FAE3003 Project Course in Groundwater Chemistry 15.0 credits

Projektkurs i grundvattenkemi

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

The applicant must have the required prerequisites stipulated in the program curriculum for the doctoral studies in Land and Water Resources Engineering.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This course is intended to increase the knowledge and competence of doctoral students working with groundwater quality and resource management at various academic institutions. After the successful completion of the course the students should be able to:

- Identify and explain the basic principles and parameters that govern the chemistry of groundwaters
- Identify and describe the geochemical processes in the groundwater environment
- Carry out field investigations and collect groundwater samples for laboratory analyses
- Interpret groundwater data generated from field and laboratory investigations
- Use salient aspects of hydrogeochemical modeling to decipher the various hydrogeochemical processes
- Identify the hydrogeochemical processes leading to different problems of groundwater contamination with an emphasis on arsenic in different part of the world
- Apply the overall knowledge to the investigation on contaminated groundwater environments and development of methods for remediation.

Course contents

The broad themes would be:

- Groundwater - geochemical system
- Controls on the chemistry of natural waters
- Redox processes
- Biogeochemical controls and terminal electron accepting processes (TEAPs)
- Groundwater quality and interpretations of hydrogeochemical data from literature sources
- Geochemical modeling of natural and contaminated groundwater systems
- Groundwater contamination and related geochemical processes
- Groundwater modelling in contaminated land and water systems.

Course literature

The reading material for the course include the following books:

1. C.A.J. Appelo & D. Postma. Geochemistry, Groundwater and Pollution. A.A. Balkema Publishers, Leiden, The Netherlands. 2nd Ed. 2005 (ISBN 04 1536 428 0)

2. B.J. Merkel, B. Planer-Friedrich & D.K. Nordstrom. Groundwater Geochemistry: A Practical Guide to Modeling of Natural and Contaminated Aquatic Systems. Springer-Verlag, 2008 (ISBN 978-3-540-74667-6).

3. D. Langmuir. Aqueous Environmental Geochemistry. Prentice Hall, 1997 (ISBN 0-02-367412-1)

Additional reading materials:

4. R. Naidu, E. Smith, G. Owens, P. Bhattacharya & P. Nadebaum. Managing Arsenic in the Environment: From soil to human health. CSIRO Publishing, Australia 2006 (ISBN: 0643068686)

5. P. Bhattacharya, A.B. Mukherjee, J. Bundschuh, R. Zevenhoven & R. Loeppert (eds.) Arsenic in Soil and Groundwater Environment: Biogeochemical Interactions, Health Impacts and Remediation. Elsevier Science, BV, Netherlands (In the Elsevier Series "Trace Elements")

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The assessment of the course will be based on the summative evaluation of the students based on the overall nature of the theme of the final examination essay (around 6000 words or 10 pages). The student may choose one or several topics of the cousrse plan and write a well structured examinations essay that should reflect a thorough understanding of the concepts that have been covered during the course.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.