

Course Title	Oil & Gas Exploration, Processing and Exploitation (Specialization in Oil & Gas Engineering)				
Course Code	OG302				
Course Type	Compulsory				
Level	B.Sc (Level 1)				
Year/ Semester	3 rd Year / 5 th Semester (Fall)				
Teacher's Name	Dr. Nicolas Droushiotis, Prof. Christodoulos N. Christodoulou				
ECTS	6	Lectures / week	3	Laboratories/week	-
Course Purpose	<p>Oil and gas are set to continue playing a vital role in meeting the world's energy needs, accounting for nearly half of the primary energy mix in 2040. There is a continuous need of explore and find new reserves in order to meet the current and future energy demand. An oil production plant is a facility which processes production fluids from oil wells in order to separate out key components and prepare them for export. Typical oil well production fluids are a mixture of oil, gas and water. Companies involved in the high-risk/high-reward area of exploration and production focus on finding, augmenting, producing, and merchandising different types of oil and gas. The purpose of the course is to give the student an overall view of the exploration & production methods/activities in a specific sector within the oil and gas industry.</p>				
Learning Outcomes	<ol style="list-style-type: none"> 1. Describe Fossil Fuels and their gas emissions (CO₂, NO_x, etc) 2. Explain the thermodynamic principles of fuel combustion, be able to write combustion reactions of fuels and calculate their calorific value 3. Describe the Oil & Gas offshore and Onshore exploration methods, advantages and disadvantages 4. Describe the Oil & Gas drilling methods and piping and upstream production 5. Explain the Oil/Gas/Water separation methods 6. Describe the Oil & Gas refining and products, their applications in the energy sector and in the petrochemical industry 7. Describe Natural Gas (NG) processing, liquefaction (LNG), storage, re-gasification, distribution and use in the energy sector and the petrochemical industry 				

Prerequisites	None	Corequisites	None
Course Content	<p>Module A - Fossil Fuels (Coal, Oil, Natural Gas)</p> <ul style="list-style-type: none"> • Chemical composition • Combustion of fuels • Exhaust gases, gas emissions (NO_x, SO₂) • Purification <p>Module B - Combustion Thermodynamics</p> <ul style="list-style-type: none"> • Enthalpy and free energy of reaction • Spontaneous reactions • Complete and incomplete combustion reactions • Lower Calorific value (LCV) and Higher Calorific Value (HCV) <p>Module C - Oil & Gas exploration (Onshore and Offshore) Geological surveys, Onshore and offshore seismology, Magnetometers, Gravimeters</p> <p>Module D - Oil & Gas drilling and pipelines</p> <ul style="list-style-type: none"> • Drilling Methods • Upstream production • NG pipelines <p>Module E - Oil & Gas refining</p> <ul style="list-style-type: none"> • Downstream production facilities • Natural Gas refining and production <p>Module F – Liquefied Natural Gas (LNG)</p> <ul style="list-style-type: none"> • LNG production (Liquefaction) • LNG storage • LNG transportation • LNG re-gasification and distribution <p>Module G – Oil & Gas Exploitation</p> <ul style="list-style-type: none"> • Oil distillation • Oil products (asphalts, heavy fuel, gasoline, diesel, LPG) • Petrochemicals (polyethylene, Methanol, Ammonia, LTG) • Hydrogen production by NG reforming and water gas shift reaction • Other petroleum products <p>Module H – Oil & Gas Applications</p> <ul style="list-style-type: none"> • Power generation (Electricity and Heat) • Transportation • Hydrogen and NG Fuel Cells 		

Teaching Methodology	<p>Power Point Presentation of Lectures, Questions, Discussion</p> <p>Explanations with examples, Reviews.</p> <ul style="list-style-type: none"> • Lectures for learning the theory and fundamentals in oil and gas exploration, chemical thermodynamics useful for processing and exploitation • Explaining with specific examples the processing of Oil & Gas and solve specific problems • Give to the students assignments for independent study of different subjects related to Oil & Gas exploration and exploitation • Tutorials, where the students ask further questions on the lectures for better comprehension • Frequent reviews and live discussions
Bibliography	<p>Suggested Textbook:</p> <p>Handbook of Natural Gas Transmission and Processing, 4th Edition, Saeid Mokhatab William Poe John Mak, Gulf Professional Publishing, Elsevier B.V., 2018</p> <p>Standard Handbook of Petroleum and Natural Gas Engineering, 3rd Edition, Editors: William Lyons Gary Plisga, BS Michael Lorenz, Gulf Professional Publishing, Elsevier B.V., 2015</p> <p>Reference Books:</p> <p>“Introduction to Chemical Engineering Thermodynamics”, J. M. Smith, Mcgraw Hill Higher Education, 7th edition, Feb 2005</p> <p>“Oil & Gas Production in Nontechnical Language” by Martin S. Raymond, PennWell Corp., October 2005</p> <p>“Operational Aspects of Oil and Gas Well Testing (Handbook of Petroleum Exploration and Production)”, S. McAleese, Elsevier Science, 1st edition, March 2000</p> <p>Fundamentals of Gas Lift Engineering, Ali Hernández, Gulf Professional Publishing, Elsevier B.V., 2016</p> <p>“Fundamentals of Natural Gas Processing”, Arthur Hidnay, Taylor & Francis, 2007</p>
Assessment	<ul style="list-style-type: none"> • Assignments 25% • Mid-Term Exam: 25% • Final Exam 60%
Language	English