Guide for A Proposal for Prelude Programme

1. **General Information**

**Title** – ”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”.

**Objectives** – Getting acquainted with unique natural regions; learning about natural objects and processes; improving field research skills and developing 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.

Together with several eminent researchers in various fields and from different countries, the young researchers and students explore the major ecoregion of Altai Republic (Russia, South Siberia). Students will get the opportunity to see “the Golden Mountains of Altai” – a UNESCO World Heritage Site – with their own eyes.

The group travels by bus along the Chuisky Trakt that goes through the Altai Republic and is on the list of 10 most beautiful roads of the world according to National Geographic. On the way we will see a wide range of amazing landscapes from mixed deciduous birch and dark-coniferous forests at the foothills and humid low-mountains of the Altai, to the semi-arid steppe and semidesert of the Kuray intermountain depression in the heart of Altai. Then the group boards 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. Within a short walking distance, the group goes up almost at 1000 meter more to be able to access alpine meadows and high-mountain tundra and finally, glaciers and the nival environment. There are few places on Earth where it is possible to go through such diverse environmental space within a short time and with such ease. The young researchers also travel in time: from fascinating lectures and field trips that explain the formation of the landscape following a mega-flood some 25,000 years ago to compelling evidence of climate change in action at a location where a dynamic tree-line is above glacier snouts and glacial retreat has been recorded for about 100 years, and intensively for about 50 years. In the vicinity, there is also an impressive area where a large palska plateau (a peatland with permafrost in the peat deposit) was rapidly degrading into an original landscape complex of the thermokarst lakes and mire while trees were establishing in small thaw depressions.

The scale of the various phenomena is enormous: the expanses of the taiga forest were vast; the palska plateau was an analogue of what Fennoscandian palska plateaus might have looked like at the beginning of the Holocene. The mountains rose from the semi-arid steppes to around 4000 m into a climate regime that supported glacier formation; and the after-effects of the mega-tsunami such as huge silt bars and ‘ripple lines’ on the steppes were of staggering proportions. Furthermore, the diversity of Altai and Aktru ecosystems is impressive. The center of plant species evolution of the Northern Asia and biodiversity hot-spot are situated here as the region is a host to many endemic species, some of which are threatened by extinction.

- Programme dates – about 2 weeks at the beginning of July
- Location – TSU Aktru Research Station (Altai Mountains)
- Programme coordinator – Irina Volkova OR Sergey Kirpotin
- Number of lecturers - 6
- Number of student assistants - 3
- Student volunteers – 5 (probably MA students)
- Station’s staff – 7 (technical staff, service personnel)
- Number of teaching hours: 35 – 40
- Students’ background: environmental disciplines, no restrictions on study years, minimum age is 19
- Class size: Up to 20

2. Accommodation
   - On-campus or off-campus accommodation – Station accommodation (14 nights); tourist camps accommodation (2 nights)
   - Estimated cost of accommodation – 30 USD per night on the Station (including meals); nights and meals on the way – up to 35 USD per day
   - Amenities/ facilities provided at place of accommodation – Visitor’s modules (motel type), shower and Russian sauna at the Station.
   - WiFi/ internet available at the Station, by schedule

3. Topics
   Specific topics in one of the following areas:
   1. Natural Environment and Climate Change
      - Glaciology, Geomorphology, Geocryology
      - Hydrology and Water Resources
      - Ecology of Biosystems
      - Biogeography
      - Mathematical Modeling in Earth Sciences and Environmental Matters
      - Anthropology and ethnoLOGY. Studies of genetic, adaptive and evolutionary processes in human populations. Interdisciplinary research in biological and social anthropology and ethnoLOGY.
   2. Language, Culture and Management
      - Basic Russian language and Russian culture
      - Territory governance

4. Draft Programme Schedule
   - Lectures:
     Plenary Session, Introductions and Reviews (4-5 lectures, at the Organizer’s discretion)
     - International and National Programs for Monitoring the Environment of Arctic and Sub-Arctic Regions (using the example of Circumpolar INTERACT and other international Networks) Dr. Terry V. Callaghan OR Dr. Margareta Johansson (by agreement)
     - Prospects for microbiological research in the Arctic and Alpine regions. OR
     - Interactions and feedbacks between the main parts of the earth system: interdisciplinary approaches (Dr. S. Kirpotin, by agreement)
     - Conjugate modeling of soils and climate conditions
     - Aboriginal cultures in Siberia. Interaction of the population, the state and business in conditions of industrial development of Siberia. (D-r. Irina Popravko,Dr. Ivan Chalakov, Plovdiv University, Bulgaria. By agreement)
Main courses:

**I. Hydrology and Glaciology of Mountain Ranges** (Massifs) (Dr. V.Zemtsov, Dr. A. Rudoy, ass.professor D.Vershinin):

1. Current state of the Altai glaciers and trends over the period of Instrumental observations since 1952. Climate change and anthroposcene.
2. Western Siberia: natural conditions, anthropogenic activities and hydrological hazards in the context of climate change.
3. Circulation currents in the Kuray intermountain depression during catastrophic release of the Kuray palaeo-lake.
5. Biogeochemical processes in the inland mountain reservoirs of Western Siberia in the context of climate change.
6. *The Results of the modeling of the water balance of geo-systems of the mountain-glacial basin of Aktru*
   OR
7. *The needs for observations of small glaciers Formation, regime and hydrological efficiency (South-Eastern Altai)*

**II. Ecology of biosystems**

**Track: Geobotany, plant ecology, mire science, biodiversity** (Experts – ass. Professor Irina Volkova, TSU Wetland Centre, TSU Laboratory of Biodiversity and Ecology, TSU Department of Botany, TSU Bio-Clim-Land Centre):

1. History and diversity of Siberian flora and vegetation.
2. Common, rare and endemic species of Altai flora (*Lessons, Field trip and workshop*).
3. Adaptations to changing environment – from plant organism to landscape.
5. Paleoecological reconstructions based on the peatland cores stratigraphy and C14 dating.
6. Mountain mires in changing climate: past, present, future OR
7. Mountain mires of South Siberia: biological diversity and environmental functions OR
8. Siberian mountain peat mires – filters for natural waters and rare type of wetlands to be protected as internationally important wetlands under Ramsar Convention on Wetlands management and wise use (IMCG, Ramsar Convention, WI, WLI, TSU Wetland Centre, field practices of students incl. Ms Programs in TSU) OR
9. Mires research, monitoring and management; ecosystem services.

**Track: Soil science** (Experts – Stockholm University, by agreement)

1. Specificity of soil formation and spatial differentiation of the soil cover in the Altai Mountains (*Lessons, Field trip and workshop*).
4. Ecosystem feedback.
5. Carbon cycle in soils.

**Track: Biodiversity** (Ass. Professor, PhD, R. Cazzolla Gatti, Dr. A.Babenko, Dr. S. Kirpotin)

1. What is biodiversity. How biodiversity has evolved and is evolving.
2. How biodiversity structures itself.
3. How biodiversity is spread on Earth.
4. Biodiversity and climate change.
5. Arctic and Alpine ecology and biodiversity: Adaptation and evolution to coldness and altitude.
6. Ecosystem services, environmental economics and politics.

III. Mathematical methods and modeling (4 Lectures, Dr. V. Khronykh and others, by agreement)

1. Methods of geostatistical modeling in planning of the environmental nature-conservative measures and actions
2. Analysis of the hierarchical organization of landscape space, using remote research methods (on the example of the mountain massifs of Western Siberia)
3. The geodetic GPS in Altai highlands

IV. Ethnoses of high-mountainous and arctic regions (influence of climatic factors, economic development / degradation of territories, tourism and traditional cultural heritage) (4 Lectures, Russian and International Experts – by agreement)

1. Peculiarities of perception of the environment in the world view of small national groups in the territory of Gorny Altai
2. Assessment of natural and climatic conditions of vital activity of the population of the Southern Siberia Mountains (on the example of Gorny Altai)

V. Basic Russian and introduction to Russian culture (4 Lectures and 2 workshops, Russian teachers – by agreement)

VI. Regional territorial management and governance (2 Lectures. Experts – Dr. Ch. Schuhhoeck, Alliance for Nature; Regional ecological departments, non-government organizations – WWF Russia. By agreement)


- Workshops:
  1. Hydrology of Mountain Ranges (Massifs) (1 Workshop and field trip)
  2. Global changes and environmental dynamics OR Landscape ecology and diversity (1 Workshop and field trip)

- Assessment
- 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 (by agreement)
5. **Course Contents and Learning Outcomes**

- Topics and course contents – will be developed

- Learning outcomes should be clearly defined
  1. Developing the ability to reflect on major approaches of natural sciences, critical understanding of the materials studied through the prism of the new holistic paradigm of synthetic natural science;
  2. Identifying key drivers of environmental changes in the real field conditions;
  3. Development of skills in the use and application of methods of environmental monitoring, ecosystem manipulations, modeling and environmental management;
  4. Enhancing the skills of an effective oral presentation and discussion skills primarily measured by in-class interactive participation and agreed assignments during the summer school. (The skills to employ cutting-edge methods are to be reflected in the final research papers by each participant.)
  5. Demonstrating understating and appreciation of ethical challenges and new values relevant to learning and research in environmental science in the framework of deep ecology concept;
  6. Applying and expanding knowledge of society relevant environmental concepts and methods and utilizing mega-transect and mega-facility concepts as a key trans-regional environmental approaches.

The young researchers and students get access to experts with expertise in geomorphology, hydrology, permafrost, glaciology and ecology. The experts are very approachable and eager to talk with the participants, the atmosphere during the school is very friendly and conducive to joyful interaction. Senior researchers and young scientists leave the Aktru summer school well-informed about topics within and outside their professional fields of interest.
6. **Assessment and Evaluation**

Example:

<table>
<thead>
<tr>
<th>Component</th>
<th>Course Learning Outcomes Tested (Based on information provided in p.5)</th>
<th>Related Programme LO or Graduate Attributes</th>
<th>Weighting</th>
<th>Team/ Individual</th>
<th>Assessment Rubrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Class participation</td>
<td></td>
<td></td>
<td>20%</td>
<td>Individual</td>
<td>Level of engagement and contribution, and subject knowledge.</td>
</tr>
<tr>
<td>2. Quizzes</td>
<td></td>
<td></td>
<td>10%</td>
<td>Individual</td>
<td>Subject knowledge</td>
</tr>
<tr>
<td>3. Field works</td>
<td></td>
<td></td>
<td>30%</td>
<td>Team, led by experts of School</td>
<td>Subject knowledge</td>
</tr>
<tr>
<td>4. Essays</td>
<td></td>
<td></td>
<td>10%</td>
<td>Individual</td>
<td>Subject knowledge</td>
</tr>
<tr>
<td>5. Project / Assignments</td>
<td></td>
<td></td>
<td>30%</td>
<td>Team, led by experts of School</td>
<td>Subject knowledge, content and creativity, background</td>
</tr>
<tr>
<td>6. Final Examination*</td>
<td></td>
<td></td>
<td>30%</td>
<td>Individual</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100%</td>
<td></td>
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</tbody>
</table>

* Optional

7. **Formative Feedback**

Describe how you would be giving feedback to students on how they are learning in this course.
8. Learning and Teaching Approach

Example:

<table>
<thead>
<tr>
<th>Approach</th>
<th>How does this approach support students in achieving the learning outcomes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical</td>
<td>Explicit skill instruction is imparted from lecturer to students during lessons. Students are also required to do their own readings to gain more understanding and knowledge of the subject in discussion.</td>
</tr>
<tr>
<td>Practical</td>
<td>Hands-on learning of the different tools to create and develop innovative products and innovative business models.</td>
</tr>
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9. Readings and References

- Books (Preferably some are published in recent years)
  1. Callaghan T V and H Savela (eds) INTERACT Stories of Arctic Science. INTERACT

- Articles


1. Field trips, Company visits and Weekend Highlights

Visit to places of interest around the Station. OR Traditions and customs of the local population. – small weekend event. By agreement.

2. Programme Cost

Provide breakdown of programme cost. Components may include:

- Transfer to the Station and back – 150 USD (per person) for the group of 20 people and more
- Coach services (if applicable) - 50 USD (per person)
- Accommodation – 450 USD (meals included, per person)
- Field trips/ Excursions/ Weekend trip (if applicable) – 50 USD (per person)

10. Cancellation Clause

In the event of unforeseen circumstances (natural disasters, epidemics etc) and the Prelude programme needs to be postponed or cancelled, the liability due to host university.

11. Other Required Documents
- Lecturers’ Curriculum Vitae
- Course Outlines
## Timeline

### Timeline for Summer Prelude Intake (May to July)

<table>
<thead>
<tr>
<th>Item</th>
<th>Action</th>
<th>Lead Time</th>
</tr>
</thead>
</table>
| Proposal submission | - Programme cost  
- Draft programme schedule  
- Accommodation  
- Information on field trips, company visits and weekend highlights | Host university | By December of 2017 |
| Confirmation of programme and estimated group size | NTU | By December of the previous year |
| Marketing and promotion of programme | NTU | January 2018 |
| Recruitment of participants (Round 1) | NTU | Mid-January to late February 2018 |
| Programme details to be confirmed:  
- Accommodation  
- Programme schedule  
- Information on field trips, and social highlights | Host university | Mid-February 2017 |
| Confirmation of participants’ list (Round 1) | NTU | Mid-March 2018 |
| Recruitment of participants (Round 2) if required | NTU | Mid-March 2018 |
| Confirmation of participants’ list (Round 2) | NTU | Early April 2018 |
| Flight booking details | NTU | Mid-April 2018 |
| Summer Prelude at city of destination | Host university | 2-week period within the summer vacation (May to July, 2018) |