Syllabus for the course Global change in the arctic – practical effects and their evaluation, LADOK-code not assigned yet

Swedish title: Global förändring i Arktis - Praktiska effekter och utvärdering

The course syllabus was confirmed by the Faculty board for graduate studies XX Month 201X. The course is in the third cycle and amounts to 7.5 credits. The course syllabus is formally approved in Swedish. This is a translation.

Learning outcomes
On completion of the course, participants shall be able to:

Knowledge and understanding
- Have a deeper understanding of the manyfold processes leading to changes in the Arctic/High Alpine ecosystems.
- Will be able to predict changes in the future caused by these processes.

Skills and abilities
- Design experiments and measurement campaigns in quantifying changes in the Arctic/High Alpine ecosystems.
- Analyse data from own measurements as well from remote sensing and previous measurements to quantify changes in the Arctic.
- Use current state of the art methods to collect data like for example drones.

Judgement and approach
- Explain why the changes both from a climate as well as from a socioeconomic point of view happen as they happen.
- Compare different sites with different exposures and predict trajectories.
- Summarise the results and generate suggestions for politicians about management decisions (like tourism chanelling).

Course content arctic
1. During a preparation time, the course leaders will have lectures and discussion rounds for the students to introduce into the issues of the course. In this time the students will prepare their project to be conducted on site. The teachers will introduce the students into the necessary techniques, e.g. application of drones, plant and soil survey.
2. During field work in to Svalbard, the course leaders will demonstrate the effects of global change in a high Arctic permafrost environment and how they are evaluated during a number of excursions from Longyearbyen and from the Isfjord radio station, where the Lund geographic department has a research history since 1972.
   o Glacial retreat:
- at Trygghamna we will show arctic primary succession on land area which have been cleared for different durations since the local glacial retreat starting at 1936.

- Vulnerability of the landscape:
  - In a number of day excursions we will demonstrate how both climate change but also tourism has changed the landscape. This will build on the long term research of Jonas Åkerman and will include
    - changes in biodiversity (expansions of species ranges),
    - changes in soil formation (compaction due to tractor use),
    - changes in erosion rates (due to longer time of de-frozen soil),
    - changes in hydrological properties of the landscape
    - changes in the active layer depth and soil development

- Cultural changes: due to the replacement of the mining based economy to a tourism based economy

3. Within a small scale project the participants will record effects of global change in the arctic and evaluate them in small groups (2-3). Here we offer a wide range of opportunities:
   - Evaluating effects of tractor use by evaluating highly resolved 3d models taken in the area using a drone.
   - Evaluating effects on biodiversity
   - Evaluating effects on cultural changes using interviews
   - Evaluating effects on erosion rates
   - Evaluating effects on hydrography
   - Weathering of limestone
   - Evaluating evidence of tourism impact
   - Evaluating impacts on ecosystem climate balance (greenhouse gases, albedo)

While we offer this range of projects we are open to other ideas that will fit to the student’s research theme. Last time students measured atmospheric exchange of vegetation and plant productivity and we are open to all practically feasible small scale projects. The projects have to be developed and the project idea has to be presented in Lund to assure their feasibility in the field.

4. After the trip, the students will continue working on their recorded data and will present their work in an open institute seminar.

Teaching
The course will be based on lectures before the excursion and explanations by the leaders during the excursion. The students will present their project work after the excursion.

Assessment
The assessment will be based on the presentation of the project after the excursion which is a compulsory part of the course.

Grading scale
demonstrate that they designed a suitable experiment or data collection and that they were able to perform a sufficient statistical evaluation of the data and that they drew the correct conclusions.

Language of instruction
English.
Entry requirements
The PhD project should be linked to some aspects of Global changes in the Arctic.

Additional information
This course will be suitable for a wide range of PhD students both from natural sciences as well as social sciences since we are covering many aspects of Global change in the Arctic.