NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF CHEMICAL AND TEXTILE ENGINEERING
CHEMICAL ENGINEERING PROGRAM

PI612 – SPECIAL TOPICS IN CHEMICAL ENGINEERING

I. GENERAL INFORMATION

CODE	**:**	PI612 Special Topics in Chemical Engineering
SEMESTER	**:**	9
CREDITS	**:**	2
HOURS PER WEEK	**:**	3 (Theory, Practice)
PREREQUISITES	**:**	PI143 Heat Transfer, PI144 Mass Transfer
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

The course prepares students for the understanding and analysis of relevant issues arising in the research and practice of chemical engineering. Students understand and appraise the importance of fulfilling norms and regulations in chemical engineering processes, operations and projects. Students also understand the importance of proper environmental management to avoid and control pollution in its different forms, the use of clean energy sources and the consideration of industrial safety issues in the practice of chemical engineering.

III. COURSE OUTCOMES

At the end of the course, students:

1. Formulate chemical engineering research projects defining their objective, scope and expected results.
2. Understand the regulations and norms any production process should fulfill in any industrial sector.
3. Understand the environmental impact of impact of industrial process and formulate strategies to minimize them.
4. Understand and describe clean technologies such as solar, wind, geothermal and ocean energy.

IV. LEARNING UNITS

1. INTRODUCTION AND DEFINITION OF RESEARCH THEMES

Industry of chemical processes / Product life cycle / Research and innovation / Selection of research projects per group.

2. CHEMICAL PROCESSES RESEARCH

Research levels and scaling / Experiment design for research / Case analysis: scientific and technological research / Environmental impact studies.

3. PISCO INDUSTRY

Peruvian pisco production process / Peruvian technical norms on pisco production NTP 2001:001:2006 / Obtaining invention patents Title 6543, INDECOPI, Peru / Pisco history and origin denomination / Research project.

4. **ENVIRONMENTAL MANAGEMENT**
   Environmental pollution and local and global levels / Global heating / Greenhouse effect / Destruction of ozone layer / Acid rain / Effluent treatment. Effects of climate change / Environmental auditing.

5. **CLEAN TECHNOLOGIES**
   Solar energy / Hydro-electricity / Wind energy / Geothermal energy / Ocean energy.

6. **ENVIRONMENTAL REGULATIONS**
   Certification and accreditation / Norm ISO 14000 and its requirements / Norm OSHA 1800 / Environmental regulation and quality certification.
   Paints industry / Raw materials / Physical and chemical properties / Fabrication process / Plant distribution / Soaps and detergents industry / Raw materials / Fabrication process.

V. PRACTICAL EXPERIENCES

- Pisco production process
- Solar energy for heating and electricity
- SEDAPAL plant for water purification

VI. METHODOLOGY

The course takes place in theory, practice and plant visit sessions. In theory sessions, faculty presents concepts, methods and applications. In practice sessions, various problems are solved and their solution analyzed. In plant visit session, students analyze diverse chemical process in actual plants around Lima city. At the end of each visit, students present a report summarizing main findings and conclusions. Student's active participation is promoted throughout the course.

VII. GRADING FORMULA

The Final Grade PF is calculated as follow:

PF = (EP + EF + PL) / 3

EP: Mid-term Exam. EF: Final Exam.
PL: Average grade of Practice Works.

VIII. BIBLIOGRAPHY

1. **ESCORSA Pere and VALLS Jaume**
   Business Technology and Innovation,
   UPC Editions, 2010

2. **ROGOLA M.**
   Treatment of Industrial Effluents
   Productica Collection, Spain, 2000