

## **Course description**

**Name of course: Arctic Soils**

**ECTS credits: 5 ECTS**

### **Course parameters:**

*Language:* English

*Level of course:* PhD (we will allow MSc if seats are available)

*Semester:* (Autumn) August 2022 (14-21 August 2022)

*Hours per week:* One week of preparatory reading, 8 days expedition to Greenland, preparation of course report

*Capacity limits:* 6 PhD students

### **Objectives of the course:**

The course provides students with an understanding of the positive impact of climate change for agriculture in subarctic areas. The course will provide a fundamental understanding of the soil and environmental factors which may influence agricultural production in South Greenland.

### **Learning outcomes and competences:**

At the end of the course, the student **should be able to:**

- (i) Explain the importance of soil physico-chemical properties for agricultural production in South Greenland
- (ii) Explain the importance of environmental factors for agricultural production in South Greenland
- (iii) Use the appropriate methodology to quantify soil physico-chemical properties
- (iv) Suggest practical solutions for intensifying agriculture in South Greenland

### **Compulsory programme:**

The rapid climate change, which is taking place in Greenland, has serious repercussions for animal and plant life throughout the country. The rising temperatures can however, offer better conditions for future agricultural production in Greenland because of increased summer temperatures and prolonged growing seasons. Land use, though, is also influenced by many other factors such as soil quality and the increasing lengths of dry periods during vegetation season.

The course focusses on insight understanding of farming conditions in South Greenland. Physical and chemical properties of South Greenlandic soils will be investigated:

- Soil depth
- Soil texture
- Soil organic matter content
- Bulk density

- Soil water retention
- Plant available water
- Soil aeration
- Hydraulic conductivity
- pH
- Micro and macro nutrient content
- Soil water repellency
- Soil microbiology

The students will visit selected farmers and field sites in South Greenland. Lectures, exercises and soil sampling activities will be performed in the field. Also, glacial rock flour deposits will be located and sampled. Large scale field experiments with addition of glacial rock flour will be visited and sampled.

Results from the exercises will, together with results from ongoing experiments on Greenlandic soils, be an integrative part of the final project report.

**Prerequisites:**

Background in Agronomy, civil engineering, geology, environmental science or related technical/natural sciences

**Name of lecturer[s]:**

The teaching will be conducted by experts in the individual research areas:

Lis Wollesen de Jonge – Responsible

Mogens Greve

Bo Vangsø Iversen

Emmanuel Arthur

Peter Weber Jensen

Trine Nørgaard

**Type of course/teaching methods:**

Classroom teaching, field work, hands-on measurements, analytical exercises

**Literature:**

1. Beerling D.J. et al. 2018. Farming with crops and rocks to address global climate, food and soil security. *Nature Plants*. 4:138-147
2. Caviezel, C., M. Hunziker, and N.J. Kuhn. 2017. Bequest of the Norsemen – The potential for agricultural intensification and expansion in Southern Greenland under climate change. *Land*: 87.
3. Hossein, M., W. Chen, and Y. Zhang. 2015. Bulk density of mineral and organic soils in the Canada's arctic and sub-arctic. *Information Processing in Agriculture*. 2: 183-190
4. Jacobsen, N.K. 1987. Studies on soils and potential for soil erosion in the sheep farming area of South Greenland. *Arctic and Alpine Research*. 19: 498-507

5. Jensen, P.W. 2018. Functional properties of Greenlandic soils. Master thesis. MSc Agro-Environmental Management, Aarhus University.

*Other material includes book chapters, notes and review articles, which will be made available upon enrollment*

**Course homepage:** N/A

**Course assessment:**

Participation in Greenland expedition and submitted report

**Provider:**

Dept. of Agroecology  
Aarhus University  
Blichers Allé 20, Postboks 50  
DK-8830 Tjele

**Special comments on this course:**

Course fee: 3000 EURO (covers trip, food, housing, boat trips etc.)

**Time:** August 14-21 2022

**Place:**

South Greenland

**Registration:**

<https://events.au.dk/arcticsoils2022/signup>

Deadline for registration 1 May 2022

**PLEASE NOTE:**

If you are non-EU citizen you will need a visa for Greenland.  
You need a vaccination against rabies