



# NATIONAL UNIVERSITY OF ENGINEERING

## COLLEGE OF ENVIRONMENTAL ENGINEERING

### HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM

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## HO230 – EVALUATION AND CONTROL OF PHYSICAL AGENTS

### I. GENERAL INFORMATION

<b>CODE</b>	: HO230 Evaluation and Control of Physical Agents
<b>SEMESTER</b>	: 7
<b>CREDITS</b>	: 4
<b>HOURS PER WEEK</b>	: 6 (Theory – Practice – Laboratory)
<b>PREREQUISITES</b>	: HO210
<b>CONDITION</b>	: Mandatory

### II. COURSE DESCRIPTION

Risk analysis in industrial hygiene. Evaluation and control of physical environmental agents. Classification of physical agents: noise, vibrations, heat, pressures and radiations. Main associated diseases. Control at the level of the source, the trajectory and the individual. Evaluation of the agent, dosimetry and individual susceptibility. Design of control systems.

### III. COURSE OUTCOMES

To know the professional risks associated with physical environmental agents. Analyze the implications of physical agents on the health of people in the work environment. Develop technical capacity for the recognition, evaluation and control of physical environmental agents in different productive sectors.

### IV. LEARNING UNITS

#### 1. UNIT I: Risk analysis and risk exposure.

Introduction to industrial hygiene and classification of agents. Risk analysis: evaluation, management and communication of risks. Identification of risks in industrial hygiene. Physical risks

#### 2. UNIT II: Recognition evaluation and control of physical agents.

Heat recognition and evaluation. TGBH and ISC evaluation indices. Evaluation of heat exposure. Comfort assessment, TE and TEC indexes. Control and problems. Recognition and evaluation of pressures. Hyperbarism and hypobarism. Measurements of pressures and composition of gases in the air. Control measures, controlled exposure. Study of cases. Recognition and evaluation of vibration. Resonance and damping. Measurement of vibrations. Vibration control. Problems and case studies. Recognition and evaluation of noise. Sonometry. Noise measurements with weighting and frequency analysis. Hearing evaluation. Noise control, acoustic correction. Development of audiometries. Noise control, acoustic insulation. Recognition, evaluation and control of radiation. Measurement of electromagnetic radiation.

## V. LABORATORIES AND PRACTICAL EXPERIENCES

The laboratories are intended to specify the knowledge acquired in the theoretical framework and develop skills for the evaluation and control of physical agents. Environment evaluations are developed in laboratory hours. Experiences are developed in the Hygiene and Industrial Safety Engineering Laboratory, mainly for the simulation of jobs.

The practices allow to develop capacities for the development of type problems and for the design of control measures, as well as to deepen the necessary calculations for the industrial design.

## VI. METHODOLOGY

Magisterial exhibitions, discussion workshops and laboratory evaluations will be held. Problems and case studies will be developed for each topic in theory and practice. For the practical part, calculation problems will be developed. It will have the support of the Industrial Hygiene and Safety Engineering Laboratory LABIHSI. The analysis and debates on practical cases will be used to consolidate learning. Group dynamics.

Multimedia projector, videos and transparencies will be used. Computer for the presentation of images, graphics, tables and text. Printed material consisting of selected short readings and computer files of the presentations and reference documents used as support.

## 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 two laboratory experiences are graded, the practice with lowest grades is eliminated and the average is calculated with the remaining three practices and the two laboratory grades.

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

## VIII. BIBLIOGRAPHY

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