



**NATIONAL UNIVERSITY OF ENGINEERING**  
**COLLEGE OF ENVIRONMENTAL ENGINEERING**  
**HYGIENE AND INDUSTRIAL SAFETY ENGINEERING PROGRAM**

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**SE214 – ELECTRICAL SAFETY**

**I. GENERAL INFORMATION**

<b>CODE</b>	: SE214 – Electrical Safety
<b>SEMESTER</b>	: -
<b>CREDITS</b>	: 03
<b>HOURS PER WEEK</b>	: 04 (Theory – Practice)
<b>PREREQUISITES</b>	: FI403 – Physics III SE101 Safety Engineering II
<b>CONDITION</b>	: Elective

**II. COURSE DESCRIPTION**

The course prepares the student in the basics of electricity and fundamentals of electrical safety for electrical risks, protection of electrical installations and equipment, applying the rules of electrical safety, electrical protection equipment and electrical technical inspections.

**III. COURSE OUTCOMES**

At the end of the course the student will:

- Understand and analyze the fundamentals of electricity and electrical safety.
- Identify and qualify electrical risks.
- Apply protection for people, electrical installations and equipment; considering electrical safety standards and electrical protection equipment.
- Evaluate electrical installations through electrical technical inspections.

**IV. LEARNING UNITS**

**1. FUNDAMENTALS OF ELECTRICITY**

Introduction to electricity / Electric quantities / Fundamental laws of electricity / Thermal effects of current.

**2. FUNDAMENTALS OF ELECTRICAL SAFETY**

Electrical risk / Use of the National Electricity Code / Electrical diagrams of electrical installations / Elements of internal electrical installations / Prevention of electrical fires / Case studies / Management of electrical risks.

**3. ELECTRICAL PROTECTION**

Electrical protection in Installations and equipment / Thermomagnetic and Differential Switches / Protection against thermal effects / Low Voltage Work. Five gold rules / Overcurrent protection / Grounding system / Earthwell construction.

#### 4. ELECTRICAL TECHNICAL INSPECTION

Electrical Technical Inspections / Case Studies / Protection Equipment. Prevention signage. Regulations on Safety and Health in electrical activities.

#### 5. ELECTRICAL RISKS IN HALF AND HIGH VOLTAGE

Electrical risks in Medium and High Voltage. Safety in work without tension. Works in the vicinity of High Voltage installations. Works in Substations. Works on airlines / Case studies.

### V. LABORATORIES AND PRACTICAL EXPERIENCES

Along the development of the course four qualified practices will be taken.

### VI. METHODOLOGY

The course is developed in sessions of theory, practice and computer lab. In the theory sessions, the teacher presents the concepts, theorems and applications. In the practical sessions, various problems are solved and their solution is analyzed. In laboratory sessions Matlab simulation software is used to solve problems and analyze their solution. At the end of the course the student must prepare and present an integrating project or work. In all the sessions, the active participation of the student is promoted.

Through practical expositions of real technical problems related to electrical safety and the analysis of electrical safety in the country. Dialogue and technical analysis among students is promoted through the application of the 'Case Methodology' and presentations.

### 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 practice with lowest grade is eliminated. The average is calculated with the remaining three.

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

### VIII. BIBLIOGRAPHY

- MINISTRY OF ENERGY AND MINES - PERU. Regulation of Health and Safety at Work with Electricity (RESESATE), 2013.
- MINISTRY OF ENERGY AND MINES - PERU. National Electricity Code (CNE) - UTILIZACIÓN, 2006.
- NATIONAL FIRE PROTECTION ASSOCIATION - USA. NFPA 70E® - Standard for Electrical Safety in the Workplace®, 2018.