



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

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**SYLLABUS - SOIL MECHANICS APPLIED TO FOUNDATIONS**

**I. GENERAL INFORMATION**

<b>CODE</b>	: EC521 Soil Mechanics Applied to Foundations
<b>SEMESTER</b>	: 9-10
<b>CREDITS</b>	: 4
<b>HOURS PER WEEK</b>	: 5 (Theory – Practice)
<b>PREREQUISITES</b>	: EC513 Soil Mechanics II
<b>CONDITION</b>	: Elective
<b>DEPARTMENT</b>	: Soil Mechanics

**II. COURSE DESCRIPTION**

The study of foundations leaned on Peruvian soils and the application of theoretical concepts of soil mechanics taken in basic courses make this specialty course indispensable for the integral training of the civil engineering in the design and construction of foundations in every region of the country which presents special conditions of static and dynamic behavior, strain due to water infiltration in cohesive and granular soil, latitude stability and grounds improvement with modern application systems.

The most important subjects of the course are: Foundations in static and dynamic condition in Peru. earthquake Geotechnics applied to foundations in Peru. Introduction to Mechanics of unsaturated soils. Foundations on expansive soils. Foundation on granular, semi-saturated and saturated soils. Foundations on liquefiable soils. Foundation in coarse granular soils. Foundation on fine-grained soils. Foundation on tropical rainforest soils. Slope displacement and stability. Geosynthetic Reinforced Foundations. Foundation pathology. Foundation repair. Improvement methods for foundation soils.

**III. COURSE OUTCOMES**

1. Study methodologies of mechanic and physical behavior of soils in general and some special types of soils in Peru for their corresponding application in the solution of foundations and other special construction procedures.
2. Explain and apply basic soil mechanics with application to the practical foundation engineering in Peruvian soils.
3. Efficiently analyze, manage and lead projects for the socioeconomic development protecting the environment.
4. Supervise and/or execute basic and conceptual engineering surveys analyzing and designing engineering projects, at the same time plan preventions measures in cases of disaster and execute defense and/or mitigation works.

**IV. LEARNING UNITS**

## **1. ORGANIZATION, DEFINITIONS AND CONCEPTS OF FOUNDATION SOILS / 7 HOURS**

Capability of taking his/her own decisions and have technical sense about foundation soils in Peru and their mechanical behavior before superstructure overloads solicitations and earthquake effects, characteristics of typical strains of the phenomenon studied and consequences of disregarding it. Practical solutions of cases occurred in Peru and abroad.

## **2. FOUNDATIONS IN STATIC AND DYNAMIC CONDITIONS / 7 HOURS**

Earthquakes Geotechnics/ Global warming and Geotechnics.

## **3. EXPANSIVE SOILS IN PERU / 7 HOURS**

## **4. GRANULAR, SEMI-SATURATED AND SATURATED SOILS. LIQUABLE SOILS / 7 HOURS**

## **5. COARSE GRANULAR SOILS. METROPOLITAN LIMA CASE / 7 HOURS**

## **6. FOUNDATION ON FINE-GRANULATED SOILS / 7 HOURS**

Foundations on coarse and fine-granulated soils, providing students with professional experience which will broaden their capability of facing with technical sense foundation problems.

## **7. FOUNDATION ON TROPICAL SOILS IN PERU / 7 HOURS**

## **8. GEOSYNTHETIC REINFORCED FOUNDATIONS / 7 HOURS**

## **9. FOUNDATIONS PATHOLOGY / 7 HOURS**

## **10. FOUNDATIONS REPAIR. REFOUNDATIONS / 7 HOURS**

## **VI. METHODOLOGY**

The methodology of this course is directed to encourage the students' active participation. Students should form field work groups that integrate theory with the investigation and the professional practice of geotechnical engineering.

## **VII. EVALUATION FORMULA**

The average grade PF is calculated as follows:

$$PF = 0.3 EP + 0.4 EF + 0.3 PP$$

EP: Mid-Term Exam

EF: Final Exam

PP: Average of four quizzes

## **VIII. BIBLIOGRAPHY**

### **1. MUNI, BUDHU**

Soil Mechanics and Foundations  
Wiley Editions, 2008

### **2. DAY, ROBERT**

Foundations Engineering Handbook  
ASCE Press, 2009

