



**NATIONAL UNIVERSITY OF ENGINEERING**  
**COLLEGE OF ENVIRONMENTAL ENGINEERING**  
**SANITARY ENGINEERING PROGRAM**

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**EC717 – CONSTRUCTION PROCESSES**

**I. GENERAL INFORMATION**

<b>CODE</b>	: EC717 Construction Processes
<b>SEMESTER</b>	: 8
<b>CREDITS</b>	: 4
<b>HOURS PER WEEK</b>	: 6 (Theory, Practice)
<b>PREREQUISITES</b>	: EC611 Materials Technology
<b>CONDITION</b>	: Mandatory

**II. COURSE DESCRIPTION**

The course prepares students for the understanding and application of construction processes to fulfill design specifications and satisfy given requirements and constraints. Students interpret construction plans and drawings, construction materials and processes at every stage of the construction work. Students also estimate construction costs, and propose construction schedules, as well as verify construction quality satisfying norms and regulations.

**II. COURSE OUTCOMES**

At the end of the course, students:

1. Understand the properties and structural properties of different construction materials.
2. Find the best choice among the presented and related to conventional constructive processes.
3. Supervise construction processes and material quality.
4. Exercise the critical attitude during construction work execution.
5. Encourage innovation and use of unconventional construction systems.
6. Understand and apply construction norms and regulations.

**III. LEARNING UNITS**

**1. CONSTRUCTION MATERIALS**

Concrete as structural material. Types of concrete. Properties of green concrete and hardened concrete. Cement. Classification. Composition. Structure. Gel. Capillary pore. Water for its preparation and curing. Aggregates. Physical characteristics. Classification. General specifications. Specific gravity. Volumetric gravity. Humidity condition. Granulometric design. Absolute and apparent volume of aggregates. Method of aggregate combination for a required granulometry. Specific surface area. Concrete admixtures. Reducer admixture of water retarding as modifiers of green concrete properties. Air incorporating admixtures. Waterproofing admixtures. Cutting-edge admixtures.

**2. ARCHITECTURAL AND STRUCTURAL ASPECTS**

Plan reading. Types of plans, architecture, structures, sanitary installations and electrical wiring. Location plan. Symbols interpretation. Constructive processes of building and gantry structures. Construction metering. Provisional works, provisional constructions. Provisional water and electricity. Preliminary works. Removal works. Demolitions, strokes, levels and layout. Earth movement. Ground leveling. Excavation: massive, ditch, cutting-off and filling.

Surplus material disposal. Internal leveling and ramming, sheet piling. Plain concrete works: perimeter footings, footing, paving for footings. Foundations. Underpinning piles, retaining wall. Stem wall, step and ramps.

## **2. CONSTRUCTION PROCESSES**

Reinforced concrete works: reinforce concrete elements, theoretical concepts, and confinement vertical elements. Grade and supporting beams. Slabs, types; one-way lightweight slab; girt steel. Concrete. Placement of roof bricks. Veneer wall, king-kong brick wall, types of bond: head, stretcher, mortar for settlement; wall indentation. Structure hull, slab pouring, curing, false-work removal. Norms and regulations.

## **3. CONSTRUCTION PROCESS FOR BUILDING WORK FINISHES**

Building finishes, rendering, plastering and molding. Primary lined plastering, indoor and outdoor plastering, column and beam plastering, wall plastering. Frosted plasterwork, embrasure revetment and burnishing. Floor and sidewalks, sub-floor. Types of floors. Woodworking. Metalworking and ironworking. Aluminum workings. Systems and mechanisms. Locking accessories. Gasses, crystals and similar materials: Single-thick, semi-double thick, double-thick and triple-thick. Painting: Plastered ceiling, indoor and outdoor screen walls, furniture paint in general.

## **4. CONSTRUCTIVE PROCESS FOR BUILDING INSTALLATIONS**

Sanitary installations. Drainage and ventilation. Blow-off. Distribution system. Cold water and fire-prevention system. Cold water outlet. Distribution systems, faucets, valves. Hot water system. Distribution and return systems. Rainwater system / Electrical wiring. Roof and wall spout, spot light. Power outlet. Communication, signal, canalization and/or pipelining outlets. Conductors and wires. Panel boards and circuit breakers. Budgeting. Introduction to the analysis of unit cost, performance and man-hour. Price adjustment using polynomial formulas.

## **IV. METHODOLOGY**

The course takes place in theory and practice sessions. In the theory sessions, the teacher presents concepts and applications. In practice sessions, various problems are solved and their solution analyzed. Students visit different construction works in Lima city to analyze reinforced concrete buildings. At the end of the course, students complete a project and defend it. Student's active participation is promoted.

## **V. GRADING FORMULA**

The Final Grade PF is calculated as follows:

$$PF = (EP + 2 EF + PC) / 4$$

EP: Mid-term Exam

EF: Final Exam

PC: Practical Work

## **VI. BIBLIOGRAPHY**

### **1. CONSTRUCTION PROCESSES OPTIMIZATION**

Pedro Torres and Luis Mendez

Alfa-Omega Editions

### **2. CONSTRUCTION MESTRICS AND COSTS ESTIMATION**

National Construction Training Center SENCICO, Peru