WATER QUALITY PROTECTION

Hydrogeology Engineer MSc mesterszak

2018/19 II. félév
Semester 2018/19/2

COURSE COMMUNICATION FOLDER

Miskolci Egyetem
Műszaki Földtudományi Kar
Környezetgazdálkodási Intézet

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1. Course introduction, teacher, number of lessons, credits

Course Title: Water quality protection **Instructor:** Dr. Péter Szűcs, full professor	**Code:** MFKHT720023 **Responsible department/institute:** Institute of Environmental Management Type of course: Compulsory
Position in curriculum (which semester): 2	**Pre-requisites (if any): -**
No. of contact hours per week (lecture + seminar): 1+1	**Type of Assessment (examination/ practical mark / other):** exam
Credits: 3	**Course:** full time

Course Description:

The students will be familiar with the basic concepts, tasks and purposes of water quality protection. The students will also learn about the contamination transport processes in surface water as well as in groundwater. The students will be prepared to assess and solve different water quality and contamination problems. The students will learn about the different tasks given by the European Water Framework in order to achieve the good status of water resources.

The short curriculum of the subject:

Water as an environmental agent. General tasks and objectives of water quality protection. Water chemistry. Qualification of water samples. Transport processes in water. Vulnerability methods concerning groundwater resources. Remediation methods in case of different contaminations. Water quality models. Current quality status of national water resources. Water quality balance calculations. Natural water purification methods. Practical work: self-made solutions of simple case-study problems.

Compatencies to evolve:

Knowledge: T1, T2, T4, T6, T7, T8

Ability: K1, K2, K3, K6, K9, K10, K11, K12, K13, K14, K15

Attitude: A1, A2, A3, A4, A5, A6, A7, A8, A9

Autonomy and responsibility: F1, F2, F3, F4, F5, F6

Assessment and grading:

Students will be assessed with using the following elements.

Attendance:	15 %
Short quizzes	10 %
Midterm exam	40 %
Final exam	35 %
Total	100%

Grading scale:

% value	Grade
90 -100%	5 (excellent)
80 – 89%	4 (good)
70 - 79%	3 (satisfactory)
60 - 69%	2 (pass)
0 - 59%	1 (failed)

Compulsory or recommended literature resources:

- Liu David, Lipták Béla: Groundwater and Surface Water Pollution. Lewis Publishers, 2000, ISBN 1-56670-511-8, pp. 1-150.
- Merkel Broder, Planer-Friedrich Britta: Groundwater Geochemistry. Springer, 2005, ISBN 3-540-24195-7, pp. 1-200.
- David M. Nielsen, Gillian L. Nielsen: The Essential Handbook of Ground-Water Sampling. CRC Press, 2006, ISBN 1-4200-4278-5, pp 1-300.
- Foulliac A. M., Grath J., Ward R.: Groundwater monitoring (Water quality measurements), 2009
- Page G. W.: Planning for groundwater protection, Orlando Academic press, 1987

2. TANTÁRGYTEMATIKA

Water Quality Protection.
Tantárgytematika (ÜTEMTERV)
Spring semester
Hydrogeologist Engineer MSc, Semester II., Compulsory course

Week	Date	Topic
1.	13. Feb	Groundwater chemistry and quality. The most important facts. Self-purification processes in water. Drinking water regulation.
2.	20. Feb	Groundwater and Global Change. Groundwater quality and protection – case-study.
3.	27. Feb	Transport and heat transport modeling. Geothermal case-studies
4.	6. Mar	Relationship between the water quality (C) and the river discharge (Q). Please define the two possible river models. Streeter and Phelps equations. Regulation the water quality along a river with the help of purification.
5.	13. Mar	Groundwater quality improvement program. Case-study
6.	20. Mar	Chemical composition of geothermal fluids.
7.	27. Mar	Water sampling, isotopes in groundwater. Karst hydrogeology, quality aspects.
8.	3. Apr	River basin management plans in Europe, Drinking water in Hungary
9.	10. Apr	*Holiday by the Dean's decision – Profession's Day*
10.	17. Apr	*Holiday by the Dean's decision – Miner Sports Day*
11.	24. Apr	Determination method of macroelements (Ca, Mg, Na, K) and microelements (Fe, Mn etc.).
12.	1. May	*National Holiday*
13.	8. May	Determination methods of main anions (bicarbonate, chloride, sulphate).
14.	15. May	Field investigations, electrochemical measurements along the Hejő river (pH, Eh (ORP), EC, TDS, DO). Plotting of chemical composition.

3. Exam questions

Exam questions 2018 – Water quality protection

1. Please define the water quality. What is the main objective of water quality protection? What kind of self-purification processes can exist in healthy surface water?
2. Please describe the advection, dispersion and diffusion process in groundwater. Please compare the Fick law to the Darcy law. What does the Peclet number express?
3. What are the units of the concentration, the molarity and molality? Please describe the contamination attributes. What kind of geophysical methods can be used for contamination plume delineation?
4. Groundwater and global change. Please describe the key problem issues on global scale related to groundwater resources.
5. Please describe the main objectives of river basin management and river basin management plans. Please describe the idea of the Groundwater Directive. Drinking water regulation in Europe.
6. The main properties of geothermal fluids. The geothermal potential of the Carpathian Basin.
7. Please describe the key issues and relations of groundwater sampling. Major groundwater sampling site types.
8. Karst water quality? The process of karstification? The types of tracers? Please describe the main idea if vulnerability mapping.
9. Drinking water in Hungary. Challenges in drinking water quality. Quality requirements. Problems related to water treatment and water distribution. Water safety planning.
10. Determination method of macro elements (Ca, Mg, Na, K) and micro elements (Fe, Mn etc.).
11. Determination methods of main anions (bicarbonate, chloride, sulfate).
12. Field investigations, electrochemical measurements (pH, Eh (ORP), EC, TDS, DO).
13. Plotting of chemical compositions.
14. Relationship between the water quality (C) and the river discharge (Q). Please define the two possible river models.
15. Please give the Streeter and Phelps equations. How can you regulate the water quality along a river with the help of purification?
16. What is the main objective of a drinking water quality improvement program? Please give some case-study examples concerning situations and solutions.