

# **The International Summer School (AKTRU School) on "Natural and human environment of Arctic and Alpine areas: relief, soils, permafrost, glaciers, biota and life style of native ethnic groups in a rapidly changing climate"**

## **Course Schedule**

July 11: Excursion of Tchuyskij Trakt and transfer to Aktru research station

July 12-18: Lectures, seminars and field trips at Aktru research station

July 19: Return to Gorno-Altai

## **Course Description**

This course is designed for senior undergraduate and graduate MS and PhD students programs such as biology, mineralogy, ecology, environmental science, and sustainable economics. The course will provide students with basic grounding in modern life and earth sciences and sustainable global and regional development. Topics will include renewable energy and socio-economics of isolated regions with extreme climate conditions, climate change, glaciology, permafrost, hydrology, biodiversity and paleontology with specifics available at high elevation alpine region of Aktru research station. This course will be taught by international and Russian experts in these domains. It will alternate approximately 15 lectures, 6 seminars, excursion, 7 field trips and variety of social events including round tables with Russian students, concerts and visit a village of native Altai people.

## **Course Goals**

The aim of this course is to familiarize the students with fundamentals and modern research in the broad domains of life and earth sciences and global sustainability in the pristine environment of and specific examples presented at Altai Mountains to teach them the concepts and methods needed to participate in scientific discussions, analytical thinking and observation skills required at field trips. The student will be acquainted with unique natural regions, learn about natural objects and processes, improve field research skills and develop complementary skills like leadership, group work, and innovative problem-solving that are needed to face the challenges of today's rapidly changing world. The school offers students the most up-to-date scientific background to the environmental challenges and sustainability that will shape our future.

## **Coursework Details**

On July 11 the group of students and instructors will be travelling on Tchuyskij Trakt to the foothills of Aktru Mountains accompanied by the description of the area of an Altai Mountain expert. They will spend a night at the camp next to the Aktru Mountain. On the following morning they will be transferred to the Aktru station on all-wheel-drive ex-military vehicles and climbs through the mountain coniferous forests to the Aktru station that is located at the upper altitudinal tree-line, at about 2200 m above sea level.

Topics of the lectures and field trips:

Hydrology and Glaciology of Mountain Ranges:

- Current state of the Altai glaciers and trends over the period of Instrumental observations since 1952. Climate change and anthropocene.
- Western Siberia: natural conditions, anthropogenic activities and hydrological hazards in the context of climate change
- Circulation currents in the Kuray intermountain depression during catastrophic release of the Kuray palaeo-lake
- Cryogenic processes and landscape formation
- Biogeochemical processes in the inland mountain reservoirs of Western Siberia in the context of climate change

Geobotany, plant ecology, mire science, biodiversity

- History and diversity of Siberian flora and vegetation
- Common, rare and endemic species of Altai flora
- Adaptations to changing environment – from plant organism to landscape
- Mires and peatlands of Siberia in changing environment: biodiversity, ecosystem structure, dynamics, role in a carbon cycle
- Paleoecological reconstructions based on the peatland cores stratigraphy and C14 dating
- Mountain mires in changing climate: past, present.
- Mires research, monitoring and management; ecosystem services

Soil science:

- Specificity of soil formation and spatial differentiation of the soil cover in the Altai Mountains.
- Anthropogenic impact on the soils of the Mountain Altai and their stability.
- Soils Genesis and Degradation.
- Ecosystem feedback.
- Carbon cycle in soils.
- Soils and permafrost.

Biodiversity:

- How biodiversity structures itself.
- How biodiversity is spread on Earth.
- Biodiversity and climate change.
- Arctic and Alpine ecology and biodiversity: Adaptation and evolution to coldness and altitude.
- Ecosystem services, environmental economics and politics.

Methods of geostatistical modeling in planning of the environmental nature-conservative measures and actions:

- Analysis of the hierarchical organization of landscape space, using remote research methods (on the example of the mountain massifs of Western Siberia)
- The geodetic GPS in Altai highlands

Ethnos of high-mountainous and arctic regions (influence of climatic factors, economic development / degradation of territories, tourism and traditional cultural heritage):

- Peculiarities of perception of the environment in the world view of small national groups in the territory of Gorny Altai

- Assessment of natural and climatic conditions of vital activity of the population of the Southern Siberia Mountains (on the example of Gorny Altai)

Regional territorial management\governance:

-Environmental policies. Specially protected natural areas.

- Comparative analysis of Russian and world experience and legislation. Goals and objectives. The Organization.

- Authorities, local people, other players - Interactions.

Field trips: the Aktru Research Station vicinity. Visiting high-altitude landscapes and objects subjected to the catastrophic geomorphological processes of summer 2011 (mudflows, deflated lakes, floods on rivers). Sightseeing trips to mountain-valley glaciers, moraine complexes. Climbing to the plateau Uchitel.

Weekend activities (Special tours on the way to the Station and back) - Visit to the Maral (*Cervus elaphus*) Farm, the Big Tavdin cave. Sightseeing tours along the Chuysky tract – the Russia's only road that is on the top 10 list of the most beautiful roads in the world according to National Geographic. Kalbak-Tash is the largest collection of petroglyphs in Siberia, a collection of about 3000 rock paintings from the Neolithic period (6-4 thousand years BC) to the ancient Turkic era (1000-700 years BC). Cave paintings show the whole life of ancient people, beginning with mythology and ending with everyday domestic problems.

Social exchange sessions with students from host university

Participation in an ethnographic event

### **Costs**

The school costs - \$1500 – will cover all events, food and transportation. Early bird discount price (\$1000) is available until 8<sup>th</sup> February, 2019.