

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	GEOKEMIJA OKOLJA
<b>COURSE TITLE:</b>	GEOCHEMISTRY OF THE ENVIRONMENT

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Varstvo okolja in ekotehnologije, 1. stopnja	Modul: Raba in varstvo tal	2. in 3.	/
Environmental Protection and Eco-technologies, 1 <sup>st</sup> level	Module: Use and protection of soil	2 <sup>nd</sup> and 3 <sup>rd</sup>	/

**Vrsta predmeta / Course type** Modularni predmet / Modular subject

**Univerzitetna koda predmeta / University course code:** GEO

Predavanja Lectures	Seminar Seminar	Sem. Vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
20	/	15	10	/	70	4

**Nosilec predmeta / Lecturer:** izr. prof. dr. Borut Vrščaj / Borut Vrščaj, Ph.D., Associate Prof.

**Jeziki / Predavanja / Lectures:** Slovenski / Slovenian  
**Languages: Vaje / Tutorial:** Slovenski / Slovenian

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

Pogojev ni.

**Prerequisites:**

No formal prerequisites.

**Vsebina:**

- Zemlja kot endogen sistem snovi in eksogen sistem energije.
- Planetarni način dojetanja naravnih pojavov in okoljevarstvenih problemov.
- Mehanizmi geokemije in njihova interdisciplinarna povezava.
- Globalni in lokalni pomena hidrogeokemičnega cikla.
- Geokemični cikli snovi.
- Predstavitev konkretnih geokemičnih problemov in ovrednotenje njihovega pomena.
- Interpretacija geokemičnih podatkov za oceno obremenjenosti okolja in tveganja za zdravje.
- Povezovanje geokemičnih raziskav z drugimi okoljskimi raziskavami in izsledki.
- Seminarska naloga z namenom samostojnega raziskovanja konkretnega okoljskega geokemičnega problema in iskanja ustrezne literature, kontaktov in metod za rešitev problema.

**Content (Syllabus outline):**

- Earth as an endogenous system of substances and an exogenous energy system.
- Global perceiving natural phenomena and environmental problems.
- Mechanisms of geochemistry and their interdisciplinary connection.
- The global and local importance of the hydrogeological cycle.
- Geochemical cycles of the substance.
- Presentation of concrete geochemical problems and evaluation of their importance.
- Interpretation of geochemical data to assess the environmental burden and health risks.
- The collaborative learning method links geochemical research with other environmental research and findings.
- Seminar work with the purpose of independent research of a concrete environmental problem

**Temeljni literatura in viri / Textbooks:**

- Geochemistry, William M.White, Wiley-Blackwell, 2013;
- Principles of Environmental Geochemistry, G. Nelson Eby, Waveland Press Inc., 2016.
- actual articles and books

**Cilji in kompetence:**

- Poznavanje in razumevanje planeta Zemlje kot endogenega sistema snovi in eksogenega sistema energije.
- Razvili planetarni način dojemanja naravnih pojavov in okoljevarstvenih problemov.
- Razumevanje mehanizmov geokemije in njigova interdisciplinarna povezava.
- Razumevanje globalnega in lokalnega pomena hidrogeološkega cikla.
- Na osnovi pridobljenega znanja pridobili sposobnost reševanja konkretnih okoljevarstvenih problemov.
- Sposobnost ocene tveganja konkretnega okoljevarstvenega problema v interdisciplinarni in globalnem smislu.
- Sposobnost zbiranja in interpretacije ustreznih podatkov za oceno geokemične obremenjenosti okolja.
- Sposobnost povezave geokemičnih raziskav z drugimi okoljskimi raziskavami in izsledki.
- Sposobnost samostojnega raziskovanja geokemičnega problema in iskanja ustrezne literature, kontaktov in metod za rešitev problema.

**Objectives and competences:**

- Knowledge and understanding of the planet Earth as an endogenous system of matter and an exogenous energy system.
- Develop a planetary way of perceiving natural phenomena and environmental problems.
- Understanding mechanisms of geochemistry and their interdisciplinary connection.
- Understanding the global and local importance of the hydrogeological cycle.
- Based on the acquired knowledge, they have acquired the ability to solve specific environmental problems.
- Ability to assess the risks of a specific environmental problem in interdisciplinary and global .
- Ability to collect and interpret relevant data for assessing the geochemical environmental burden.
- Ability to link geochemical research with other environmental research and findings.
- Ability to independently explore the geochemical problem and find suitable literature, contacts and methods for solving the problem.

**Predvideni študijski rezultati:**

Študentje predmeta bodo:

- Razumeli temelje geologije.
- Razumeli področje geokemije okolja in njegovo povezavo z drugimi vedami.
- Razumeli geokemično kroženje snovi.
- Razumeli faktorje in procese, ki vplivajo na usodo in prenos onesnažil v različnih sferah okolja.
- Razvijali veščine uporabe geokemičnega znanja na praktičnih okoljevarstvenih problemih.

**Intended learning outcomes:**

Students will:

- Understood the basic of geology.
- Understand the field of geochemistry and its connection with other disciplines.
- Understand the geochemical circulation of matter.
- Understand the factors and processes that affect the fate and transfer of pollutants in different spheres of the environment.
- Develop skills in using geochemical knowledge on practical environmental issues.

**Metode poučevanja in učenja:****Oblike dela:**

- predavanja
- laboratorijske in terenske vaje
- samostojno delo študentov/tk

**Metode dela:**

- razlaga
- dialog, diskusija
- preučevanje praktičnih primerov
- aktivno skupinsko delo

**Learning and teaching methods:****Forms of teaching:**

- In-class lectures
- Laboratory and field work
- Individual work of students

**Teaching methods:**

- Explanation
- Discussion, debate
- Practical demonstration
- Teamwork

- terensko and practical delo
- priprava, predstavitev in zagovor seminarske naloge

- Field and practical work
- Involvement of experts in the specific fields preparation, presentation of a seminar paper

<b>Načini ocenjevanja:</b>	<b>Delež (v %) / Weight (in %)</b>	<b>Assessment:</b>
<ul style="list-style-type: none"> <li>- kolokvij iz praktičnih vaj</li> <li>- pisni izpit</li> <li>- seminarske naloge</li> </ul> <p>Na vajah je obvezna vsaj 90-odstotna prisotnost. Študent mora izdelati seminar in kolokvij, potem lahko pristopi h končnemu pisnemu izpitu</p> <p>Ocenjevalna lestvica:</p> <ul style="list-style-type: none"> <li>▪ zadostno 6: 60–67 %</li> <li>▪ dobro 7: 68–75 %</li> <li>▪ prav dobro 8: 76–83 %</li> <li>▪ prav dobro 9: 84–90 %</li> <li>▪ odlično 10: 91–100 %</li> </ul>	<p><b>20</b></p> <p><b>60</b></p> <p><b>20</b></p>	<ul style="list-style-type: none"> <li>- colloquium of practical work</li> <li>- written exam</li> <li>- seminar work</li> </ul> <p>At least 90% attendance at lab work is required. Students must first pass colloquium of practical work, presented seminar work, which is a prerequisite for final written examination.</p> <p>Grading scale:</p> <ul style="list-style-type: none"> <li>▪ Sufficient D (6): 60–67%</li> <li>▪ Good C (7): 68–75%</li> <li>▪ Very good B (8): 76–83%</li> <li>▪ Very good B+ (9): 84–90%</li> <li>▪ Excellent A (10): 91–100%</li> </ul>

**Materialni pogoji za izvedbo predmeta :**

- predavalnica z multimedijско opremo

**Material conditions for subject realization:**

- classroom with the multimedia equipment

**Obveznosti študentov:**

- Obvezna udeležba na predavanjih
- Seminarska naloga

**Student's commitments:**

- Mandatory attendance at lectures
- Seminar work

**Reference nosilca predmeta:**

**STROKOVNE IZKUSNJE**

- 2004 zaposlena v Javni agenciji za tehnološki razvoj Republike Slovenije kot vršilka dolžnosti direktorice z namenom ustanovitve agencije, 2005 je postala generalna direktorica in zapustila funkcijo v letu 2007.
- 2007 - 2008 zasebna raziskovalka na področju okolja.

**ZNANSTVENE IZKUSNJE**

- 1990-1994 gostujoča raziskovalka na Institutu Jožef Stefan v Ljubljani, Oddelek za jedrsko kemijo, z uporabo metode INAA na osnovi k0 za določanje elementov v sledovih v vzorcih vode in tal.
- Leta 1998 gostujoča študentka doktorskega študija in Inštitutu za geokemijo okolja na Univerzi v Heidelbergu, ki jo je podprta DAAD, na področju hidrogeokemičnega modeliranja v nenasičenih tleh.
- 2002-2003 je gostujoča podoktorska raziskovalka na Univerzi v Tokiu na Japonskem, podprta s strani JSPS, na področju geokemičnih raziskav kamnin, raziskav izotopov žlahtnih plinov meteoritov.

**Lecturer's references:**

**PROFESSIONAL EXPERIENCES**

- 2004 employed at Public Agency for Technology Development of the Republic of Slovenia as acting director with the aim to establish the agency, 2005 became director general and left the position in 2007.
- 2007 – 2008 privat researcher in the field of environmental.

**SCIENTIFIC EXPERIENCES**

- 1990-1994 visiting researcher, working at the Institute "Jozef Stefan" Ljubljana, Department of Nuclear Chemistry, using the k0 - based method of INAA for determination of trace elements in water and soil samples.
- In 1998 visiting Ph. D. student in Institute for environmental geochemistry at University of Heidelberg, supported by DAAD, in the field of hydro-geochemical modelling in unsaturated soils.
- 2002-2003 visiting postdoctoral student in Tokyo University, Japan, supported by JSPS, in the field of geochemical investigation of rock materials, noble-gas isotopes investigation of meteorites.