

IMSOGLO

Arctic Soils COURSE DESCRIPTION (2019)

<u>Course information I</u>	
Course name	Arctic Soils
Point(s) (ECTS)	5 ECTS (Study time 140 h, Contact hours 70 h)
Institute	Agroecology
Primary programme	EMJMD in International Master of Science in Soils and Global Change
Forms of instruction	Self-study – 20%; Lecture/Class room instruction – 20% Seminars/Practical – 50% Guidance (coached exercises) – 10%
Qualification description	<p><i>Course Objectives</i></p> <p>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.</p> <p><i>Learning Outcomes/Final Competencies</i></p> <p>At the end of the course the student should be able to:</p> <ol style="list-style-type: none">(i) Explain the importance of soil physical properties for agricultural production in South Greenland(ii) Explain the importance of soil chemical properties for agricultural production in South Greenland(iii) Explain the importance of environmental factors for agricultural production in South Greenland(iv) Use the appropriate methodology to quantify soil physical and chemical properties(v) Suggest practical solutions for intensifying agriculture in South Greenland
Comments on teaching	The course combines self-study, participation in a field trip to South Greenland, collection of soils and data in Greenland, theoretical lectures, soils analysis, project reports.
Prerequisites	It is assumed participants have basic knowledge in soil science, as well as some soil physics and soil chemistry courses
<u>Course information II</u>	
Semester (s)	Autumn. The field trip will be the last week of August followed by lectures in September forward
Language of teaching	English
Hours – weeks – semester (s)	8 days trip to South Greenland (combination of on-site lectures and field work) 2 hours lecture and 4 hours of exercises per week for 8 weeks 10 days for preparation of project report
Course content	The rapid climate change, which is taking place in Greenland, has serious repercussions for animal and plant life throughout the country. The rising

	<p>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.</p> <p>The course focusses on understanding the farming conditions in South Greenland. Physical and chemical properties of South Greenlandic soils will be investigated:</p> <ul style="list-style-type: none"> • Soil depth • Soil texture • Soil organic matter content and quality • Particle density • Bulk density • Soil water retention • Plant available water • Soil aeration • Hydraulic conductivity • Soil structure • pH • CEC • Micro and macro nutrient content • Soil specific surface area • Soil water repellency • Soil microbiology <p>The students will visit selected farmers in South Greenland and participate in field sampling activities. Also glacial rock flour deposits will be located and sampled. Glacial flour forms when glaciers crush underlying rocks and stones to very fine particle sizes of fine sand and silt. The material washes out from under the glacier and is then deposited. The material is available near the cultivated fields in South Greenland. Glacial flour may help to neutralize acidity, improve soil structure, promote microbial activity, and slow down soil depletion. The material may be a ready source of calcium, iron, magnesium, and potassium as well as other trace elements.</p> <p>In the succeeding laboratory investigation students will perform experiments to illustrate the effect of adding glacial flour to Greenlandic soils. The results will be an integrative part of the final project report.</p>
<p>Teacher</p>	<p>The teaching will be conducted by experts in the individual areas: Lis Wollesen de Jonge – Responsible Mogens Greve Bo Vangsø Iversen Emmanuel Arthur Peter Weber Jensen Trine Nørgaard</p>
<p>Literature</p>	<p>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</p>

	<p>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. <i>Land</i>: 87.</p> <p>3. Hossein, M., W. Chen, and Y. Zhang. 2015. Bulk density of mineral and organic soils in the Canada's arctic and sub-arctic. <i>Information Processing in Agriculture</i>. 2: 183-190</p> <p>4. Jacobsen, N.K. 1987. Studies on soils and potential for soil erosion in the sheep farming area of South Greenland. <i>Arctic and Alpine Research</i>. 19: 498-507</p> <p>5. Jensen, P.W. 2018. Functional properties of Greenlandic soils. Master thesis. MSc Agro-Environmental Management, Aarhus University.</p> <p><i>Other material includes book chapters, notes and review articles.</i></p>
Maximum enrolment	7
Location	Campus Aarhus, AU Foulum, South Greenland

Assessment (form of examination)	
Grading	Internal co-examination
Assessment	7-point grading scale
Notes	Examination will be based on the submitted reports.
Prerequisites for examination participation	Participation in field trip to Greenland, approved participation in practical exercises and submitted project report
<u>Exam</u>	
Examination type	Written report
Name	Xxxx
Exam time	
Preparation time	2 weeks
Aid	All