	Hypsographic curve. Marine physiography and environments. Global tectonics and margins
3	Continental shelf and late Quaternary deposits. Fluids emissions, pockmark and mud volcano
3	Continental slope. Submarine canyon. Turbidity currents: genetic processes and turbidites. Submarine landslides. Soft sediment deformation
2	Contourites. Abyssal plains. Oceanic trenches. Seamount, guyot
3	Marine water chemistry. Salinity and density. Sea water temperature. Minimum oxygen
3	Surface marine circulation. Coriolis effect. Upwelling and downwelling. Physiography of the Mediterranean. Shallow and deep circulation in the Mediterranean
3	Wind-generated waves. Tides: static and dynamic model
3	Littoral system and coastal processes. Classification of the coasts. Cliffs. Beaches. Beach profiles. Coastal sedimentary balance
3	Coast vulnerability and coastal risk. Defense systems: walls, cliffs, groins, breakwaters and their effects. Artificial nourishments
3	Anomalous waves and tsunamis. Calculation of anomalous wave parameters. Marine geological hazard
3	Marine cartography. Positioning systems, bottom sampling, wells
3	Geology and marine geomorphology of the central Mediterranean
4	Acoustics. Snell's law. Seismic reflection. Acoustic impedance and reflection coefficient. Resolution and penetration. Deconvolution. Seismic sources and hydrophone. Digital acquisition. Multichannel seismic. Velocity analysis. Seismic processing. 3D Seismics
2	Acoustic methods – Multibeam and Side Scan Sonar
Hrs	Workshops
2	Marine Cartography Laboratory
4	High resolution seismic profiles interpretation
4	High penetration seismic profiles interpretation
2	Seismic Data Calibration
4	Morphobathymetric Data Interpretation