NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF ENVIRONMENTAL ENGINEERING

HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM

SA725 – FIRE PREVENTION AND CONTROL

I. GENERAL INFORMATION

CODE	**:** SA725 – Fires Prevention and Control
SEMESTER	**:** 5
CREDITS	**:** 04
HOURS PER WEEK	**:** 06 (Theory – Practice)
PREREQUISITES	**:** Safety Engineering / Environmental Agents II
CONDITION	**:** Mandatory

II. COURSE DESCRIPTION

Acquire fundamental concepts of Fire Prevention and Control Engineering, under a modern approach to engineering design, taking as context economic globalization and emerging risks. Develop observation skills, broad criteria and decision-making capacity, which provide leadership possibilities to conduct projects that include concepts of fire protection and human security.

III. COURSE OUTCOMES

By 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 fires.
- Define simulation models in the occurrence of fires to predict impacts on human security.
- Design fire risk control models based on the applicable safety standards.
- Design emergency response plans and / or contingencies as part of risk management based on human security criteria and standards.
- Prepare clear technical reports detailing the process developed, interpreting results and formulating conclusions and recommendations.

IV. LEARNING UNITS

UNIT 1: LOCATION AND THEORETICAL FRAMEWORK

Objective: Highlight the importance of Fire Prevention and Control and provide the basic concepts of the course. Presentation of the Course. Discussion of the Syllabus. Importance. The environment. Relevant actors. General Concepts: Fire. Limit inflammability. Flash points. Danger of a fuel. Activation energy. Propagation. In the time. In the space. Classification of Fire. Explosion. Detonation. Types of Explosions.

UNIT 2: NORMATIVE ASPECTS
Objective: To provide the legal framework for fire prevention and control.

UNIT 3: FIRE RISK
Objective: Analyze the fire risk, the combustion process and the extinguishing agents. Gases. Smoke. Oxygen insufficiency. Heat. Flames. Combustion. Combustion process. Principles of Extinction. Extinction agents. Materials. Processes Buildings.

UNIT 4: FIREMEN
Objective: To know the organization of the CGBVP and the basic equipment of a Fire Station.

UNIT 5: METHODOLOGY
Objective: Manage the basic methodology of Fire Safety. Basic Methodology Evaluation. Comparison. Control.

UNIT 6: FIRE RISK ASSESSMENT
Objective: To know the fire risk Assessment techniques. Fire Risk Assessment. Techniques Inspection.

UNIT 7: TECHNICAL CONTROL
Objective: To know the Technical Control of fire risk. Technical control Basic Control Plan. Monitoring Epidemiological surveillance. Individual treatment

UNIT 8: SECURITY IN DESIGN
Objective: To know the basic safety guidelines for the design of buildings.

UNIT 9: FIRE EXTINGUISHERS
Objective: Manage the methodology of selection, distribution and location of fire extinguishers. Extinguishers. Definition Classification. Selection. Distribution and Location.

UNIT 10: CHARACTERISTICS OF EXTINGUISHERS
Objective: To know the basic characteristics of fire extinguishers.

UNIT 11: ALARM AND DETECTION SYSTEMS
Objective: To know the alarm system and fire detection.

UNIT 12: DESIGN OF AN ALARM AND DETECTION SYSTEM.
Objective: To apply the basic guidelines of the design of an alarm and fire detection system.

UNIT 13: THE FIRE-FIGHTING EXTINCTION SYSTEMS
Objective: To know the operation and types of fire extinguishing systems.

UNIT 14: AUTOMATIC SPRINKLERS
Objective: To know the operation and types of automatic sprinklers.

UNIT 15: SPRINKLERS DESIGN
Objective: Basic design of an automatic sprinkler system.

UNIT 16: CARBON DIOXIDE SYSTEMS
Objective: To know the operation and basic guidelines of the design of a carbon dioxide system.

UNIT 17: HALON 1301 SYSTEM
Objective: To know the operation and basic guidelines of a Halon 1301 system.

UNIT 18: FM 200 SYSTEM
Objective: To know the operation and the basic guidelines of an FM 200 system.

UNIT 19: HYDRAULIC CONCEPTS
Objective: Review of the basic concepts.

UNIT 20: DESIGN OF NETWORK CONTRAINCENDIOS
Objective: To know the design elements of a firefighting network.

UNIT 21: FOAMS AND DESIGN.
Objective: To know the design elements of a firefighting network.

UNIT 22: ADMINISTRATIVE CONTROL
Objective: To know the administrative control.

UNIT 23: SECURITY PROGRAM
Objective: To know the experience of a security chief responsible for fire safety.

UNIT 24: RECHARGING EXTINGUISHERS
Objective: To know the basic procedures of recharging extinguishers.

UNIT 25: EMERGENCIES
Objective: To know the basic elements of an Emergency Plan.

UNIT 26: DANGEROUS MATERIALS
Objective: To know the identification system of the Hazardous Materials

UNIT 27: TRAINING
Objective: To know the basics of a Technical Training.

UNIT 28: CONTRAINCENDIUM BRIGADES.
Objective: To know the basic elements of the training of a Fire Brigades.

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 theory sessions and cabinet practices. 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 a project applied to a topic 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 are graded, the practice with lowest grades is eliminated and the average is calculated with the remaining four practices and the monograph grades.

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

VIII. BIBLIOGRAPHY

- NFPA, Fire Protection Manual, National Fire Protection Association, Trad. Diorki, Fifth Edition, Editorial OPCI / IFST, Colombia. September 2012
- National Building Regulations - 2006 Edition and updates. A.010 - A.130
- NFPA Standards.