



General information	
Academic subject	Oceanography
Degree course	Science and Management of Maritime Activities
Academic Year	2022-2023
European Credit Transfer and Accumulation System (ECTS)	6
Language	Italian
Academic calendar (starting and ending date)	01/03/23-20/06/23
Attendance	Not compulsory

Professor/ Lecturer	
Name and Surname	Gerardo Romano
E-mail	gerardo.romano@uniba.it
Telephone	080 5442633
Department and address	Dipartimento di Scienze della Terra e Geoambientali, Campus universitario, Via Orabona 4, Bari
Virtual headquarters	
Tutoring (time and day)	Every Wednesday from 9:30 to 10:30

Syllabus	
Learning Objectives	<ul style="list-style-type: none">Provide the student with basic knowledge on the physical processes and dynamics of the oceans (currents, tides and waves), on the interactions of the oceans with the atmosphere and on the exchanges of matter / energy at sea and along coastal areas, and on analysis of meteo-marine data. At the end of the course the student will have acquired a knowledge of the dynamics of geophysical fluids, a better understanding of the main forcings of the wave state and marine circulation, and will be able to calculate some parameters useful for the management of resources and activities in the sector.
Course prerequisites	No specific knowledge is required
Contents	Physical and chemical characteristics of sea water: Distribution of oceans and land. Hypsographic curve. The ocean basins. Sea water composition. Absolute salinity and practical salinity. PSS-1978 scale. Gas dissolved in the sea. Sea water

	<p>temperature, pressure and density. Equation of state of sea water. Average thermocline characteristics of the oceans. Thermocline variations with depth. T-S diagrams. Sound propagation in the sea. Propagation of light in the sea. Balance of radiation and energy on the sea surface.</p> <p>Dynamics of geophysical fluids: Conservation of mass or continuity equation. Conservation of momentum or momentum or Navier-Stokes equation. Earth's gravity field, centrifugal force, Coriolis force. Barotropicity and baroclinicity. Vorticity. Hydrostatic equation. Ocean basin scale oscillations: South Pacific oscillation (ENSO, el Nino, La Nina). North Atlantic Oscillation (NAO).</p> <p>Currents: Horizontal motion in the absence of friction: inertial, geostrophic and cyclostrophic current. Effect of friction: modification of the geostrophic equilibrium, decay of speed over time. Areas of convergence and divergence of water masses. Ekman's theory of drift currents. Gradient or thermo-aline currents. Tidal currents. Plastic islands. The astronomical tide. Revolution of two celestial bodies around the common center of gravity. Gravitational force, centrifugal force and tidal force.</p> <p>Waves: General information on waves. Generation and dissolution of waves. Capillary waves and gravitational waves. Stationary and progressive waves. Phase and group velocity. Airy's theory. Shallow sea waves and deep sea waves. Tsunami, anomalous waves</p>
Books and bibliography	<i>Introduction To Physical Oceanography. Robert H. Stewart</i>
Additional materials	<i>Classroom notes</i>

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
150	48		102
ECTS			
6			
Teaching strategy			
<p><i>The course is developed through lectures relating to the relevant and indispensable aspects of the discipline for the achievement of the specific educational objectives of the teaching and overall, of the study course. The frontal teaching is supported by seminars and exercises and by an interaction with the learners through discussion groups on the e-learning platform or in the classroom. During the lessons, various tools are used to improve teaching such as, for example, PowerPoint presentations projected in the classroom, schemes, bibliographic indications and anything else deemed useful for improving the effectiveness of teaching. If possible, the course is not held in e-learning modality</i></p>			
Expected learning outcomes			

Knowledge and understanding on:	<ul style="list-style-type: none"> ○ The acquisition of the cognitive elements necessary for the understanding and characterization of marine dynamics
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ The acquisition of the methodology necessary for the analysis of oceanographic data and the understanding of their spatial and temporal evolution Making informed judgements and choices
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <i>At the end of the course, students will be able to understand the fundamental laws governing the oceanic environment. They will be able to interpret the oceanographic time series and to understand the most relevant mechanisms of interaction between oceans and atmosphere.</i> • <i>Communicating knowledge and understanding</i> <i>The acquisition of skills and language (including mathematical and one based on the use of graphs and tables) necessary for the description of oceanographic dynamics. The acquisition of the methodology necessary for learning, the mastery of the discipline, the critical study of the main oceanographic processes and the most significant literature existing on the topics under study</i> • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ The acquisition and development of the ability to critically study oceanographic data. Ability to interpret graphs and tabs relating to individual parameters (e.g. salinity, temperature, etc.) as well as ability to cross-correlate information relating to multiple parameters to identify the presence of space-time correlations

Assessment and feedback	<p><i>The final exam exam takes place in oral form; the relative evaluation is expressed with a mark out of thirty, with possible honors. Further tests of the profit can be carried out during the course. They can be taken into account in the final evaluation.</i></p>
Methods of assessment	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ The evaluation criteria used aim to verify the actual acquisition, by the student, of the methodology necessary for the knowledge and understanding of the oceanographic dynamics indicated in the program. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ The evaluation criteria used aim to verify the actual acquisition, by the student, of the methodology necessary for the application of the knowledge and understanding of the oceanographic dynamics indicated in the program also through scientific studies on individual topics through seminar-type educational activities, with specific attention to studies on the effects of global warming on ocean dynamics and marine pollution • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ The evaluation criteria used aim to verify the actual acquisition and development, by the student, of the ability to critically study the oceanographic dynamics indicated in the program. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ The evaluation criteria used aim to verify the actual acquisition, by the student, of the argumentative ability of oceanographic knowledge, in order to be able to communicate them well in moments of sharing, comparison and discussion even in the classroom and on the platform forum and - learning, ○ both individually and in groups • <i>Communication skills</i> <ul style="list-style-type: none"> ○ The evaluation criteria used aim to verify the ability to use the correct terminology • <i>Capacities to continue learning</i> The evaluation criteria used aim to verify the actual acquisition, by the student, of the methodology necessary for learning, mastery of the discipline, the critical

	study of the main aspects of the oceanographic dynamics indicated in the program
Evaluation criteria	<ul style="list-style-type: none"> ○ <i>the final evaluation is expressed with a mark out of thirty, with possible honors.</i>
Criteria for assessment and attribution of the final mark	<i>The final exam exam takes place in oral form; the relative evaluation is expressed with a mark out of thirty, with possible honors. Further tests of the profit can be carried out during the course. They can be taken into account in the final evaluation.</i>
Additional information	