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

PI525 – PLANT DESIGN

I. GENERAL INFORMATION

CODE	**:**	PI525 Plant Design
SEMESTER	**:**	10
CREDITS	**:**	4
HOURS PER WEEK	**:**	5 (Theory, Practice)
PREREQUISITES	**:**	PI510 Chemical Process Economics, PI415 Control Instruments
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

The course prepares students for formulating and completing chemical engineering projects that represent the proper solution to a real-world problem. Student work in teams to complete the capstone project related to the design of a chemical engineering plant integrating different chemical process and operations. At the end of the course, students submit a report and orally defend it in front of a jury.

III. COURSE OUTCOMES

At the end of the course, students:

1. Have skills to successfully complete the design of chemical engineering plants since the initial formulation of the problem, identification of all required chemical processes and operations, to the final specification of all components of the plants.
2. Determine the technical and economic feasibility of engineering projects.l
3. Are able to search proper and relevant information related to the project.
4. Develop critical thinking for comparing and analyzing different solution alternatives and select the right one.
5. Complete clear and well written technical reports using proper symbology and terminology.
6. Orally present the results of the project in a clear, concise and proper way.

II. LEARNING UNITS

The course has two parts. In the first part, faculty presents relevant topics on the technical and economical evaluation of chemical engineering projects. In the second part students work in teams to complete the capstone project related to the design of a chemical engineering plant integrating different chemical process and operations.

PART I. CHEMICAL ENGINEERING PROJECTS

- Chemical process technology and industry.
- Technological Process in process industry.
- Engineering in project development.
- Topics on applied chemical engineering technology.
- Topics on separation process, multicomponent separation.
- Topics on chemical reactors.
- Energetic integration.

- Topics on project costs and budgets. Project economics. Capital goods. Manufacturing costs. Fixed and variable costs. Project economic evaluation

PART II. CAPSTONE PROJECT

Student carry out the project according to the following steps:

- Identification of the problem or necessity to be solved.
- Definition of general objectives of the project.
- Proposal or project schedule
- Definition of technical specifications satisfying requirements and constraints.
- Proposal of different alternatives to solve the problem
- Definition of metrics to compare the pertinence of alternatives.
- Selection of most appropriate alterative.
- Determine and describe all chemical process and operations.
- Complete design of the solution. Computations, computer simulations, use of norms and standards.
- Specify all required instruments, equipment, machinery and software applications.
- Present and describe the solution in planes, including layouts, distribution planes, and so on.
- Determine the cost and budget of the project, investment plan, and calculate the profitability index of the project.
- Submit a report describing the product, specifications, simulations, drawings, tests, results, planes, conclusions.
- Orally defend the project.

V. METHODOLOGY

The course takes place in a workshop format. Students form groups of three to five members and work along the semester to complete the project. Instructor is a member of all groups, revising the advances and providing support and orientation.

The themes of the projects are proposed by instructors or students. Instructor verifies that all project themes are relevant, modern, and solve an actual problem or need of a company, industry or human group. Projects could be in the areas of food industry, petrochemical, plastics, glass, or any other relevant chemical engineering industry.

Along the semester each student group present and defend their advances according to the proposed schedule. At the end of the cycle students defend their results in front of a jury who evaluate the project according to the 13 Student Outcomes. Active participation of students is encouraged along the semester.

VI. GRADING SYSTEM

The Final Grade (PF) is calculated with the following formula:

PF = (2 FP + PP) / 3

FP: Final presentation
PP: Average of five reports

VII. BIBLIOGRAPHY

1. **TOWLEER Gavin and Sinnott Ray**
   Chemical Engineering Design : Principle, Practice and Economics
   Elsevier Publications, 2010
2. The bibliography depends on the theme of each project. Studenst are encouraged to revise all type of bibliography including technical papers, books, and so on.