NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF PETROLEUM AND PETROCHEMICAL ENGINEERING
PETROLEUM ENGINEERING PROGRAM

PP514 – WELL SERVICES AND WORKOVER I

I. GENERAL INFORMATION

CODE	**:**	PP514 Well Services and Workover I
SEMESTER	**:**	9
CREDITS	**:**	4
HOURS PER WEEK	**:**	5 (Theory–Practice)
PREREQUISITES	**:**	PP424 Oil Production II
CONDITION	**:**	Compulsory
DEPARTMENT	**:**	Petroleum and Natural Gas Engineering

II. COURSE DESCRIPTION

The course prepares students in the fundamentals, methods, techniques, operations, equipment and tools used in well interventions for carrying out their maintenance (cleaning), solving mechanical problems (reparation or installation) or solving well problems affecting their production (stimulation). Reconditioning (workover) and stimulation operations are important to assure the performance and economic life of wells.

III. COURSE OUTCOMES

At the end of the course, students:

1. Understand the mechanical characteristics of wells, as well as petro-physical characteristics of reservoirs.
2. Design workover plans applying proper drawing and calculations within the approach of reservoirs engineering.
3. Select required equipment and tools for well services and reconditioning.

IV. LEARNING UNITS

1. WORKOVER EQUIPMENT

Equipment classification / Deep and semi-deep equipment / Workover tools and equipment / Circulation pumps / BOP / Auxiliary equipment / Tools / Washing pipes / Light plants / Davit / Cables and wireline equipment.

2. HEADS

Types / Operating pressure / High pressure and low pressure heads / Head type according to well production / Screwed / Flanged / Welded / Head parts / Piper hanger flange / Master and control valves / Side valves / Flow control / Other head types: for fracturing , drilling, cementation.

3. ELECTRO-CENTRIFUGAL PUMPING

Components of an electro-centrifugal pumping system / Surface equipment / Electricity distribution network / Electricity generator / Power transformer and control panel / Underground equipment / Galvanised steel electric cables / Centrifugal pump / Gas separator / Electric motor / Electro- submersible pumping service.

4. GAS LIFT

Types of gas lift: conventional or simple packaging / Gas lift well services.

5. PRODUCTION PACKERS

Definition / Anchorage types / Mechanical anchorage / Hydraulic anchorage / Electric cable anchorage / Packers / Packer parts / Main mandrel, elements or gums, wedges, cones / Packer types / Recoverable mechanical packer / Recoverable hydraulic pacer / Recoverable packer with polished receptacle / Permanent packers / Accessories / Movement of power piping in packers / Subsurface safety valves /

6. PACKER FIXING AND DOWNLOADING OPERATIONS – HYDROSTATIC PACKERS

Pacer fixing operations / Fixing by hydraulic shooter / Shifting tool / Seal plugs in nogo nipple / Packer download / Production packer / Permanent and temporal seal plugs.

7. WELL RECONDITIONING

Objectives / Background and previous records for well reconditioning / Reserves / Cost estimation / VAN / Pay out / Justification / Reconditioning materials and equipment / Reconditioning procedures / Hydraulic fracturing / Fracturing design / Casing cutting / Casing restore / Fracturing heads.

V. METHODOLOGY

The course takes place in theory and practice sessions. In the theory sessions, the teacher presents concepts and applications. In practice sessions, several problems related to well services and workover are solved and analyzed. At the end of the course, students complete a project and defend it. Student's active participation is promoted.

VI. GRADING FORMULA

The Final Grade PF is calculated as follow:

PF = (EP + EF + PC) / 3

EP: Mid-term Exam EF: Final Exam
PC: Practical Work

VII. BIBLIOGRAPHY

1. Kate Van Dyke
   A Primer of Oilwell Service, Workover and Completion, 2010
2. Schlumberger
   Well Workover and Intervention, 2008
3. Well Control School
   Well Control for Completion and Workover, 2010.