NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF PETROLEUM AND PETROCHEMICAL ENGINEERING

PETROCHEMICAL ENGINEERING PROGRAM

HC528 – ENVIRONMENTAL MANAGEMENT AND CONTROL

I. GENERAL INFORMATION

CODE	**:**	HC528 Environmental Management and Control
SEMESTER	**:**	10
CREDITS	**:**	4
HOURS PER WEEK	**:**	6 (Theory-Practice)
PREREQUISITES	**:**	HC515 Petroleum Refining Processes II HC516 Natural Gas Process
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

The course prepare students in the understanding of how the different operations in the petroleum and gas industries can affect the environment, as well as how is possible to avoid environmental damage throughout the entire process of hydrocarbons industry.

III. COURSE OUTCOMES

At the end of the course, students:

1. Understand the importance of environmental care and preservation.
2. Understand and analyze main laws and legislation regarding environment protection.
3. Analyze the different process for environment monitoring and control.
4. Appraise and acquire an environmental awareness.
5. Adopt preventive measures avoiding environment damage.
6. Understand the process of project closure taking into account environmental passives.
7. Assess the scope of Environmental Impact Studies, Environmental Adequacy Programs, and Environmental Management Pans.

IV. LEARNING UNITS

1. INTRODUCTION

Historical background / Stages and development of current legislation for environmental protection / International agreements for environmental protection.

2. LAWS AND LEGISLATION

Environmental legislation in the world / Environmental legislation in Peru / Environmental Protection Code / General Law of Hydrocarbons and regulations related to environmental protection / Protocols.

3. ENVIRONMENTAL LAWS APPLICATION

Applications in exploration, well drilling, exploitation and transport of hydrocarbons / Hydrocarbon exploitation regions / Peruvian laws.

4. ENVIRONMENTAL IMPACT STUDY

Project identification / Methodology for carrying out environmental impact assessment studies / Land and offshore operations / Geological, geographical and social-economical issues / Analysis of impact on flora and fauna.

5. **ENVIRONMENTAL MANAGEMENT PROGRAM**
   Objectives / Fundamentals of implementation / Application stages / Preparation of Environmental Adequacy Programs P.A.M.A. for oil operations in Peru / Operations execution / Monitoring / What and where to observe.

6. **OPERATING PRACTICES**
   Operational practices in Peru / Environmental standards / Identification of potentially polluting operations / Preventive practices.

7. **ENVIRONMENTAL MANAGEMENT PLAN**
   Objectives and scope / Identification of impacts / Mitigation measures / Execution / Monitoring / Record of expenditures and investments.

8. **PROJECT CLOSURE**
   Abandonment plan / Requirements for the restoration and reforestation on land / Application in marine operations / Supervision of an abandonment plan.

9. **ENVIRONMENTAL GUIDELINES**
   Application of environmental guidelines for exploration activities on land and sea / Drilling of wells in ground, maritime and fluvial environments / Transportation, storage and marketing.

10. **CONTINGENCY PLANS**
    Concept of contingency plan / Goals / Features / Applications for oil operations on land and sea.

11. **ENVIRONMENTAL ADMINISTRATION SYSTEMS**
    Environmental quality (Total Quality Management) / The PDCA cycle / Worldwide environmental management systems / Standard for the implementation of environmental administration systems and scheme of auditing (EMAS).

12. **INTERNATIONAL STANDARDS**
    ISO 14000, ISO 14001, ISO 14004, ISO 14010, ISO 14011.1, ISO 14012, ISO 14021, 14024, ISO 14031, ISO 10041, 14044 ISO 14050 AND ISO 14060 standards.

V. METHODOLOGY

The course takes place in theory, practice and laboratory sessions. In the theory sessions, the teacher presents concepts and applications. In practice sessions, various problems are solved and their solution analyzed. Laboratories experiences are carried out using a guide with students working in group and presenting a report describing main results, analysis and conclusions. 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 + PL) / 4

EP: Mid-term Exam	EF: Final Exam
PC: Practical Work	PL: Laboratory Practice

VII. BIBLIOGRAPHY

1. ISO 14000.
   International Standard.
2. National Environmental Laws. D.S. Nº 046-93, D.S. Nº 051-93, D.S. Nº 055-93. D.L. Nº 613.