PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ

ACADEMIC OFFICE OF INSTITUTIONAL AFFAIRS

PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ - PUCP

FIELD SCHOOL PROGRAM IN PERU

BIODIVERSITY, WATER RESOURCES AND CLIMATE CHANGE IMPACTS IN THE TROPICAL ANDES OF PERU
JULY 2016

GENERAL INFORMATION

Course:	BIODIVERSITY, WATER RESOURCES AND CLIMATE CHANGE IMPACTS IN THE TROPICAL ANDES OF PERU
Location:	Lima – Huaraz
Time period:	12 days
Number of hours:	84 hours
Coordination:	Silvia Rosas
Professors:	Fabian Drenkhan, Martín Timaná

SUMMARY

The course is dedicated to advanced international students of primarily earth, natural and environmental sciences. Classes consist of integrative topics divided into two thematic blocks with focus on biogeography and hydro-glaciology. The program will be held in two different natural regions of Peru in order to provide a holistic view of actual socio-environmental challenges in the Tropical Andes and its western foothills.

The central course objective is to provide students with interdisciplinary theoretical and applied key knowledge and process comprehension of interlinked drivers which determine biodiversity and current impacts of global change in the tropical Andes of Peru.

COURSE OUTCOMES

Upon completion of the course the student will be able to:

- Explain concepts and importance of ecology, biogeography and biodiversity
- Analyze oceanic interactions with coastal and Andean climate linked to prevailing ecosystems
- Comprehend the basics of tropical glaciers and links to water supply in the Andes and Pacific coast of Peru
- Connect interactions between atmosphere, hydrosphere, biosphere and cryosphere in the context of global change and adaptive management challenges in the region
- Apply basic GIS tools for cryosphere change detection in high mountain areas

COURSE REQUIREMENTS

Attendance and Participation

It is expected that students will have 90% of assistance at classes and guided visits and will actively participate in each of the planned activities of the course.

METHODOLOGY

The activities of the field trip program are organized in two components:

a. Lectures

Block I: The Peruvian coast
Explore climatic and ecosystemic features of the Pacific coast and Andean foothills (3 days).
The cold nutrient-rich Peruvian Sea represents one of the most productive marine ecosystems worldwide. Despite its latitudinal position close to the equator, the Peruvian coast represents one of the world's driest deserts due to its special climatic settings. Therefore, species have to cope with high aridity. During austral winter, a special plant community develops at the Pacific Andean foothills, called Lomas formation. These fog oases are supplied by oceanic moisture and drizzle. Specific adaptations, resulting in high endemism, allow species to resist water scarcity and efficiently use the short wet season.

Block II: Tropical glaciers, water resources and related risks
Analyze high mountain areas and their key role for human welfare: tropical glaciers, water resources and Andean livelihoods (7 days).
In the Tropical Andes almost all main rivers originate from glaciers with headwaters above 5000 m a.s.l. With around 500 km^2 glacier area, the Cordillera Blanca (Ancash, Peru) represents the largest tropical glacier mountain range worldwide but has been severely affected by massive ice loss corresponding to ~35% glacier area reduction in the last 40 years. As virtual water towers, glaciers have been a fundamental sustention of Andean and coastal livelihoods for thousands of years of human history. Direct glacier and high Andean lake water discharge constitute a vital continuous water supply for many settlements, agricultural irrigation, hydropower generation and mining use, particularly during the dry season. This natural buffering system of climate's seasonality and variability is likely to deteriorate, triggered by allover retreating glaciers, shifts in climatic patterns but also changes in water allocation. Robust adaptation and integrative water management strategies including stakeholders are challenged by severe impacts from local and global change and resulting conflicts over water resources.

b. Field Trips, city tours and GIS-assisted learning:

The students will acquire expert knowledge in theoretical, practical and computer-assisted practice lessons additionally considering the cultural background of Peru. Applied features of the course are:

- Pre-Colombian Peruvian history: National Museum of Arqueology, Anthropology and History, Pueblo Libre, Lima
- City center tour: go back in time and explore old colonial and republican Lima
- Coastal climate and biodiversity: Lomas de Lachay fog oases at the Pacific Andean foothills
- Tropical Glaciers: trip to Pastoruri (~5200 m a.s.l.), one of the emblematic Cordillera Blanca glaciers and its surroundings (colored lake, Puya raimondii plants, etc.)
- Glacier lakes: Palcacocha lake (4566 m a.s.l.), risk analysis and current monitoring efforts

- Use of Andean water resources: visit of the 263 MW Cañon del Pato hydropower plant
- High mountain risks: visit of the Glacial Lake Outburst Flood - Early Warning System (GLOF-EWS) control center at Carhuaz
- Applied change detection in high mountains: GIS-assisted analysis of glacier and lake changes in the Peruvian Andes

SCHEDULE OF ACTIVITIES

This Field School is scheduled to take place from July 11th to 22th 2016 (12 days)

Date	Topic	Activities
Mon 11	Tour at PUCP university; National Museum of Arqueology, Anthropology and History; City center tour	PUCP and Lima city tour
Tue 12	SESSION 1.a: Basic concepts of ecology an biogeography	Lecturing
	SESSION 1.b: Biodiversity and its importance	
Wed 13	SESSION 1.c: Coastal and Andean ecosystems of Peru	Lecturing
	SESSION 1.d: Current threats and conservation efforts	
Thu 14	Field Trip to "Lomas de Lachay" fog oases (km105, Lima)	Field trip
Fri 15	SESSION 2.a: Physical environment of the Tropical Andes I: Geology, climate and water cycle	Lecturing
	SESSION 2.b: Physical environment of the Tropical Andes II: Glaciers and water resources	
Sat 16	SESSION 2.c: Climate change observations and adaptation in the Peruvian Andes	Lecturing
	SESSION 2.d: GIS tools for high-mountain Geography	
Sun 17	Bus tour to Huaraz, Ancash	Bus tour
Mo 18	Visit of the Cañon del Pato hydroelectric plant and GLOF-EWS control center in Carhuaz	Field Trip
Tue 19	Palcacocha Lake (4566 m a.s.l.): water management, lake security and risk assessment	Field Trip
Wed 20	Pastoruri glacier (~5200 m a.s.l.): glacier retreat and Andean features (e.g. Puya raimondii)	Field Trip
Thu 21	Bus tour to Lima	Bus tour
Fri 22	SESSION 9: Group presentations and course conclusions Closing ceremony	Lecturing

EVALUATION

There will be no exam but an official Certificate of Participation (minimum requirement: 90% of participation in the program).