

<b>TITOLO DEL CORSO</b>			
<b>PETROLEUM GEOLOGY</b>			
<b>Settore Scientifico - Disciplinare: GEO/02</b>		<b>CFU: 6 (3 LF + 3 LAB)</b>	<b>Ore: 60</b>
<b>Ore di studio per attività:</b>	<b>Lezioni frontali:</b>	<b>Laboratorio:</b>	<b>Attività di campo:</b>
	2	1	0
<b>Tipologia di attività formativa:</b> caratterizzante			
<b>SYLLABUS</b>			
<b>Prerequisiti:</b>			
Bachelor level knowledges of stratigraphy, sedimentology, paleontology, structural geology, organic geochemistry, geophysics.			
<b>Lezioni frontali</b>			
numero di ore 1	<u>Argomento:</u> Introduction: Oil and gas in the energy market. The role of geosciences in petroleum exploration/production.		
numero di ore 1	<u>Argomento:</u> The concept of Petroleum system as an exploration and reserve assessment tool.		
numero di ore 2	<u>Argomento:</u> Production and accumulation of organic matter. Source rock evaluation: type and quality of kerogen (Van Krevelen diagram and Rock Eval Pyrolysis).		
numero di ore 2	<u>Argomento:</u> Thermal evolution and maturation of organic matter: from burial history to thermal history to generation history.		
numero di ore 1	<u>Argomento:</u> Petroleum migration: contrasting long-range lateral migration and vertical migration; the concept of drainage area.		
numero di ore 2	<u>Argomento:</u> The concept of reservoir characterization. Porosity, permeability and saturation. Clastic reservoirs.		
numero di ore 2	<u>Argomento:</u> Carbonate reservoirs: introduction to carbonate sedimentology; the Choquette and Pray's pore-space classification; porosity-permeability relation in carbonate reservoirs; Lucia's petrophysical classes.		
numero di ore 1	<u>Argomento:</u> Fractured reservoirs.		
numero di ore 2	<u>Argomento:</u> Seal rocks: Capillary pressure and buoyancy; Fault seal analysis.		
numero di ore 2	<u>Argomento:</u> Petroleum traps: Structural traps; Stratigraphic traps; Structural contour maps.		
numero di ore 2	<u>Argomento:</u> Sequence stratigraphy: key concepts; from seismic stratigraphy to sequence stratigraphy; reflector terminations and sequence stratigraphy surfaces.		

numero di ore 2	<u>Argomento:</u> Reflection seismics in petroleum exploration: key concepts; from acquisition to processing to interpretation.
numero di ore 2	<u>Argomento:</u> Principles of well log analysis.
numero di ore 2	<u>Argomento:</u> Prospect evaluation: Volumetrics and Risk analysis.
<b>Laboratorio</b>	
numero di ore 2	<u>Attività:</u> Reconstructing the burial history of a source rock from the stratigraphic log of a well.
numero di ore 2	<u>Attività:</u> Assessing the generation potential of a source rock from Rock-eval data and basin analysis.
numero di ore 2	<u>Attività:</u> Practicing with isopach maps.
numero di ore 2	<u>Attività:</u> Describing a thin section of a carbonate rock; standard microfacies and facies zones.
numero di ore 2	<u>Attività:</u> Describing and classifying the pore space in the thin section of a carbonate rock. Petrophysical rock typing (Lucia's petrophysical classes).
numero di ore 4	<u>Attività:</u> Discussing case-histories of giant clastic and carbonate reservoirs from published papers.
numero di ore 2	<u>Attività:</u> Practicing with structural contour maps.
numero di ore 2	<u>Attività:</u> Inside sequence stratigraphy: building a Wheeler diagram and interpreting sequence boundaries and sequence stratigraphy surfaces from a synthetic seismic line.
numero di ore 2	<u>Attività:</u> Sequence stratigraphic correlation of cores based on parasequence stacking patterns.
numero di ore 2	<u>Attività:</u> Interpreting faults on a grid of 2-D seismic profiles.
numero di ore 2	<u>Attività:</u> Interpreting structures and stratigraphy of a 2-D regional seismic line.
numero di ore 2	<u>Attività:</u> Interpreting seismic facies and practicing with seismic attributes.

numero di ore 2	<u>Attività:</u> Tying a well to a seismic line.
numero di ore 2	<u>Attività:</u> Simple exercises of well log interpretation.
numero di ore 2	<u>Attività:</u> Petroleum Play analysis: discussing examples of common risk segment maps.
numero di ore 2	<u>Attività:</u> Assessing the volumetrics of a petroleum prospect.
numero di ore 2	<u>Attività:</u> Discussing the petroleum geology of Italy, starting from published reviews.

### **Risultati di apprendimento attesi**

<p><b>Knowledge and understanding:</b> The students must demonstrate the ability of integrating knowledges of different disciplines of Earth sciences in the context of petroleum exploration. They will learn to use and evaluate datasets also by discussing case-histories taken from published papers and reports. They will learn how to present data and how to elaborate them in maps and other types of presentation.</p>
<p><b>Applying knowledge and understanding:</b> The students will learn how to apply their knowledge and understanding of different Earth science disciplines and methods to real cases of petroleum exploration. They will critically evaluate and use published data and reports in activities simulating the different steps of a petroleum exploration project.</p>
<p><b>Making judgements:</b> By simulating the different phases of an exploration project, the students will learn how to use their knowledge and understanding to make autonomous decisions and formulate judgments with incomplete or limited information.</p>
<p><b>Communication:</b> The students will learn how to present data and interpretations, how to communicate their knowledges and their judgements, how to formulate solutions and decisions by building step by step a project of petroleum exploration (play-based and prospect evaluation) and delivering their results as a final presentation.</p>
<p><b>Learning skills:</b> The students will be stimulated to progress by self-directed learning. They will have to undertake further study with a high degree of autonomy to deliver a final project building upon the knowledge, understanding and activities performed during the course.</p>
<b>Modalità di verifica dell'apprendimento</b>

**Esame finale:**

The final exam consists of the presentation of a project of petroleum exploration (play-based and prospect evaluation) integrating the activities performed during the course.