

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Hidrogeologija onesnaževal
Course title:	Contaminant Hydrogeology

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Geologija, druga stopnja, magistrski	Aplikativna geologija (modul)	1. letnik, 2. letnik	Zimski

Univerzitetna koda predmeta/University course code:

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
30	15	30	0	0	75	5

Nosilec predmeta/Lecturer:

Vrsta predmeta/Course type:

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Zaključena dodiplomska (prva) stopnja.
Opravljeni izpiti Matematika 1, Matematika 2 in Fizika iz obsega 1. stopenjskega študija geologije.

Prerequisites:

Bachelor degree.
Completed exams in Mathematics 1, Mathematics 2, and Physics included in the curriculum of BcS in Geology.

Vsebina:

Predavanja:
Kemija podzemne vode – interakcija vode in kamnin
Vrste onesnaževal v podzemni vode
Masni transport v nasičenem medzrnskem poroznem mediju
Širjenje onesnaževal v razpoklinskih in kraško razpoklinskih sistemih
Transformacija, zadrževanje in sprememba onesnaževal v vodonosnikih
Masni transport v nenasičenem poroznem mediju
Večfazni tok onesnaževal v vodonosnikih
Anorganska onesnaževala podzemne vode
Organska onesnaževala podzemne vode
Monitoring podzemne vode in monitoring tal
Vaje:
Seminarske vaje (računske vaje iz masnega transporta v poroznem mediju)
Laboratorijske vaje (uporaba matematičnih modelov za modeliranje masnega transporta v poroznem mediju).

Content (Syllabus outline):

Lectures:
Chemistry of groundwater – water rock interaction
Contaminants of groundwater
Mass transport in saturated intergranular porous media
Distribution of pollutants in fissured and karstic systems
Transformation, retardation and decay of contaminants in aquifers
Mass transport in unsaturated porous media
Multi-phase flow in aquifers
Inorganic contaminants of groundwater
Organic contaminants of groundwater
Groundwater and soil monitoring
Exercises:
Seminar exercises (mathematical exercises in the mass transport in groundwater)
Laboratory exercises (application of mathematical models in modelling mass transport in porous media).

Temeljna literatura in viri/Readings:

Posamezna poglavja iz / Chapters from:
FETTER, C.W., 1999: Contaminant Hydrogeology. PRENTICE HALL.
BEAR, J. & VERUJIT, A., 1987: Modelling Groundwater Flow And Pollution. D. REIDEL PUBLISHING COMPANY.

KEHEW, A. E., 2001: Applied Chemical Hydrogeology. PRENTICE HALL.
 LANGMUIR, D., 1997: Aqueous Environmental Geochemistry. PRENTICE HALL.
 DOMENICO, P.A. & SCHWARTZ, F.W., 1990: Physical And Chemical Hydrogeology. WILEY.
 SCHWARTZ, F.W. & ZHANG, H., Fundamentals Of Ground Water. WILEY.
 BATU, V., 2006: Applied Flow And Solute Transport Modeling In Aquifers : Fundamental Principles And Analytical And Numerical Methods. WILEY.

Cilji in kompetence:

CILJI: Poglobiti razumevanje širjenja onesnaževal v podzemni vodi in vodonosnikih. Razumevanje konceptov masnega toka v različnih poroznih medijih v geološkem okolju. Podati teoretične osnove masnega transporta v različnih vodonosnikih in poroznih medijih z namenom uporabe znanj pri praktičnih primerih izkoriščanja podzemne vode za oskrbo prebivalstva s pitno vodo in zaščite vodnih virov.
 KOMPETENCE: Sposobnost analize in simulacije širjenja onesnaževal v različnih vodonosnikih.

Objectives and competences:

OBJECTIVES: To deepen understanding of the spread of contaminants in groundwater and aquifers. Understanding the concepts of mass flow in various porous media in a geological environment. To introduce the theoretical basis of mass transport in various aquifers and porous media with the purpose of using knowledge in practical cases of exploitation of groundwater for supplying drinking water to the population and protection of water resources.
 COMPETENCES: Ability to analyze and simulate the spread of contaminants in different aquifers.

Predvideni študijski rezultati:

Pridobljeno poglobljeno znanje iz masnega transporta v geološkem poroznem mediju. Pridobljene osnove poznavanja kemizma podzemne vode. Razumevanje procesov masnega toka v poroznem mediju. Osvojene računske spretnosti za modeliranje masnega toka v poroznem mediju. Dobro razumevanje procesov onesnaževanja podzemne vode in možnosti modeliranja so dobra osnova za izvajanje zaščitnih podzemnih virov pitne vode.

Intended learning outcomes:

The acquired in-depth knowledge of mass transport in geological porous media. Acquiring bases of knowledge of groundwater chemistry. Understanding the processes of mass flow in a porous medium. Credible skills for modeling the mass flow in the porous medium. A good understanding of groundwater pollution processes and modeling options is a good basis for the implementation of the protection of underground sources of drinking water.

Metode poučevanja in učenja:

Predavanja, laboratorijske vaje, seminar.

Learning and teaching methods:

Lectures, laboratory practices, seminar.

Načini ocenjevanja:

Načini ocenjevanja:	Delež/Weight	Assessment:
snov predavanj	70,00 %	knowledge from the lectures
snov vaj	30,00 %	knowledge from exercises
Ocene: 6-10 (pozitivno;) ob upoštevanju Statuta UL in fakultetnih pravil.		Marks: 6-10 (positive) according to the UL Statute and faculty rules.

Reference nosilca/Lecturer's references:

BRENČIČ, Mihael, DAWSON, Andrew, FOLKESON, Lennart, FRANÇOIS, Denis, LEITNER, O, Teresa E. Pollution mitigation. V: DAWSON, Andrew (ur.). Water in road structures : movement, drainage & effects, (Geotechnical, geological, and earthquake engineering). Dordrecht [etc.]: Springer, 2008, str. 283-297.
 BRENČIČ, Mihael. Prečkanja cest preko vodovarstvenih območij = Crossing of drinking water resources protection zones by roads. Geologija., 2004, knj. 47, 2, str. 273-281.
 BRENČIČ, Mihael, VIDMAR, Saška. Razlitja nevarnih snovi in njihov vpliv na podzemno vodo = Toxic fluid spills and their effects on groundwater. Ujma (Ljublj.), 2002, št. 16, str. 167-172.