



PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ - PUCP
FIELD SCHOOL PROGRAM IN PERU
ECOLOGICAL ENGINEERING IN CUZCO
2015 SEASON

GENERAL INFORMATION

Course:	Ecological Engineering in Cuzco
Location:	Huyro, Huayopata. Cuzco.
Time period:	1month/4 weeks.
Number of hours:	180 hours.
Professor:	Ing Miguel Hadzich Marín
Professor's Assistants:	Ing Enrique Mejía Solís, Ing Wilton Lima

SUMMARY

The course focuses on teaching green technologies that allow people to live comfortably in the farm as well as on production technologies to take advantage of local resources. Green technologies include basic needs such as water, sanitation, lighting, communication, among others, and production technologies comprise concepts ranging from sowing, cultivation and harvesting of certain tropical products (tea, coffee, and cacao) to the use of renewable energy for operating machines used in industrial processing.

The Ecological Engineering course will be taught completely in Granja Ecológica PUCP in Huyro, which is a center for the implementation, spreading and development of sustainable technologies for Peruvian rural residents. The 6.5-hectare land has a high jungle ecosystem characterized by having sunny days throughout the year, a well-defined wet season and diverse flora and fauna; which makes from it an ideal environment to grow a variety of native species such as mango, tea, tubers, loquats, bamboo, cane, Andean fruit, coffee, cacao, banana, among others. The farm is a place of recovery and preservation for some of the species which are disappearing from the area. In addition, it is located only 3 hours away from Machu Picchu archaeological ruins, where you can arrive on foot.

OBJECTIVES

Upon completion of the course, students will be able:

- To apply the theory and practice learned to renewable energies, appropriate technologies, agriculture and permaculture in real situations in order to achieve a sustainable life style.
- To apply the techniques learned in agricultural activities, crop processing, and equipment, machinery, and tool manufacturing.
- To recognize the possibilities offered and study the properties of the local natural resources and environmental conditions.

REQUIREMENTS

The program is open to graduate and undergraduate students without any previous field work experience. Spanish is not required since most activities are conducted in English.

The course is designed for students with different specializations. Faculties have great experience teaching people with diverse background. Consequently, no prior knowledge is required, just the willingness to participate in the course.

METHODOLOGY

The methodology of this course is mostly based on learning from practical experience and daily life at Granja Ecológica PUCP.

The course consists of three modules:

- **Appropriate Technologies:** Technologies based on renewable energies for tea and coffee processing.
- **Renewable Energies:** In order to have a complete sustainable agricultural system, there will be workshops to learn how to transform hydraulic and solar energy into electricity and power for pumping water.
- **Crop Management:** Knowledge and techniques related to cultivation of local plants.

For a better learning experience, these three components will be articulated in such a way that thematic coherence will be reflected in daily activities of the course. The modular themes will not be covered independently but concurrently, and they will be interrelated.

SCHEDULE OF ACTIVITIES

The course will be held twice a year, in June and July:

Week 1

- **Renewable energy:** Solar water heating systems, electrification with solar energy systems (photovoltaic panels). Solar energy concentration and his applications.
- **Management of crops:** Management of organic gardens (crop seedlings, harvesting and maintenance).

Week 2

- Knowledge of tea and its traditional processing: harvest of tea, current firewood tea processing, activities of processes: withering, fermentation, drying, classification, and packing. Everything will take place at the Herbi tea factory.
- Implementation of a solar tea factory: processing of black and green tea in the new plant of linear solar parabolic concentrators, elaboration of different processes to differentiate the quality among them.
- **Management of crops:** Crop seedlings, harvesting and maintenance of tea plants

Week 3

- Knowledge of coffee and traditional processing: harvest of coffee, current processing of solar drying processes activities: pulp removal, drying, and packing.
- Implementation of a traditional coffee processing factory: Coffee processing in Scheffler-type solar concentrator, elaboration of different processes to differentiate the quality among them.
- **Management of crops:** Crop seedlings, harvesting and maintenance of coffee plants. Cacao crop seedlings, harvesting and maintenance

Week 4

- **Renewable energy:** Systems for rural electrification with waterwheels. Rural pumping systems: norias, ram pumps, rope pumps, solar pumps.

- **Management of Crops:** Management of Organic gardens: crop seedlings, harvesting and maintenance.

EVALUATION

Activities in the field 30%

Participation in classes 30%

Performance during the course 40%