Petroleum Geology

Calendar: 3rd day semester

Contact Hours: TP 45h; OT 7,5 h

Scientific Area: Geotechnics

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

Understand basic principles of geology in Petroleum system.

Understand the process that leads to the generation of petroleum and to the accumulation of a viable oil field.

Provide basic understanding of the concepts and methods in petroleum exploration and development.

Syllabus:

Historical Review of Petroleum Exploration.

The petroleum system. Organic versus inorganic origin of petroleum. The Carbon Cycle. Formation of a petroleum deposit from source to trap. Source rock characteristics. Productivity and Preservation of Organic Matter.

The subsurface (sedimentary) environment. Temperature within the earth. Pressure types. Subsurface waters.

Migration: Primary Migration and the Expulsion of Hydrocarbons. Secondary Migration.

The Reservoir: Porosity; Permeability; Effects of Diagenesis on Reservoir Quality; Carbonate and Fractured Reservoirs.

Geological mapping. Geologic maps interpretation: rules and cross sections.

Formation Evaluation: well logs. Applications of Logs in Sedimentary Facies Analysis.

Traps and Seals: Nomenclature of a Trap; Distribution of Petroleum within a Trap. Seals and Cap Rocks.

Trap types: structural; stratigraphic; combination; and hydrodynamic.

Geophysical Methods of Exploration. Seismic Reflection Surveying. Other Geophysical methods.

Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

Subjects and contents of this unit give ability in elemental petroleum geology.

The syllabus is divided in key subjects related with practical concepts. The student should be able to study important sedimentary structures, petrography of Carbonate and Clastic sedimentary rocks and textures, evaluate geologic maps information and draw cross sections, or to use logs in sedimentary facies analysis.

References:

Selley, R. (1997). Elements of Petroleum Geology, Academic Press.

Bjørlykke, Knut (2010). Petroleum Geoscience: From Sedimentary Environments to Rock Physics, Springer.

Gomes, J S & Alves, F B (2011). O universo da indústria petrolífera – da pesquisa à refinação – 2ª Edição, Fundação Calouste Gulbenkian.