



Course Code OGEE-510	Course Title Petroleum Geology	ECTS Credits 7.5
Prerequisites None	Department Engineering	Semester Fall, Spring
Type of Course Required	Field Oil, Gas and Energy Engineering	Language of Instruction English
Level of Course 2 nd Cycle	Lecturer(s) Dr Ernestos Sarris	Year of Study 1st
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are to:

- Introduce the students to the geologic processes that created the Earth system.
- Explain the theory of plate tectonics and how the three major families of rocks are created (Igneous, Sedimentary and Metamorphic).
- Identify how sediments convert to sedimentary rocks and what types of sedimentary rocks host hydrocarbons.
- Define the basic concepts of basin analysis.
- Differentiate carbonate rocks (chemical and biological sedimentary rocks) from sandstones (siliciclastic sedimentary rocks).
- Distinguish conventional from non-conventional geological reserves.
- Illustrate the conditions of conventional petroleum accumulation.
- Provide technical knowledge for understanding the mechanisms of hydrocarbon generation and migration.
- Examine how the tectonic stress field creates petroleum traps.
- Underline the importance of cap/seal rocks and their importance in petroleum exploration.
- Define the concepts of the two main petrological parameters of a reservoir (Porosity and Permeability-Darcy fluid flow law).
- Demonstrate the concept of the petroleum system in sedimentary basins.
- Introduce the students to volumetric analysis and perform preliminary calculations for insitu reserves.
- Practice basic stress analysis so that students will understand the link between rocks types and drilling.

Learning Outcomes:

After completion of the course students are expected to:

1. Know how the earth system works.
2. Explain the geologic processes that created the three major families of rocks.
3. Identify which types of rocks are major hosts of oil and gas.
4. Categorize the main characteristics of a conventional petroleum reservoir.
5. State the mechanisms of hydrocarbon generation from parent rocks and migration to the petroleum trap.
6. Specify the importance of the cap and seal rocks in the petroleum system.
7. Distinguish the petrophysical parameters of reservoirs such as porosity (storage) and permeability (Darcy fluid flow law).
8. Perform volumetric calculations for estimating in-situ reserves.
9. Understand the concepts of stress analysis for drilling engineering.

Course Contents:

- Basic concepts and terms.
- The earth system.
- Igneous rocks (processes of magma solidification).
- Sedimentary rocks (formation of rocks by surface processes).
- Metamorphic rocks (alterations of rocks by temperature and pressure increase).
- Sedimentology of carbonate rocks (chemical and biological sediments).
- Sedimentology of sandstone rocks (siliciclastic sediments).
- Basic concepts of basin analysis.
- Introduction conventional petroleum reservoirs.
- Generation of Hydrocarbons in the parent rock.
- Migration of Hydrocarbons to the reservoir.
- Creation of hydrocarbon Traps from tectonic processes.
- Seal and Cap rocks on top of reservoirs.
- Reservoir major characteristics (Porosity, Permeability and Pressure).
- Reserves preliminary calculations.
- The petroleum system (a time depended physical process).
- Basic stress analysis.

Learning Activities and Teaching Methods:

Lectures, In-class Exercises, Quizzes, Demonstration Videos.

Assessment Methods:

Assignments, Exercises, Projects, Midterm Exams and Final Exam.

Required Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Elements of Petroleum Geology (3 rd ed.)	Selley R.C. and S.A. Sonnenberg	Academic Press	2015	978-0-12-386031-6

Recommended Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Fundamentals of Drilling Engineering	Mitchell R.F. and S. Z. Miska	SPE	2011	978-1-55563-207-6