LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Hydrologi och akvatisk ekologi
Hydrology and Aquatic Ecology

VVRA01, 15 credits, G1 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED W
Date of Decision: 2023-03-27

General Information

Main field: Technology.
Compulsory for: W1
Language of instruction: The course will be given in English

Aim

- The objective of the course is to display connection between hydrological and ecological processes as influenced by humans.
- The students should after the course have a basic knowledge in solving water environmental problems using hydrology and aquatic ecology.
- The students should also have an insight in to the relationships between biological and physical processes in water-based ecosystems.
- Special emphasis is given to ability to work and communicate in groups and a critical viewpoint.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to explain and use basic concepts such as water balances, runoff, soil and groundwater, and physical and chemical characteristics for surface water systems
- be able to describe photo synthesis and basic nutrient turnover for organisms in surface water and how water and nutrients/pollutants are transported in the environment

Competences and skills
For a passing grade the student must

- be able to solve a typical water environmental problem by using hydrology and aquatic ecology
- communicate the solution of the above problem orally and in a written report for different stake holder groups

Judgement and approach
For a passing grade the student must

- be able to critically evaluate solutions for typical water environmental problems from a scientific and societal viewpoint
- evaluate solutions for typical water environmental problems from an ethical and a sustainable viewpoint

Contents

- *Water resources:* Human needs, technical systems for water management, human influence, catchment area.
- *Water cycle; The hydrological system, water balance, precipitation, evaporation, infiltration,* groundwater, runoff.
- *Stream water and lakes:* Flow reduction, introduction to thermodynamics and flow processes, mixing, residence times, stratification of water mass, substance transport, oxygen conditions, sedimentation, basic channel flow.
- *Basic ecological concepts*: General basic concepts such as evolution, genetics and ecosystem technology. Nutrient-rich and nutrient-poor lakes, the interaction between different trophic levels (such as phytoplankton, zooplankton and fish), eutrophication, the connection between sediment and water mass for the exchange of nutrients, littoral and pelagic food chains, coastal vegetation.
- *Nutrient cycling;* The cycle of carbon, nitrogen and phosphorus, connection between nutrients and phytoplankton, zooplankton and fish, availability of nutrients during different times.
- *Human impact;* Impact from urban areas, agriculture and forestry, lakes and rivers as recipients, diffuse source impact, treatment technology, measures in running water and lakes.
- *Presentation technique* consists of lectures, a project report on hydrology and aquatic ecology, and oral presentation.

The teaching provides theoretical background as well as practical application in a selected catchment areas in southern Sweden where field exercises are carried out. With this as a background and example, the students work in groups on a project assignment. In addition, traditional lectures and exercises are held.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Examination is done both individually and in group. Part 1 is graded by the compulsory written exam at the end of period 1. Part 2 is graded partly by a group based project work. The weighted total grade (3, 4, or 5) is based on the examination and project work. To pass the course, passed written test, passed written and oral presentations from excursions, and passed written and oral presentation of project work are required. The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

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Parts

Code: 0117. **Name:** Part 1.
Credits: 7,5. **Grading scale:** TH. **Assessment:** Written examination and oral and written presentation of field work. **Contents:** Water circulation, human influence, and ecology. **Further information:** Examination at the end of period 1.

Code: 0217. **Name:** Part 2.
Credits: 7,5. **Grading scale:** TH. **Assessment:** Written and oral presentation of project work. **Contents:** See central information **Further information:** Oral and written presentation of project work at the end of period 2.

Admission

Assumed prior knowledge: Knowledge in mathematics, physics, chemistry, and biology corresponding to college level.
The number of participants is limited to: No
Selection: See general information on LTH home page.
The course overlaps following course/s: VVR111

Reading list

- Christer Brönmark och Lars-Anders Hansson: The Biology of Lakes and Ponds. Oxford University Press, 2018, ISBN: 978-0-19-871360-9. DOI 10.1093/oso/9780198713593.001.0001 web page: https://global.oup.com/academic/product/the-biology-of-lakes-and-ponds-9780198713609?cc=se&lang=en&.
- Berndtsson, R. et al: Hydrology for Environmental Engineers. Lund University, Water Resources Engineering, 2023. Digital version available for free on course page, printed version available for purchase at Division of Water Resources Engineering, Lund University.
- Berndtsson, R. et al.: Riseberga Restoration Project. Lund University, Water Resources Engineering, 2023. Digital version available for free on course page, printed version available for purchase at Division of Water Resources Engineering, Lund University.

Contact and other information

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Course coordinator: Mikael Ekvall, mikael.ekvall@biol.lu.se
Course homepage: http://www.tvrl.lth.se/utbildning/
Further information: The course is a cooperation between the Division of Water Resources Engineering and the Department of Ecology.