

Course plan

<i>Course Title:</i>	Soil Degradation, Erosion and Restoration
<i>ECTS:</i>	4
<i>Objectives:</i>	To give students state-of-the-art comprehensive knowledge of soil erosion and ecosystem degradation processes and general principles of ecosystem restoration of degraded lands.
<i>Pre-required knowledge:</i>	B.Sc. – M.Sc. level education in natural sciences (biology, geosciences, agricultural sciences, natural resources, environmental sciences or equivalent).
<i>Examination elements:</i>	<ul style="list-style-type: none">• Graded individual problem solving projects (some in groups) and reporting within main themes during course (40%)• Reports about main elements of two main field trips (20%)• Open book take home examination in home country (40%)
<i>Pre-campus assignment: (incl. deadline)</i>	Selection of papers sent to students. No deadline.
<i>Post-campus assignment: (incl. deadline)</i>	Open book examination, 2 week deadline.
<i>Pedagogical approach:</i>	Lectures, field excursions and field projects, short student presentations, independent student and group projects (returned and graded during course).
	<p>The teaching method of SoilSoc courses is problem based. By taking students to Iceland we will give them a chance to learn about erosion in an erosion active environment and how to fight it in an authentic manner.</p>
<i>Scientific content:</i>	Introduction <p>Land degradation and restoration of severe degraded lands is among the most severe problem facing human kind. Soil erosion a widespread problem in Europe and is in fact greater in the Nordic countries than many realize, but is, by far, most severe in Iceland. The Nordic countries allocate substantial resources for soil erosion research and measures and for development aid related to the problem of soil erosion and desertification remedies.</p> <p>The aim of this course is to give students a comprehensive understanding of soil erosion, land degradation, and the scientific knowledge on means to stop erosion and restore degraded lands. The course is designed for students of environmental, natural, agricultural and related sciences. It is also quite suitable for Nordic students interested in working in the developing countries. The course will also have a Nordic dimension by discussing the role of cryoturbation and geomorphology in soil erosion processes and address open lands and range lands, in addition to cultivated land.</p> <p>Erosion processes in Iceland are extremely active and is considered among the most pressing environmental problems in the country.</p>

Course plan

Land degradation takes on many forms which makes the location ideal for environmental study of this kind. Iceland has the oldest operating soil conservation agency in the world (Landgræðsla ríkisins -SCSI), with a history full of lessons about ecosystem restoration that can be applied on other parts of the world. Research in the area of soil erosion and ecological restoration is well established with scientists with a broad range of background and practical experience. Scientific endeavors include practical use of research in formulating methods and to survey and solve soil erosion problems (A LbhÍ-SCSI project group led by prof. O. Arnalds received the Nordic Nature and Environment Prize in 1998 for such project). In Iceland, the science of restoration ecology is brought into practical use for planning and carrying out small and large scale restoration projects.

The US scientific background of many of the Icelandic teachers adds new dimension to the Nordic scope of this science.

The course includes extensive field trips using Iceland as a natural laboratory with nature experiences.

Course topics include:

Soil erosion. Processes (wind, water, gravity, cryic processes and geomorphology), identification and mapping of erosion. Erosion research methods and tools (wind and water).

Land degradation. Degradation processes, ecosystem functions and losses; grazing and land degradation. Includes both soil and broader ecological and socio-economical aspects of land degradation in the world. Land degradation, desertification, the global community and UN-environmental conventions. Different methods for evaluation land condition and soil erosion, which include the use of satellite photography and more conventional methods, and land classification.

Ecological restoration. Basic principles of restoration ecology. The “restoration toolbox” and approaches to mitigating soil erosion and restoration of severely degraded land. Research and practice of ecological restoration research of severely degraded land. Richly underpinned by examples of halting severe soil erosion and restoration projects in the field in Iceland.

Other topics covered (directly or in relation to other topics):

Carbon sequestration and land restoration. Synergies (relationships) between UN-global environmental conventions (Climate Change, Biodiversity, Sustainable Development, Desertification etc). Land degradation and development aid. Geomorphology field study. Volcanism in Iceland. The unique volcanic soils of Iceland. Geomorphology of cold areas.

Learning Outcomes: Thorough understanding of erosion and degradation processes and skills to begin establish independent soil erosion research. Comprehensive understanding of the many methods

Course plan

to assess land condition and erosion processes and approach and adopt existing methods for other natural conditions in the geographic area of professional work of the student. A broad understanding of degradation process in the world, their effect, ecological consequences, international research and institutional surroundings, including the EU and the UN.

State-of-the-art working knowledge of ecological restoration theory and skills to adapt this knowledge to various different conditions. Understanding of how grazing affects ecosystems and contributes to degradation, and of good grazing practices. Understanding of how ecosystem degradation, restoration, and global environmental threats and goals are interlinked.

Other information: The course was offered in 2008 with 23 participants. Student scores were particularly high, including those on suitability and scientific content. It is clear that this course offers important addition to topics in relation to soil science and ecosystem management, enriching the students knowledgebase.
