



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

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**ES931 – MASONRY, ADOBE AND WOOD**

**I. GENERAL INFORMATION**

<b>CODE</b>	: ES931 – Masonry, adobe and wood
<b>SEMESTER</b>	: 9
<b>CREDITS</b>	: 03
<b>HOURS PER WEEK</b>	: 06 (Theory – Practice – Seminar)
<b>PREREQUISITES</b>	: ES831 – Earthquake resistant engineering and disaster prevention
<b>CONDITION</b>	: Mandatory

**II. COURSE DESCRIPTION**

Material structures such as masonry, wood and “tapial” (earth structures) are regularly used in the region. However, this study is somewhat limited in university and postgraduate education although its use is quite widespread, especially the unarmed masonry, but indiscriminate.

**III. COURSE OUTCOMES**

At the end of the course the student will:

- Organize and know the stages and parts of a structural project.
- Understand the structural behavior of wood
- Understand the structural behavior of the tapial and its different versions
- Understand the structural behavior of masonry in its different versions.

**IV. LEARNING UNITS**

**1. GENERALITIES**

Presentation and generalities / Structural project / Analysis and calculation, methodologies / Technical drawing / Seminar of loads / Foundations.

**2. WOOD**

Timber for heavy and light industry / Treatment and Industrialization / bending / Technical visit / Compression and flex compression / Nailed connections / Sap2000 seminar / Bolted connections / Armor / Wooden buildings / Mezzanines and panels / Detailed engineering.

**3. TAPIAL**

Ground structures and components / Adobe walls / Analysis of walls / Quincha walls / Behavior and manufacturing / Other structures in tapial / Technical visit / Calculation of Buildings.

#### 4. MASONRY

Masonry components / Structural behavior / Etabs seminar / Supporting walls / Non-bearing and retaining walls / Bracing walls / Confined masonry buildings / Armed masonry buildings.

#### V. METHODOLOGY

To achieve the desired objectives and based on the profile of the graduate according to the current national reality, the course will be developed based on:

- Theoretical-practical sessions in which the material delivered will be analyzed and solutions to structural engineering problems applied to the case of masonry and tapial will be developed.
- Real problems, which will be solved in each session and / or by unit through the group work of 03 members.
- In each session the student will be presented with the previously read topic. The quality and quantity will be assessed individually or in groups.
- In the practical sessions it will be combined between visits, seminars and evaluations that will contain questions that demonstrate the understanding of the topics studied as the ability to solve problems in engineering projects.

#### VI. EVALUATION FORMULA

The learning will be evaluated through the "F" system.

- Partial Exam (PE): Weight 1
- Final Exam (FE): Weight 2
- Average of Six Practices (P): Weight 1.

$$FA = \frac{PE + 2 * FE + P}{4}$$

#### VII. BIBLIOGRAPHY

- E.020 Standard: Loads, MVC, 2006
- E.030 Standard: Earthquake Resistant Design, MVC, 2016
- E.101 Standard: Grouping of timber for structural use, MVC, 1989
- E.102 Standard: Design and construction with wood, MVC, 1994
- E.080 Standard: Adobe, MVC, 1999
- E.070 Standard: Masonry, MVC, 2006, 1982