



NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF ENVIRONMENTAL ENGINEERING

HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM

SE102 – SAFETY ENGINEERING II

I. GENERAL INFORMATION

CODE	: SE102 – Safety Engineering II
SEMESTER	: 6
CREDITS	: 04
HOURS PER WEEK	: 06 (Theory – Practice)
PREREQUISITES	: Safety Engineering I
CONDITION	: Mandatory

II. COURSE DESCRIPTION

The course prepares the student in the application of the concepts, methods and techniques for the evaluation and control of the risks of work accidents in all economic sectors. The dangers and risks as elements of study of all productive process from the global framework of Occupational Safety and Health. Reference is made to the historical bases of Industrial Safety (IS), from a Systems Theory approach in Industrial Safety Engineering, Value Chain Concept applied to the IS, Productivity in the Company, Work Study, Human Factor, Risks, Risk factors, The accident, types, conditions and unsafe acts, key factors, Investigation of Accidents, Inspections, safety analysis at work, accident register, frequency indexes, severity and others, accident costs, Training, Training and motivation, Organization and Management of security programs.

III. COURSE OUTCOMES

At the end of the course the student will:

- Identify the hazards and evaluate the risks of the different industrial processes that have the potential to generate major accidents.
- Define simulation models in the occurrence of accidents to predict impacts on environmental safety.
- Design models for controlling major accident risks based on the applicable safety standards.
- Design emergency response plans and / or contingencies as part of risk management based on criteria and environmental safety standards.
- Prepare clear technical reports detailing the process developed, interpreting results and formulating conclusions and recommendations.

IV. LEARNING UNITS

1. Material handling and storage. Training levels HAZ-MAT. Transportation of Hazardous Materials. Flammable and combustible liquids. MSDS sheets. Passive and active protection. APELL and TRANSAPPELL.

2. Design of industrial buildings and facilities: site planning, outdoor installations, arrangement of facilities, lighting, use of color in building structures. Rules and Regulations - RNE, Electric Code, NTP.
3. Construction and maintenance of buildings: excavations, portable ladders, scaffolding, forklifts, maintenance in the factory, maintenance personnel. Prevention of falls. Electrical hazards: electrical injuries, electrical equipment, inspection and maintenance. Electric welding. - Mechanical tools, portable manuals. Confined spaces.
4. Emergency / Contingency Plans: emergency classes, considerations about the action plan.
5. Dangers and security measures in:
 - Lifting devices and conveyors.
 - Ropes, cables, chains and slings
 - Industrial motorized trucks.
 - Elevators and railroads factory.
 - Protection of transmissions and work points. - Machinery for woodworking. Machines and tools.
 - Motorized vehicles: Vehicle safety program, safety practices in the repair shop. Road safety.

V. LABORATORIES AND PRACTICAL EXPERIENCES

Weekly practices will be carried out according to the progress of the learning units. It will present practical cases, reading controls, presentation of research on environmental accidents, design of risk controls for major accidents.

VI. METHODOLOGY

The course develops in sessions of theory and practices of cabinet. In the theory sessions, the teacher presents the concepts and in the practical sessions, their integral understanding is sought with the use of risk assessment methodologies. In practice sessions cases will be used to deepen the theoretical concepts.

At the end of the course the student must prepare and present an applied project / work related to one of the topics that have been addressed 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 "C" 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 five qualified practices and one project (PI) are graded, the practice with lowest grades is eliminated and the average is calculated with the remaining four practices and the project.

$$PA = \frac{P1 + P2 + P3 + P4 + PI}{5}$$

VIII. BIBLIOGRAPHY

- International Labor Office (ILO), Encyclopedia of Occupational Health and Safety, Electronic edition corresponding to the third edition of the Encyclopedia, with the collaboration of the ILO and the Ministry of Labor and Social Affairs, Spain, 1999.
- Law No. 29783. Safety and Health at Work - 2011
- DS-005-2012-TR. Occupational Health and Safety Regulations - 2012
- National Building Regulations - 2006 Edition and updates. A.010 - A.130
- Jon Redondo. Prevention and Safety in vertical works. Desnivel editions. 2009
- Bárbara García Gogéngola. Works in Explosive Atmospheres. Cometal Foundation. 2012