



**NATIONAL UNIVERSITY OF ENGINEERING**  
**COLLEGE OF CIVIL ENGINEERING**  
**CIVIL ENGINEERING PROGRAM**

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**SYLLABUS - SANITARY AND ELECTRICAL INSTALLATIONS**

**I. GENERAL INFORMATION**

<b>CODE</b>	: CO823 Sanitary and Electrical Installations
<b>SEMESTER</b>	: 8
<b>CREDITS</b>	: 3
<b>HOURS PER WEEK</b>	: 6 (Theory – Practice)
<b>PREREQUISITES</b>	: HH224 Fluid Mechanics II
<b>CONDITION</b>	: Mandatory
<b>DEPARTMENT</b>	: Construction

**II. COURSE DESCRIPTION**

This theoretical and practical course is elective and its objective is to provide students with knowledge about hydraulics methodology and techniques applied to the design, construction, operation and maintenance of water and drainage sanitary installations in buildings.

This course explains theories such as: Integral conception of indoor installations, types of installations, construction materials, and economic - technical aspects; all of them under current National Building Regulations and the Standard 200.

The domain of this conceptual and practical subject matter will allow students to develop a basic knowledge about materials, such as pipes, accessories, equipment and sanitary equipment to design, build and operate a technical – economic sanitary installation system in a building. Students complete an indoor sanitary installation project.

**III. COURSE OUTCOMES**

1. Formulate with precision the problem for certain practical case proposed, identifying required data and information.
2. Assess the quality of materials and equipment to be used in a sanitary installation.
3. Learn the operation and use of the systems and their equipment.
4. Determine quantities of elements and accessories and estimate the cost of the installation.
5. Develop planes and complete the design of an indoor sanitary installation project.

**IV. LEARNING UNITS**

**1. INTRODUCTION**

Pressure units, pressures under sanitary equipment operation. Availabilities.  
Application of NBR (National Building Regulations), standard 200.

**2. HOT AND COLD WATER SYSTEM TYPOLOGY**

Water supply urban systems and indoor water systems in buildings, linear and non linear components. Pressure planes in public utilities.

**3. DIRECT SYSTEM**

Direct system elements / Design parameters / Units cost for public and private use / Pressure drop / Cold and hot water network calculation.

#### **4. INDIRECT SYSTEM**

Linear and non linear components / Cold and hot water network design in sanitary atmospheres / Design and calculation of an indirect system – Electric pump / Materials: piping, cold and hot water accessories, sanitary equipment, equipment, drainage accessories and ventilation.

#### **5. HYDRO PNEUMATIC SYSTEM**

Elements of the hydro pneumatic system / Storage and equipping / Description of every non linear element.

#### **6. DRAINAGE AND VENTILATION**

Elements of drainage systems / Ventilation system / Types of ventilation / design.

#### **7. DESIGN PROJECT**

Students complete the design of an indoor sanitary installation for a building from the initial formulation of the problem to planes and diagrams representing the proper solution.

### **V. METHODOLOGY**

The methodology of the course is directed at encouraging the students' active participation. It is made up of a number of quizzes and domiciliary designs (individual exposition) and visits to works, from which the lowest grade will be eliminated. Unlike those above mentioned, the elaboration of design and calculation of the final project about indoor sanitary installations receive advice from the instructor of the course so there is no replacement of these grades. The exposed methodology will make it possible for students to develop knowledge, aptitudes and skills.

### **VI. EVALUATION FORMULA**

The average grade PF is calculated as follows:

$$PF = 0.2 EP + 0.2 EF + 0.2 PP + 0.4 TF$$

EP: Mid-Term Exam

EF: Final Exam

PP: Average of four quizzes

TF: Final design project report

### **VII. BIBLIOGRAPHY**

#### **1. PERU'S NATIONAL BUILDING REGULATIONS**

#### **2. INSTALLATIONS IN BUILDINGS**

Barcelona, Spain, Gustavo Gill Editorial Group, 2012

#### **3. ENGINEER'S HANDBOOK**

Academia Hutte. Barcelona, Spain. Gustavo Gill Editorial  
Mc. Graw – Hill Editorial, 2015

#### **4. AZEVEDO NETTO, JOSÉ MARÍA.**

Hydraulics Handbook  
Technical Editorial, Mexico.