

Course Title	Oil & Gas Geology and Reservoir Characterization (Specialization in Oil & Gas Engineering)				
Course Code	OG200				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	2 nd Year / 4 th Semester (Spring)				
Teacher's Name	Dr. Christakis Onisiphorou				
ECTS	5	Lectures / week	3	Laboratories/week	0
Course Purpose	<p>Oil and gas exploration is significant in the search for energy resources, especially offshore oil and gas exploration is a major engineering field and includes several disciplines needed for the completion of these activities, preceding processing and exploitation. One of these fields is a thorough understanding of petroleum geology and its applications, and also the characterization of such hydrocarbon reservoirs. Therefore, the course is well placed in the Oil & Gas specialization of Mechanical Engineering to provide this knowledge.</p> <p>This course provides an introduction into oil and gas geology and relates essential topics of geology which are of major importance in hydrocarbon exploration. These include geological history, earth's surface processes, structural geology, depositional environments and sedimentary rocks, emphasizing on their importance in oil entrapment.</p> <p>The students are also introduced to different forms of exploration surveys, including geological, seismic and gravity surveys, and also become familiar with exploratory wells and logging. Furthermore, the course provides knowledge on reservoir classification and characterization, including use of the pressure-temperature diagram in examples. Types of oil recovery methods are also presented in detail, and the course helps to develop skills in calculating oil and gas reserves estimates.</p>				
Learning Outcomes	<ol style="list-style-type: none"> 1. Explain the importance of geology in oil and gas exploration. 2. Describe the earth's surface processes and evaluate the importance of plate tectonics and structural geology. 3. Identify different forms of depositional environments and assess the different types of sedimentary rocks important for hydrocarbon exploration. 4. Develop skills to differentiate and apply various types of investigations such as geological, seismic and gravity surveys. 5. Classify oil and gas reservoirs and apply phase behaviour diagrams 6. Assess various types of oil recovery methods. 7. Calculate oil and gas reserve estimates. 				
Prerequisites	None		Corequisites	None	

Course Content	<ul style="list-style-type: none"> • Introduction to petroleum geology: the Earth as a dynamic body. Origin, formation and age. Importance of geological time and geological periods. Long term geological evolution. • Stratigraphic principles, plate tectonics and structural geology: Stratigraphy and paleontology. Plate tectonics. Structural geology (faults, folds and joints) and its importance to oil and gas exploration. • Sedimentology and sedimentary rock formation: Earth Surface Processes. Depositional environments. Sedimentary rocks. Significance of internal structures in sedimentary rocks. Source, reservoir and seal rocks. Oil entrapment. • Hydrocarbon exploration and types of surveys: Geological Surveys. Seismic surveys. Gravity methods. Exploratory wells and logging. • Reservoir characterization: Basic definitions and reservoir properties. Phase behaviour of hydrocarbons. Pressure-Temperature diagram. Reservoir classification, monitoring and drive mechanisms. • Field development and recovery methods: Field development planning. Primary and secondary recovery methods. Enhanced oil recovery. • Estimation of Oil and Gas Reserves: Types of oil reservoirs. Oil reserve estimation using volumetric method. Recovery factor. Solved examples. Gas reserve estimation using volumetric method. Recovery factor. Solved examples. 								
Teaching Methodology	The course is primarily taught through formal lectures in class. In addition, it includes powerpoint presentations, discussion with students and practical examples, where relevant.								
Bibliography	<p>Textbooks:</p> <p>Selley, R.C. (1998), Elements of Petroleum Geology. 2nd ed. Academic Press, San Diego.</p> <p>References:</p> <p>Bjorlykke, K. (2010), Petroleum Geoscience: From Sedimentary Environments to Rock Physics. Springer, Heidelberg.</p> <p>Slatt, R.M. (2007), Stratigraphic reservoir characterization for petroleum geologists, geophysicists, and engineers, Elsevier Science.</p>								
Assessment	<p>The course is assessed through mid-term examinations and a final examination. The criteria for assessment can be found on the e-learning site for the specific course. The weights of the course assessment are as follows:</p> <table> <tr> <td>Mid-term Exam 1</td> <td>25%</td> </tr> <tr> <td>Mid-term Exam 2</td> <td>25%</td> </tr> <tr> <td>Final Exam</td> <td>50%</td> </tr> </table>			Mid-term Exam 1	25%	Mid-term Exam 2	25%	Final Exam	50%
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Mid-term Exam 2	25%								
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Language	English								