GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2022-2023

Groundwater Chemistry (C002655)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 150 h** **Contact hrs** 50.0 h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	English	Gent	practicum	30.0 h
			lecture	20.0 h
B (semester 1)	English	Gent	lecture	20.0 h
			practicum	30.0 h

Lecturers in academic year 2022-2023

Walraevens, Kristine	WE13	lecturer-in-charge

Offered in the following programmes in 2022-2023	**crdts**	**offering**
Master of Science in Teaching in Science and Technology (main subject Geology)	6	A
Master of Science in Sustainable Land Management (main subject Land and Groundwater Management)	5	B
Master of Science in Geology	6	A
Master of Science in Geology	6	A
Exchange programme in Geology (master's level)	6	A

Teaching languages

English

Keywords

Natural groundwater composition, groundwater pollution

Position of the course

The course builds on the course of Hydrogeology (3rd bachelor geology). It intends to provide the students with an insight in the main processes that determine groundwater composition, with examples from Flanders

Contents

Contents
- Hydrogeochemical processes

The groundwater quality determining factors:
1. Composition and mixing ratio of end members
2. Mass transport processes
   Advection
   Hydrodynamic dispersion
3. Chemical reactions
   Equilibrium reactions or kinetic description?
   Chemical equilibrium in groundwater
   Kinetic reactions

Discussion of important chemical reactions
Inorganic reactions in the unsaturated zone
Organic reactions in the unsaturated zone
Inorganic reactions in the saturated zone

- Natural isotopes in groundwater
- Groundwater quality evolution in the semi-confined aquifers in Flanders
- Groundwater quality in the phreatic aquifers in Flanders
- Groundwater contamination
- Hydrogeochemical models

Groundwater sampling, analysis and quality norms

Initial competences

To have an insight in the basic concepts and models of geology.
To have followed successfully the course of Hydrogeology or to have obtained the related final competences otherwise.

Final competences

1 The students will have an insight into the factors determining groundwater quality.
2 The students are able to evaluate groundwater analyses.
3 The students are able to make independent interpretations concerning groundwater quality.
4 The students are able to apply the precautionary principle.
5 The students are able to communicate about groundwater chemistry.
6 The students are able to relate groundwater chemistry with societal needs and concerns.
7 The students are able to deal independently with groundwater quality issues in a professional context.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, practicum

Extra information on the teaching methods

The course includes 20 hours of teaching and 30 hours of practicals.
Part of the teaching activities may be organized online.

Learning materials and price

Course notes are available Cost: 10 EUR

References

DOMENICO & SCHWARTZ (1990). Physical and Chemical Hydrogeology. John Wiley & Sons (ISBN 0-471-52987-7)
APPELO & POSTMA (2005). Geochemistry, groundwater and pollution. 2nd edition. Balkema (ISBN 04-1536-428-0)

Course content-related study coaching

During the lectures, tips for studying are given. The practicals include an intensive interaction with the tutor, in which ample opportunity is provided for questioning and discussion on the subject. The teacher is available for additional discussion after appointment.

Evaluation methods

end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, oral examination

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

The examination intends to test whether the student has acquired an insight into the factors

determining groundwater quality, and is able to evaluate and to interpret a groundwater chemical analysis.

Calculation of the examination mark

Periodic evaluation= 100% (Theory and exercises)