



**NATIONAL UNIVERSITY OF ENGINEERING**  
**COLLEGE OF PETROLEUM AND PETROCHEMICAL ENGINEERING**  
**PETROLEUM AND NATURAL GAS ENGINEERING PROGRAM**

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**PP211 – TECHNOLOGIES OF PETROLEUM INDUSTRY**

**I. GENERAL INFORMATION**

<b>CODE</b>	: PP211 Technologies of Petroleum Industry
<b>SEMESTER</b>	: 3
<b>CREDITS</b>	: 4
<b>HOURS PER WEEK</b>	: 5 (3 Theory – 2 Practice)
<b>PREREQUISITES</b>	: PF111 (Physics I)
<b>CONDITION</b>	: Compulsory

**II. COURSE DESCRIPTION**

The course provides, prepares, and illustrates the student in the application of concepts about the history of petroleum in Peru and in the world, as well as the phases of the oil industry, exploration, exploitation, transport and storage, refining. It provides the student with understanding of the basic requirements for oil well drilling as well as fracturing procedures and knowledge of both subsoil and surface production facilities.

**III. COURSE OUTCOMES**

At the end of the course, students:

1. Understand oil history in Peru and in the world.
2. Identify the exploration, exploitation, transportation and refining phases of the oil industry.
3. Comprise the formation of hydrocarbons and identify the geology of Peru and the oil basins.
4. Recognize the types of production systems that an oil reservoir has.
5. Include the completion of a well for start-up as well as stimulation by hydraulic fracturing.
6. Identify types of oil reserves as proven, probable and possible.
7. Recognize the type of transport and storage of surface hydrocarbons.

**IV. LEARNING UNITS**

**1. HISTORY OF THE PETROLEUM INDUSTRY IN PERU AND IN THE WORLD / 2 HOURS**

Perforation of 1st. Well.- Characteristics.- Petroleum in Peru. What is Petroleum.- Classification.- Origin.- its components and their properties.

**2. PETROLEUM RESERVOIRS / 2 HOURS**

Training processes.- Principles governing oil accumulation. Favorable structures and types of reservoirs according to their structures and the driving forces that control them.

**3. PHASES OF THE OIL INDUSTRY / 3 HOURS**

Exploration, exploitation, storage and transportation, refining, distribution and market. Petroleum basins of Peru. Companies that operate lots in Peru.

**4. STAGE OF EXPLORATION / 2 HOURS**

Geology of the terrestrial crust and the rocks that form it. - Variations of the terrestrial crust and formation of the sedimentary basins.

## **5. GEOLOGICAL STRUCTURE / 2 HOURS**

Anfclinales, domes, monoclivales, faults, lenticular deposits. Stratigraphic traps. Surface indications: oil and gas outcrops, Exploration methods. - topographic land and aerial works. General geological studies.

## **6. GEOPHYSICAL EXPLORATION / 3 HOURS**

Seismic, gravimetric, magnetic, electrical methods. Exploration by drilling, geochemical exploration.

Geology in Peru: Geology in the Northwest, Geology and operations in the jungle.

## **7. GENERAL CONSIDERATIONS OF THE PERFORATION / 3 HOURS**

Basic requirements.- Drilling equipment - Percussion system and rotary drilling systems: Rotating system, circulation system and suspension system.

## **8. PIPE MANAGEMENT EQUIPMENT / 3 HOURS**

Factors that limit the speed of advancement in the perforation.- Coating and cementation.- Disadvantages in the Perforation.

## **9. WELL FRACTURE / 2 HOURS**

Procedures for completion of a well.- Christmas tree.- Summary of well equipment ready to produce.- Drilling muds: Functions, How is it prepared? .- Electric profile: importance, interpretation.

## **10. PETROLEUM PRODUCTION / 2 HOURS**

Extraction methods, Natural flow.- Pneumatic Pumping, Mechanical Pumping.- Oil Collection.- Pressure Maintenance of a Reservoir.- Separation of Gas and Oil.

## **11. GAS TREATMENT / 3 HOURS**

Refrigeration, absorption and adsorption processes, Propane and butane storage.- Secondary recovery.- Secondary recovery calculation.

## **12. PETROLEUM RESERVES / 2 HOURS**

Tested, Probable and Possible. - Determination of Petroleum Reserves tested in a given period. - Patterns that are followed to modify Petroleum reserves tested.

## **13. STORAGE AND TRANSPORTATION / 2 HOURS**

Separation of solids.- Dehydration of emulsions.- Collection, Local storage, shipment, measurement and sampling.- Pipelines.- Main characteristics of the Nor-Peruvian pipeline.

## **14. TRANSPORT AND STORAGE OF PETROLEUM / 2 HOURS**

Water transport Measures of oil and loss control.- Calibration of storage tanks.- Measurements in storage tanks, Natural Gas: utilization, Where does it come from?, Gas utilization.

## **15. OIL REFINING / 3 HOURS**

Primary distillation, Vacuum distillation, thermal disintegration, Catalytic disintegration, thermal reforming, catalytic reforming, polymerization, alkylation, isomerization. Liquefied petroleum gas (LPG): Advantages, characteristics.

## **V. PRACTICAL EXPERIENCES**

There will be 3 classified practices and 1 for an exposition presented in class.

## **VI. METHODOLOGY**

The course is developed in sessions of theory, practice of general concepts on oil history in Peru and in the world, hydrocarbons formation and identification of the oil basins in Peru. Transportation facilities and surface storage, the exploration, exploitation, transportation and refining phases. Mechanisms and methods of oil production.

## **VII. EVALUATION FORMULA**

Evaluation system: G. The final average FA is calculated as follows:

$$\mathbf{FA = (ME + FE + 2*AP) / 4}$$

ME: Mid-term exam      FE: Final exam

AP : Average grade of practices (3 out of 4).

## **VIII. BIBLIOGRAPHY**