NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF ENVIRONMENTAL ENGINEERING

HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM

HO320 – INDUSTRIAL FACILITIES DESIGN OF HYGIENE AND INDUSTRIAL SAFETY ENGINEERING

I. GENERAL INFORMATION

CODE	**:**	HO320 – Industrial Facilities Design of Hygiene and Industrial Safety Engineering
SEMESTER	**:**	10
CREDITS	**:**	04
HOURS PER WEEK	**:**	08 (Theory – Practice – Laboratory)
PREREQUISITES	**:**	Ergonomic Work Design
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

The course prepares the student to apply the concepts, methods and techniques for the design of industrial hygiene and safety installations. Develops integral projects for the application of hygiene and industrial safety engineering (CAPSTONE). Design of hygiene and safety systems. Fire prevention and protection systems. Systems of protection against disasters. Security signaling system. Industrial lighting systems. Industrial ventilation systems.

III. COURSE OUTCOMES

At the end of the course the student will:

- Design comprehensive projects for the application of hygiene and industrial safety engineering (CAPSTONE).
- Understand industrial processes and work tasks with potential hazards.
- Apply the control measures based on a risk analysis of industrial processes and / or works of potential danger.
- Plan and develop designs of specialized control measures for cases of hygiene and industrial safety hazards.
- Plan and develop designs of specialized control measures for industrial safety hazards and disaster protection.

IV. LEARNING UNITS

1. **FORMULATION OF APPLICATION PROJECTS OF HYGIENE AND INDUSTRIAL SAFETY ENGINEERING (CAPSTONE)**
   Structure of a CAPSTONE project. Identification of hygiene and safety risks in the industry. Delimitation of the technical problem to solve. Formulation of objectives and restrictions. Solution alternatives proposals. Detailed development of the solution including simulations

and analysis of results. Description of results through models. Proposed implementation of the solution including estimated budget.

2. **APPLICATION OF COMPUTATIONAL SIMULATORS FOR THE DESIGN OF HYGIENE AND INDUSTRIAL SAFETY FACILITIES**
   Study of computational simulators applied to designs in engineering. Application of computer system for the design of facilities in hygiene and industrial safety engineering. 3D design of industrial facilities using SketchUp.

3. **DESIGN OF INDUSTRIAL SAFETY ENGINEERING FACILITIES**
   Design of industrial safety systems. Fire prevention and protection systems. Systems of protection against disasters. Security signaling system.

4. **DESIGN OF INDUSTRIAL HYGIENE ENGINEERING FACILITIES**
   Design of industrial hygiene systems. Industrial lighting systems. Industrial ventilation systems. Control of dust / fumes, gases and vapors.

5. **IMPLEMENTATION OF THE PROPOSED SOLUTION INCLUDING ESTIMATED BUDGET**
   Proposal to implement the selected solution. Preparation of stages, activities and tasks. Preparation of the project schedule. Preparation of the estimated budget of the selected solution.

V. LABORATORIES AND PRACTICAL EXPERIENCES

PRACTICE N ° 1:
Development of the integral evaluation of the hygiene and industrial safety risks level using the Gray Clustering method.

PRACTICE N ° 2:
Research Article: Research Report in the Hygiene and Industrial Safety Engineering area.

PRACTICE N ° 3:
Development of Industrial Hygiene and Safety Engineering Facilities Design using SketchUp software.

PRACTICE N ° 4:
Research poster: Research Report on Industrial Hygiene and Safety Engineering using the Academic Poster structure.

LABORATORY N ° 1:
CAPSTONE Project: Engineering Report / Project applied to the design of Industrial Hygiene and Safety Engineering facilities. Use of the MENDELEY software.

LABORATORY N ° 2:
Implementation of the proposal for the Design of Hygiene and Industrial Safety Engineering Installations using the Ms PROJECT software.

VI. METHODOLOGY

The course is developed in theory sessions, directed practices in classrooms and laboratories. In the theory sessions, the teacher presents the concepts and exercises the student in putting into practice, the knowledge received in previous cycles generating an amplitude of criteria in order to facilitate a design proposal in hygiene and industrial safety facilities.
In practical sessions-laboratory, the teacher develops examples and exercises to outline the designs that should be shown in plans, models, experiments, technical reports that include measurements, graphs and others as the problem to be solved is addressed.

At the end of the course the student must prepare and present an Engineering Report, an research project applied to some of the topics that have been discussed in the course. In all the sessions, the active participation of the student is promoted.

VII. EVALUATION FORMULA

The learning will be evaluated through the "F" system.

- Partial Exam: Weight 1
- Final Exam: Weight 2
- Practices Average: Weight 1.

Calculation of the Final Average:

$$FA = \frac{PE + 2 * FE + PA}{4}$$

PE: Partial Exam; FE: Final Exam, PA: Practices Average

For the Practices Average, during the semester four qualified practices and the laboratory experiences, the practice with lowest grades is eliminated. The average is calculated with the remaining three practices and the laboratory experiences grades.

$$PA = \frac{P1 + P2 + P3 + L1 + L2}{5}$$

VIII. BIBLIOGRAPHY

- FISS-UNI (2015). Engineering Project Design - CAPSTONE. Lima - Peru: http://fiisvirtual.uni.edu.pe/wp-content/uploads/2013/09/Proyecto-Capstone-Ingenier%C3%ADa-Industrial.pdf

- Lozano, B. (2014). Firefighting water systems. Venezuela.

- NTP (2012). Technical standard for safety signage. Lima Peru.

- SCIENCE DIRECT (2017). Research on hygiene and industrial safety engineering. USES.