Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

SLUkurs

Syllabus

PNS0082 Catchment science to support public policy: Defining the consequences of human impact and management, 7.0 credits

Syllabus approved

2011-04-12

Subjects

Environmental Assesment/Environmental Communication

Education cycle

Third cycle

Grading scale

Pass / Failed
The requirements for attaining different grades are described in the course assessment criteria which are contained in a supplement to the course syllabus. Current information on assessment criteria shall be made available at the start of the course.

Language

English

Prior knowledge

This is a course for PhD students in soil and water with a basic knowledge of hydrology, water and soil chemistry, and ecology. The scientific approach will be multidisciplinary, with treatment of basic principles of chemistry, ecology, hydrology, and soil science. Although a strong grounding in environmental science will be helpful for students enrolled in this course, advanced discipline-specific knowledge of the different scientific disciplines will not be required.

Objective, including learning outcomes

Students from aquatic sciences and soil sciences will obtain an understanding of the interactions among atmospheric and land-based pollutants, soils, vegetation, and drainage water chemistry and biology within a catchment perspective. Students will be introduced to the principles of watershed science through a variety of interactive seminars and field studies and will explore the ways in which environmental science can be used to guide public policy and resource management decision making. There will be a major focus on the principles and tools of scientific assessment and how data and scientific understanding can be used to guide public policy. At the end of the course, the student will be able to:

- Understand the basic methods and uncertainties involved with collecting catchment-based data
- Understand the value of catchment-based information for answering policy questions and decision making.
- Use the catchment perspective to resolve issues related to environmental pressures such as eutrophication and acidification.
- Appreciate the strengths and weaknesses of different approaches to catchment science, including characterization, monitoring, modeling, space-for-time substitution analysis, and integration.
- Regionalize site-specific findings to the broader landscape.
- Formulate specific research questions and use them to design a study approach and interpret study results.

Content

The course will provide an overview of watershed science, interactions and linkages between environmental compartments (atmosphere, hydrosphere, lithosphere) and human-caused pollutants, and linkages and feedbacks between environmental science and public policy. It will explore how watershed science can be used to assess environmental problems and to improve natural resource management and decision making. Some of the major themes to be addressed by students via reading, discussion, lectures, field research, and reporting (oral and written) will include the following:

1. How watersheds function
2. Mechanisms of effects of atmospheric and land-based pollutants
3. Types of watershed studies
4. How to link research questions with field and analytical approaches
5. Tools for bridging the gap between science and policy (i.e., beneficial uses, best management practices, critical loads, ecosystem services)
6. Stressors of widespread concern to watershed health (acidifying compounds,

toxics, heat, nutrients, erosional materials, fecal bacteria, channel and flow modification)
7. Pollutant sources (atmospheric emissions, urban sources, agricultural sources, energy and industrial sources)
8. Principles of watershed restoration
9. Sampling and data analysis tools
10. Watershed assessment techniques

The instructors will set out questions to guide independent study, and help to provide students with tools needed to explore those questions in detail. Relationships among human activities and inherent ecosystem sensitivity will be explored so that human impacts of pollutants can be considered in light of natural variability and complicating factors such as climate and disturbance. Particular emphasis will be placed on the ways in which catchment science can be used to support natural resource management and environmental decision making. Instructors and students will explore the use of process-based mathematical techniques, critical load and ecosystem service paradigms, best management practices, and regionalization of findings to make science/policy connections.
Course Structure
Students will read background materials independently before the formal meetings occur. Formal meetings will occur five days per week and will involve one week of seminars (remote connection available over the web) at SLU (Ultuna) and one week of a combination of seminars and fieldwork at the Erken field station (Norrtälje). Most lectures will be given by Dr. Sullivan; some will be given by Dr. Bishop. Gunilla Lindström from the Uppsala county board will also come to discuss the implications of the EU water framework directive for ecological management. Discussions will be co-facilitated by Drs. Sullivan and Bishop. At the end of each meeting during the first week in Ultuna, students will each present a short (5-10 minute) summary of a journal article or case study related to one of the topics under study. After each student presentation, the material summarized will be discussed by all students and instructors.

Requirements for examination

PhD students who wish to be awarded university credits are required to participate in both scheduled seminars and the intensive field week (3 ECTS). A final group presentation will be required as well. All participants are required to read the course literature before the seminar week begins (1 ECTS). In addition, students can choose to do an individual project after the intensive portion of the course, including an oral presentation and written report (3 ECTS). The final optional

project report will be due no later than October 21, 2011. Students are required to deliver their report in time to receive the additional credits.

Additional information

The deadline for application to participate in this course is 1 July 2011. You may apply to attend the course by sending an email to Brian Huser (brian.huser@slu.se). Your application should provide information about your affiliation, the topic of your PhD study, and whether you belong to FoSW or not. The number of participants is limited to 25 people. Students who apply prior to 1 June 2011 will be given first priority.

Responsible department

Department of Aquatic Sciences and Assessment