NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF ENVIRONMENTAL ENGINEERING

HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM

EE344 – LIGHTING ENGINEERING

I. GENERAL INFORMATION

CODE	**:** EE344 – Lighting Engineering
SEMESTER	**:** 8
CREDITS	**:** 03
HOURS PER WEEK	**:** 04 (Theory – Practice)
PREREQUISITES	**:** FI403 Physics III
CONDITION	**:** Mandatory

II. COURSE DESCRIPTION

The course prepares the student in the theoretical knowledge about light and lighting, as well as the terminology used in lighting technology and the analysis of the various sources of artificial light and luminaires, for application in the design of lighting in an environment, complemented by the sizing and calculations of lighting design.

III. COURSE OUTCOMES

By the end of the course, the student will:

- Understand and analyze the characteristics of artificial light sources and luminaires.
- Become aware of the need and importance of adequate lighting for the development of human activity.
- Size and calculate lighting designs, interprets results and formulates conclusions.
- Investigate and organize data for the adequate analysis, interpretation and application of the required information.
- Use calculation software to support the processing and analysis of results

IV. LEARNING UNITS

1. **DEFINITIONS AND LUMINOUS MAGNITUDES**
   Definitions / The human eye / Fundamental luminous magnitudes.

2. **LAMPS AND EQUIPMENT**
   Incandescent lamps / discharge lamps / high pressure lamps / low pressure lamps / LED lamps.

3. **LUMINAIRES**
   Basic Fundamentals / Reflection / Refraction / Absorption.

4. INTERIOR LIGHTING

General criteria / Interior lighting design / IES and CIE method / Work equations / Dimensioning and average lighting calculations / Luminaire distribution.

V. LABORATORIES AND PRACTICAL EXPERIENCES

Practice 1
Investigation 1: Biological circle.
Investigation 2: Pollution by illumination.
Investigation 3: Energy efficiency in lighting.

Practice 2
Presentation 1: High and low pressure sodium lamps.
Presentation 2: High pressure mercury lamps, metal halides and Mixed.

Presentation 3: Fluorescent lamps.

Presentation 4: LED and induction lamps.

Practice 3 and 4: Project: Lighting design.

VI. METHODOLOGY

The course is developed in theory sessions and practical presentations. In theory sessions, the teacher presents the concepts and applications. In the practical presentations, the team works and exposes the characteristics and applications of the different types of lamps and lighting design. Students must permanently investigate the various aspects that the presentations require. Calculation software is used for the development of the project. At the end of the course the student must present the design of an interior environment, developing the dimensioning and calculations, as well as explaining and sustaining the results. 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 four qualified practices, the practice with lowest grades is eliminated and the average is calculated with the remaining three practices.

$$PA = \frac{P1 + P2 + P3}{3}$$

VIII. BIBLIOGRAPHY

- MINISTRY OF ENERGY AND MINES - PERU. Regulation of Interior Lighting and Sports Fields DGE 017-AI-1/1982.

- IES - Illuminating Engineering Society of America - USA. Society of Lighting Engineering: Standards and Lighting manuals. IES publications.

- CIE - Commission Internationale de l'éclairage. International Lighting Commission: Standards and Lighting manuals. CIE publications.