

Course Specifications

Valid as from the academic year 2018-2019

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

Credits	4.0	Study time	105 h	Contact hrs	35.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	fieldwork	5.0 h
		lecture	15.0 h
		practicum	15.0 h

Lecturers in academic year 2018-2019

Hermans, Thomas	WE13	lecturer-in-charge
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Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Geology	4	A
Preparatory Course Master of Science in Geology	4	A

Teaching languages

English

Keywords

Groundwater - groundwater flow - groundwater quality - transport processes

Position of the course

In this course, the students will learn the basic knowledge required for the understanding of the origin, the behaviour and the fate of groundwater. We will discuss the importance of groundwater in terms of quantity and quality, as well as the anthropogenic influence on groundwater. We will develop the necessary tools for an integrated understanding of groundwater.

Contents

- Introduction (use of groundwater, hydrological cycle)
- Occurrence of groundwater (rock properties, distribution of groundwater, aquifers and aquitards, saturated and unsaturated zone, groundwater in Flanders)
- Groundwater flow (hydrostatic, Darcy's law, hydraulic conductivity, storage coefficient)
- Monitoring wells, pumping and slug tests
- Groundwater quality (major and minor elements, ionic balance, isotopes, diagrams)
- Transport of solute and non-aqueous phase liquid
- Introduction to groundwater models

Initial competences

Elements of geology
Basic knowledge of mathematical concepts (derivatives, integrals)

Final competences

- 1 The students have knowledge in the occurrence of groundwater in the subsurface.
- 2 The students have insights in the components of the groundwater balance.
- 3 The students understand groundwater flow and have insight in the hydraulic parameters involved.
- 4 The students have knowledge of the effects caused by groundwater pumping.
- 5 The students have notions of groundwater quality.
- 6 The students understand the way solute species and pollutants are transported in groundwater.

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, fieldwork

Extra information on the teaching methods

During the lectures, the theoretical concepts related to the course will be taught with examples. Students are encouraged to actively participate through short assignments. During practicals, exercises related to the concepts studied during the lectures will be given. The students solve those exercises by themselves under the supervision of an assistant.

During fieldwork, the theoretical concepts are applied in real field conditions: measurement of hydraulic heads, slug tests and pumping tests. The acquired data are later processed and interpreted during the practicals.

Learning materials and price

Slides of the theoretical lessons (Minerva)

Syllabus with theory (Dutch)

Estimated costs (5 €)

References

DOMENICO & SCHWARTZ (1990). Physical and Chemical Hydrogeology. John Wiley & Sons (ISBN 0-471-52987-7)

Schwartz F.W., Zhang H. 2002. Fundamentals of Ground Water, Wiley.

Fetter C.W. 2001. Applied Hydrogeology (4th edition), Prentice Hall.

Course content-related study coaching

Possibility to raise questions during the lectures and practicals

Possibility to contact the lecturer and the assistant by e-mail and make an appointment

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, assignment

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

Written examination, 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

During the semester, 3 exercises related to the practical lessons will be given and a small report describing the solution proposed by the student is expected at the end of the period. This is part of the continuous assessment.

The written exam will be composed of three types of questions: questions directly related to the theory, open questions related to the concepts seen in the lessons but requiring clear reasoning, exercises similar to the ones made during practicals.

For the second exam session, an oral examination will follow the written examination during which we will go through the answers and give the student the opportunity to remedy any discrepancies in his/her answer or to arrive at a more accurate assessment by asking specially adapted supplementary questions.

Calculation of the examination mark

A combination of continuous assessment (assignment, i.e. 10% of the final mark) and end-of-term assessment (written exam, i.e. 90% of the final mark) for the first examination period.

For the second examination period, 100 % of the final mark is based on the examination.