LUND UNIVERSITY

LTH
FACULTY OF ENGINEERING

Course syllabus

Tillämpad vattenkemi
Applied Aquatic Chemistry

KOOF01, 5 credits, G2 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED B/K
Date of Decision: 2023-04-18

General Information

Main field: Technology.
Compulsory for: W2
Language of instruction: The course will be given in English

Aim

Many professional engineers in ecosystem working on water resource management, water treatment, land issues and the exercise of authority where water issues play a major role. Not least, chemical, biological and ecological issues are constantly in focus. The ability to combine knowledge of water chemistry in natural systems with extensive expertise in technology and ecology allows the engineer ecosystem unique. The wide labour market in the private and public sectors also places great demands on the ability to communicate effectively in English with employees, customers and the public.

The course shall give relevant knowledge about chemical processes in fresh water and models for understanding the interplay between humans and environment as well as ability to carry out numerical water chemistry calculations. The course shall also give ability to evaluate environmental problems in accordance with a scientific view in all society.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- Have good knowledge about pH and buffer systems and be able to see the connections to natural systems

- Be familiar with the fundamental concepts of aquatic chemistry: ANC, alkalinity, DOC, solubility and rexoxprocesses
- Be familiar with the thermodynamic relation to electrochemistry and its applications in water chemistry
- Interpret and plan for problems and questions in accordance with the water chemical model

Competences and skills
For a passing grade the student must

- Be able to plan and perform calculations with aquatic chemistry using MATLAB
- Be able to write electrochemical cells and analyse the reactions for electrochemical processes with special applications in aquatic chemistry e.g. potential/Eh - diagrams
- Be able to report results from water chemistry laboratory work in a correct and clear manner.

Judgement and approach
For a passing grade the student must

- Be able to present and interpret calculations in a logical and relevant way
- Have the skill to present results of projects that have been carried out during the course and discuss these with teachers and fellow students

Contents

The course treats central chemical processes such as acid/base reactions, gas/water exchange reactions, buffering systems, titration strategies, solid phase/liquid reactions, redox processes and redox buffering. A methodology for computational water chemistry is developed during the course. Emphasis is put on the students' ability to interpret water chemistry processes, systems and calculations and to solve authentic water chemistry assignments. A core pedagogic element is that the students should support each other's learning by an active a reflective approach in groups. The laboratory work is mandatory and offers an opportunity for the students to get a personal experience of the processes treated theoretically, and to get insight in how chemical analysis may be handled professionally. Problem solving and communication thus play important roles throughout the course.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Quantitative and qualitative assessment of a submitted workbook consisting of solutions with aquatic water chemistry problems with theory, methods, calculations, results and interpretations. The qualitative assessment is based on correctness, completeness, complexity and creativity. Laboratory and laboratory reports carried out individually and in groups.

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.

Parts
Code: 0109. **Name:** Laboratory Work.
Credits: 1. **Grading scale:** UG. **Assessment:** Passed laboratory assignments. **Contents:** Laboratory work in aquatic chemistry. Projects for deeper insight in atmospheric chemistry.
Code: 0209. **Name:** Aquatic Chemistry.
Credits: 4. **Grading scale:** TH. **Assessment:** Continous examination in Aquatic Chemistry part. **Contents:** Continous examination in Aquatic Chemistry part.

Admission

Assumed prior knowledge: KASA01 Fundamental Chemistry and FAFA70 Energy and Environmental Physics.
The number of participants is limited to: No
The course overlaps following course/s: KOO090

Reading list

- Atkins, P, Jones, L, Laverman, L., Young K., Patterson J.: Chemical Principles – The quest for insight, 8:e uppl. WH Freeman , 2023, ISBN: 9781319498498.
- Warfvinge, P: Course book in aquatic chemistry. (The course book is updated every year.).

Contact and other information

Course coordinator: Dr. Johan Reimer, johan.reimer@chem.lu.se
Course coordinator: Dr. Per Falås, per.falas@chemeng.lth.se
Course homepage: http://www.kilu.lu.se/cas/education/undergraduate-education/ekosystemteknik/
Further information: Attendance mandatory on first lecture.