

## **COURSE OF STUDY** *Scienze e Gestione delle attività marittime - Science and Management of Maritime Activities*

**ACADEMIC YEAR** 2024-2025

**ACADEMIC SUBJECT** *Marine Geology*

<b>General information</b>	
Year of the course	<i>II</i>
Academic calendar (starting and ending date)	<i>07-10-24/19-01-25</i>
Credits (CFU/ETCS):	<i>6</i>
SSD	<i>Geologia Stratigrafica e sedimentologica GEO/02</i>
Language	<i>Italian</i>
Mode of attendance	<i>Strongly recommended</i>

<b>Professor/ Lecturer</b>	
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Virtual room	<i>TEAMS Platform code: usg8jm4</i>
Office Hours (and modalities: e.g., by appointment, on line, etc.)	<i>By appointment using email address</i>

<b>Work schedule</b>			
<b>Hours</b>			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<i>150</i>	<i>40</i>	<i>15</i>	<i>95</i>
<b>CFU/ETCS</b>			
<i>6</i>	<i>5</i>	<i>1</i>	

<b>Learning Objectives</b>	<i>The aim of the course consists in: - providing basic knowledge of Marine Geology, with particular regard to materials and processes affecting the seabed; - acquiring skills useful for the correct collection of oceanographic data, and for their analysis, processing and representation.</i>
<b>Course prerequisites</b>	<i>Basic knowledge of Earth Science.</i>

<b>Teaching strategie</b>	<i>Lectures, also recorded in e-learning mode, supported by seminars on some topics of the course. Lessons and seminars are followed, where necessary, by a discussion with students in the classroom. During the lessons, powerpoint presentations and video are used. During exercises classroom macroscopic samples of sedimentary rocks are distributed and their description and recognition is carried out; examples of thematic maps and seismic profiles are also shown and interpreted. If possible, one field excursion will take place along coastal areas, possibly involving other teachers of the Course of Study.</i>
<b>Expected learning outcomes in terms of</b>	

<b>Knowledge and understanding on:</b>	<i>The student will have to demonstrate knowledge of the fundamental concepts of marine geology, having clear the distribution of sediments and sub-environments in the various areas of the seabed; will have to know the dynamics of sedimentary processes occurring in the marine environment, as well as the different methodologies used for its study.</i>
<b>Applying knowledge and understanding on:</b>	<i>The student must be able to correctly use the knowledge learned during the course for: the observation and description of the geological and sedimentary characteristics of the marine environment; the recognition of the dynamics of the marine environment also through the interpretation of the results of direct and indirect surveys carried out for the study of different parameters of the seabed.</i>
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>• <i>Making informed judgments and choices</i> <i>The student must be able to solve a geological question related to the topics of the course, making the most suitable methodological choices to solve the problem. Furthermore, the student must also have acquired learning skills useful for undertaking future studies independently. To achieve these objectives, questions relating to the topics covered will be asked during the lessons.</i></li> <li>• <i>Communicating knowledge and understanding</i> <i>The student must be able to describe clearly and with language properties all the topics covered during the course both during moments of sharing, comparison and discussion during the lessons, and during the oral exam.</i></li> <li>• <i>Capacities to continue learning</i> <i>The student must be able to independently acquire further knowledge starting from the basis of the contents transmitted during the course and making connections with other subjects of the course of the Degree Course. During the lessons, discussions on the topics covered will be stimulated in order to develop this ability</i></li> </ul>
<b>Syllabus</b>	
<b>Content knowledge</b>	<p><i>The course consists of 5 CFU/ETCS of lectures and 1 of classroom and possibly field exercises.</i></p> <p><i>The topics covered during the lectures can be grouped into 5 main themes, summarized below.</i></p> <p><b>1) INTRODUCTION TO MARINE GEOLOGY AND PHYSIOGRAPHY OF THE OCEAN FLOOR</b></p> <p><i>The evolution of the Earth; composition and structure of the Earth; the drift of the continents; paleomagnetism; plate tectonics; the motions of the lithospheric plates and the expansion of ocean floors; diverging margins; converging margins; transform margins. Hypsographic curve. The bathymetric provinces of passive continental margins and converging margins. The significance of the platform / slope / basin systems in geodynamic. The canyons and the continental rise. Mid-ocean ridges. Transform faults and fracture zones. Deep ocean basins.</i></p> <p><b>2) SEDIMENTS AND SEDIMENTARY TRANSPORT</b></p> <p><i>Characters, classification and distribution of sediments in the seabed (carbonate and siliceous muds, sapropels and black shales, iron sediments, phosphates...).</i> Genesis, classification and properties of sedimentary rocks. Sedimentary processes and tractive and massive transport. Main sedimentary structures.</p> <p><b>3) DYNAMICS AND SEDIMENTARY PROCESSES IN LITORAL AND SHALLOW SEA SYSTEMS. ANTHROPIC IMPACT</b></p> <p><i>Notes on the dynamics of waves, tides and sea currents; dynamics of depositional systems: delta, beach and platform environments. Anthropogenic impact in coastal areas. Case studies.</i></p>

	<p>4) OCEAN CIRCULATION AND CLASSIFICATION OF DEEP-SEA SEDIMENTS <i>Physical, chemical, and dynamic characteristics of ocean waters; thermohaline circulation. Marine depositional systems: slope, turbidites, contourites, hemipelagites, pelagic clays. Deposits of wind and volcanic origin; glacio-marine sediments, sediments of extraterrestrial origin.</i></p> <p>5) METHODS OF INVESTIGATION OF THE OCEAN FLOOR <i>Direct (sampling, surveys ...) and indirect (Side Scan Sonar, Single and Multi Beam, reflection seismic ...) investigation methods.</i></p> <p><i>The classroom didactic exercises concern the recognition of sedimentary rocks samples and the interpretation of thematic maps and seismic profiles; if possible, at least one field excursion will take place along coastal areas, possibly involving other teachers of the Course of Study.</i></p>
<b>Texts and readings</b>	<p>BOSELLINI A., MUTTI E., RICCI LUCCHI F. (1989) - <i>Rocce e successioni sedimentarie</i>. UTET, TORINO</p> <p>DOGLIONI C. (1991) - <i>Una interpretazione della Tettonica Globale</i>. <i>Le Scienze</i>, 270, 32-42.</p> <p>KENNETT J. (1982) - <i>Marine Geology</i> – Prentice Hall, London. RICCI LUCCHI F. (1992)- <i>I ritmi del mare</i>. N.I.S., Bologna</p>
<b>Notes, additional materials</b>	<i>The teacher recommends specific readings on web pages and/or scientific papers and provides slides shown during lessons.</i>
<b>Repository</b>	<i>All lessons in .pdf format and their recording are uploaded to the website: <a href="http://mariscuola-ta-corsi.marina.difesa.it">mariscuola-ta-corsi.marina.difesa.it</a>, where all students can download these documents by entering their credentials.</i>

<b>Assessment</b>	
Assessment methods	<i>The final exam consists of an oral exam covering all the topics included in the program. The relative evaluation is expressed with a mark out of thirty, with possible honors.</i>
Assessment criteria	<ul style="list-style-type: none"> <li>• <b>Knowledge and understanding</b> <i>The student will have to demonstrate knowledge of the fundamental concepts of marine geology, having clear the distribution of sediments and sub-environments in the various areas of the seabed; will have to know the dynamics of sedimentary processes occurring in the marine environment, as well as the different methodologies used for its study. The understanding and possession of the fundamental concepts is a necessary condition for passing the exam.</i></li> <li>• <b>Applying knowledge and understanding</b> <i>The student must demonstrate to be able to correctly use the knowledge acquired during the course necessary to describe the geological and sedimentary characteristics of the marine environment and to recognize the dynamics of the marine environment also through examples of results of direct and indirect investigations carried out for the study of different parameters of the seabed. Mastery of these skills is a necessary requirement for passing the exam.</i></li> <li>• <b>Autonomy of judgment</b> <i>The student must be able to solve a geological question related to the topics of the course, making the most suitable methodological choices to solve the problem. The demonstration of having good autonomy in this field will contribute to a very positive evaluation of the final exam.</i></li> <li>• <b>Communicating knowledge and understanding</b> <i>The communicating knowledge will be evaluated taking into account the capability to: use complex sentences, focus on the scientific question, highlight the state of the art and its development. The acquisition of this skill will contribute to the final positive evaluation.</i></li> </ul>

	<ul style="list-style-type: none"> <li>• <i>Communication skills</i> <i>The student must be able to describe clearly and with a clear but correct language all the topics covered during the course. Possession of these skills will be reflected in an increase in the final mark, with the possibility of reaching the maximum.</i></li> <li>• <i>Capacities to continue learning</i> <i>The student must be able to independently acquire further knowledge starting from the basis of the contents transmitted during the course, and making connections with other subjects of the course of the Degree Course. The demonstrated ability to autonomously enrich one's knowledge will contribute to a more than positive evaluation of the final exam, up to the achievement of the maximum.</i></li> </ul>
Final exam and grading criteria	<p><i>The final mark is awarded out of thirty, with the possible achievement of honours. The final exam is passed when the grade is greater than or equal to 18. To achieve a high evaluation, the student must demonstrate that he: has developed good independent judgement, possesses an adequate capacity for argumentation and exposition, has understood and explored the topics covered.</i></p>
<b>Further information</b>	