NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ENVIRONMENTAL ENGINEERING
SANITARY ENGINEERING PROGRAM

SA312 – ECOLOGY

I. GENERAL INFORMATION

CODE	**:**	SA312 Ecology
SEMESTER	**:**	6
CREDITS	**:**	2
HOURS PER WEEK	**:**	3 (Theory, Practice)
PREREQUISTES	**:**	SA323 Sanitary Microbiology I
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

The course prepares students in the understanding of ecology, environment and sustainability, as well as the importance of applying sanitary engineering methods to the environment conservation and care. Students understand the principles of the interactions between living and non-living beings on the Earth, and how these interactions are important for keeping and preserving life. Students analyze the importance of biodiversity, as well as main environmental problems affecting life on Earth.

II. COURSE OUTCOMES

At the end of the course, students:

1. Understand and explain the concept of ecology and the interactions between living and non-living beings.
2. Analyze the dynamics of population growing considering environment and nutrition effects.
3. Understand and explain the importance of biodiversity considering the different natural regions of the country.

III. LEARNING UNITS

1. ECOLOGY

Life processes, interaction and adaptations. Habitat. Biodiversity. Meta-population and migration. Ecosystems. Biogeography. Evolution. Human ecology. Physical environment: water, gravity, pressure, wind, fire, soil, air, climate. Organization levels of living beings: plants, animals, humans, microorganisms. Differential characteristics.

2. RELATION TO EVOLUTION

Life history. Population adaptation and development. Natural selection. Inheritance. Behavioral ecology. Cognitive ecology. Social ecology. Coevolution. Geo-ecography. Molecular ecology.

3. POPULATION AND NUTRITION

Population study. Population dynamics. Birth rate. Mortality. Morbidity. Fertility. Overpopulation. Human population and ecology. Nutrition in ecosystems. Autotroph and heterotroph organisms. Trophic networks and chains. Principles on metabolism and physiology of human beings.

4. **BIOGEOCHEMICAL CYCLES**
   Carbon. Nitrogen. Sulfur. Phosphor. Water. Cycle ecological importance. Anthropogenic influence. Microbial ecology of agriculture soils. Environmental impact of agriculture. Ecological agriculture. .

5. **BIODIVERSITY**
   Importance of biodiversity. Peru natural regions: coast, mountains and jungle. Characteristics of each region. Eco-regions. Government protected natural regions. Biodiversity conservation. Scientific, touristic and economic impact of biodiversity.

6. **ENVIRONMENT**
   Environment pollution. Environmental problems. Greenhouse effect. Causes and consequences. Desertification. Causes. Alternatives for reducing desertification. Ozone layer. Causes of deterioration. Effects on ecosystems and human beings. Prevention measures.

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 areas in Lima city to analyze their ecosystems and environmental problems. 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 follow:

PF = (EP + EF + PC + PL) / 4

EP: Mid-term Exam	EF: Final Exam
PC: Practical Work	PL: Laboratory Practice

VI. BIBLIOGRAPHY

1. **ENVIRONMENTAL TECHNOLOGY**
   C. Armas
   Limusa Editions

2. **ECOLOGY AND CIVILIZATION**
   H.O. Butteler
   Pearson Editions.

3. **ENVIRONMENTAL DEVELOPMENT AND SUSTAINABLE DEVELOPMENT**
   Ernesto Enkerlin
   McGraw Hill Editions.

4. **ECOLOGY AND ENVIRONMENT**
   G.T. Miller
   Iberoamerican Dditions.