



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ENVIRONMENTAL ENGINEERING
ENVIRONMENTAL ENGINEERING PROGRAM

AS152 – Environmental Services

I. GENERAL INFORMATION

CODE	: GA113 – Environmental Services
SEMESTER	: 8
CREDITS	: 04
HOURS PER WEEK	: 04 (Theory – Practices)
PREREQUISITES	: GA112 – Protected Natural Areas and Forests
CONDITION	: Mandatory

II. COURSE DESCRIPTION

The course introduces the student to the development of environmental services, their classification and uses in planning, as well as the different control and conservation mechanisms developed nationally and internationally. Based on the analysis of the different classification systems of ecosystem services, the use and application of valuation methods and mapping techniques will begin. At the end of the course the student will have the capacity to study the environmental services of the main Peruvian ecosystems, based on ecological, geographical and social criteria. Studies of experiences developed in Peru and internationally are presented and will begin in the use of specialized software.

III. COURSE OUTCOMES

At the end of the course the student will:

- Develop its capacity to relate the structure and function of ecosystems with environmental services.
- Apply different valuation methods for environmental services.
- Analyze the factors associated with environmental services (hazards, pollution, etc.).
- Apply mapping and mapping techniques to the study of environmental services.
- Determine the prioritization of environmental services, based on the balance of their degree of influence on economic activities and their associated factors.
- Develop conservation actions for environmental services.

IV. LEARNING UNITS

1. ECOLOGICAL BASIS RELATED TO ENVIRONMENTAL SERVICES

Ecological processes and environmental services / Ecological characteristics of Peru-ecosystems / Conceptual bases, terms associated with environmental services / Legal framework, political context and environmental services.

2. CLASSIFICATION OF ENVIRONMENTAL SERVICES

Identification and classification of environmental services / Proposed classification by the Millennium Assessment / Other classification systems for environmental services.

3. ASSOCIATED FACTORS AND IMPORTANCE

Degradation of nature as a factor that jeopardizes the provision of environmental services / The context of climate change and environmental services / REED and REDD + mechanisms in forests.

4. VALUATION OF ENVIRONMENTAL SERVICES

PBI relationship and environmental services / Valuation and methods of environmental services / Payment for environmental services / Assessment studies of ecosystem services in Peru.

5. MAPPING OF ECOSYSTEM SERVICES

Basic aspects of mapping and mapping techniques / Quantification of services / Introduction to the mapping of ecosystem services / Applications of maps of ecosystem services / Case study of mapping of ecosystem services in Peru.

6. PRIORITIZATION AND IMPORTANCE OF ENVIRONMENTAL SERVICES

Conservation measures for environmental services / Analysis of successful cases.

V. LABORATORIES AND PRACTICAL EXPERIENCES

- Practice 1: Structure and function of ecosystems
- Practice 2: REDD + Mechanisms, and Peruvian forests.
- Practice 3: Valuation methods of the water environmental services
- Practice 4: Participatory GIS
- Workshop 1: Classification systems of S.A.
- Workshop 2: Progress on the assigned monographic work.

VI. METHODOLOGY

The course is developed in theory sessions with case studies and workshops. In theory sessions, the professor presents the concepts and theoretical bases. The case studies, show successful project development experiences. In the workshops, various problems are solved and their solution is analyzed, with the help of the SOLVES software. At the end of the course the student must prepare and present their practical work (PW). In all the sessions, the active participation of the student is promoted.

VII. EVALUATION FORMULA

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

- Partial Exam: Weight 1
- Final Exam: Weight 1
- Qualified Practices: Weight 1.

Calculation of the Final Average:

$$FA = \frac{PE + FE + PA}{3}$$

PE: Partial Exam; FE: Final Exam, PA: Practices Average

For the Practices Average the three practices with the highest grades, it must include the practical work:

$$PA = \frac{QP1 + QP2 + Q3 + PW}{4}$$

VIII. BIBLIOGRAPHY

- MINISTERIO DEL AMBIENTE, PERÚ. Guía de valoración económica del patrimonio cultural. 2016.
- LLERENA, Carlos y YALLE, Sara. Los servicios ecosistémicos en el Perú. Xilema Vol. 24. Pp: 62-75. 2014.