

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Geologija rudišč
Course title:	Ore Deposit Geology

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Geologija, prva stopnja, univerzitetni	Ni členitve (študijski program)	3. letnik	

Univerzitetna koda predmeta/University course code: 964

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
30	15	30	0	15	90	6

Nosilec predmeta/Lecturer: Matej Dolenc

Vrsta predmeta/Course type: Izbirni / Elective

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

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

Vpisan izbirni predmet ter opravljeni izpiti iz Mineralogije, Petrologije magmatskih in metamorfnih kamnin, Sedimentne petrologije in Mineralnih surovin za pristop k izpitu.

Prerequisites:

Inscription to the Course, and passed exams of Mineralogy, Igneous and metamorphic petrology, Sedimentary petrology and Mineral materials to take an exam.

Vsebina:

Razvoj teorije nastanka rudišč
Značilnosti rudonosnih magem in rudonosnih raztopin
Proces izločanja rudnih mineralov in nastanka rudišč
Identifikacija pogojev ob nastanku rudišč:
geotermometrija, geobarometrija in izotopske analize
Povezava med strukturo in teksturo rudnih mineralov, njihovim nastankom in značilnostmi rude, ki vplivajo na optimalni način njihove predelave
Povezava med zgodovino rudarjenja
Osnovne metode bogatenja rud in pomen mineraloških analiz za njihovo optimizacijo
Morfologija rudnih teles in razvoj ustreznih odkopnih metod - anatomija rudnika
Mineralna sestava rud in najustreznejše metode predelave rudnih mineralov v kovine
Odlaganje rudnih jalovin
Kisle rudniške vode
Sodobne metode rudarjenja z varovanjem okolja

Content (Syllabus outline):

Development of ore deposits genetic studies
Characteristics of ore-bearing magmas and ore-bearing fluids
Proces of ore minerals and ores deposition and ore bodies formation
Identification of ore formation conditions:
geotermometry, geobarometry and isotope studies
Links between ore mineral texture and structure, their genetic environment, and ore type characteristics which influence on their optimal beneficiation
Basics of ore beneficiation methods and importance of mineralogical analyses for their optimisation
Ore bodies morphology and development of appropriate mining methods – mine anatomy
Ore mineral composition and most appropriate methods of transforming ore minerals to metals
Ore beneficiation tailings disposal
Acid Water Mine Drainage
Modern mining methods with environment protection

Temeljna literatura in viri/Readings:

GUILBERT J.M. & PARK C.F., 1986: The geology of ore deposits. Waveland press, inc., 985 p.
SPITZ K. & TRUDINGER J., 2009: Mining and the Environment from ore to metal. CRC Press, Taylor & Francis Group,

Cilji in kompetence:

CILJI: Slušatelj osvoji znanja o nastanku rudišč in o uporabi raziskovalnih metod, ki omogočajo identifikacijo pogojev njihovega nastanka. S prepoznavanjem rudnih struktur in tekstur ter ustrezno mineraloško analizo sestave osvojijo poznavanje lastnosti kovinskih mineralnih surovin, ki so pomembne za optimizacijo njihovega pridobivanja, predelave in lastnosti končnih produktov (rudnih koncentratov in jalovine) ter njihovega morebitnega vpliva na okolje.

Slušatelji osnovijo osnove znanja o metodah odkopavanja in bogatenja rude ter o predelavi v kovine ali druge materiale. Poseben poudarek je na osvajanju znanja za prepoznavanje in izogibanje možnih vplivov odkopavanja in predelave na okolje.

KOMPETENCE: Slušatelj je sposoben povezati znanja iz predmetov "Mineralogija, Petrologija, Geokemija, Mikroskopija rud in Mineralne surovine in jih uporabiti za projekte raziskovanja, pridobivanja in predelave v kovine in druge materiala iz mineralnih surovin.

Objectives and competences:

OBJECTIVES: Students learn about the origin and the possible use of analytical methods for identification of ore forming conditions. Students learn about appropriate ore structure, texture and mineralogical analyses which enable recognition of metal ore characteristics which are important for optimization of their exploitation and beneficiation, and final products characteristics (ore concentrates and tailings), and their possible environmental impact. Students learn fundamental methods of ore exploitation, beneficiation, and transformation into metals and other materials. Special focus will be given to learn about in time recognition and avoiding of possible mining and beneficiation processes environmental impacts.

COMPETENCES: The student is able to link knowledge from previous subjects: "Mineralogy, Petrology, Geochemistry, Ore Microscopy, and Mineral Resources and use it for projects of exploration, exploitation and beneficiation and transforming into metal from mineral deposits.

Predvideni študijski rezultati:

Slušatelj razume in prepozna rude in okolje njihovega nastanka, kakor tudi tiste njihove značilnosti, ki vplivajo na metode njihovega raziskovanja, odkopavanja in predelave do končnega izdelka, obenem pa tudi možne neugodne vplive teh postopkov na življenjsko okolje, da bi jih lahko preventivno onemogočili. Slušatelj pozna in razume verigo lastnosti rud in potrebnih analiz rud, rudišč ter osnovnih metod raziskovanja, odkopavanja, bogatenja ter predelave vse do končnih produktov ter njihovih možnih vplivov na okolje, ki jih je potrebno minimalizirati z definiranjem ustreznih rešitev. Slušatelj mora biti sposoben prepoznati problem in predložiti osnovne metode za njegovo rešitev. Slušatelj ima osnovne izkušnje in je sposoben uporabiti osnovna znanja in metode ter poiskati dodatne v literaturi, ki so nujno potrebna kot predlog za konkretno projektno delo pri raziskovanju, pridobivanju in predelavi mineralnih surovin. Slušatelj je sposoben uporabiti lastnosti rud in rudišč za izdelavo projektnih nalog za njihovo raziskovanje, pridobivanje - eksploatacijo, bogatenje ter vse do končne metalurške predelave in ekološko sprejemljivost navedenih postopkov. Pri delu je slušatelj sposoben sodelovati s strokovnjaki iz področij pridobivanja in predelave mineralnih surovin (rudarji in geotehnologi in metalurgi ter materialisti in okoljskimi specialisti), uporabljati domačo in tujo strokovno in znanstveno literaturo.

Intended learning outcomes:

The student understands and recognizes ores and environment of their formation as well as their characteristics, which influence the methods of their exploration, exploitation, beneficiation and transformation into the final product, and their potential unfavourable impacts onto the living environment, to be able to preventively avoid it. The student is able to understand and explain the chain of characteristics and the necessary analytical methods of ores, ore deposits, fundamental methods of mining and beneficiation and metallurgical processes till the final products, and their potential impact onto the environment, which need to be minimalised with the proposal of appropriate techniques. Students must be able to find/define and be able to propose appropriate initial solutions. The student has basic experiences and is able to use fundamental knowledge and also to be able to find additional one into the literature, on the base of which can propose appropriate methods for exploration, mining, and processing of mineral resources. He is able to use ore and ore deposit characteristics for definition of the project design starting parameters for their exploration, exploitation – mining, beneficiation till the final metallurgical processing, and environmental suitability of all used procedures. The student is able to work with professionals from other fields of ore resources (miners, geotechnologists, metallurgists and material scientists and environmental specialists), and he/she is able to use domestic and foreign professional and scientific literature.

Metode poučevanja in učenja:**Learning and teaching methods:**

Predavanja Laboratorijske vaje 2 dni terenskega dela PowerPoint predstavitve V okviru predavanj študentje izdelajo seminarsko nalogo, ki jo javno predstavijo.	Lectures Laboratory work 2 days of field work PowerPoint Presentations Within the lectures students will prepare and present a seminar work.
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Načini ocenjevanja:	Delež/Weight	Assessment:
Pisni izpit	55,00 %	Written exam
Praktično delo in/ali oddane domače naloge	30,00 %	Practicum and/or homeworks
Predstavitve seminarske naloge	5,00 %	Presentation of seminar
Terenska poročila	5,00 %	Field reports
Aktivno sodelovanje pri predmetu	5,00 %	Active participation in Course

Reference nosilca/Lecturer's references:

VRHOVNIK, Petra, ROGAN ŠMUC, Nastja, DOLENEC, Tadej, SERAFIMOVSKI, Todor, DOLENEC, Matej. An evaluation of trace metal distribution and environmental risk in sediments from the Lake Kalimanci (FYR Macedonia). *Environmental earth sciences*, 2012.

VRHOVNIK, Petra, ROGAN ŠMUC, Nastja, DOLENEC, Tadej, SERAFIMOVSKI, Todor, TASEV, Goran, DOLENEC, Matej. Geochemical investigation of Sasa tailings dam material and its influence on the Lake Kalimanci surficial sediments (Republic of Macedonia) - preliminary study : Geokemične raziskave jalovinskega materiala rudišča Sasa ter njegov vpliv na sedimente Kameniškega jezera (Republika Makedonija) - preliminarna študija. *Geologija*, 2011, vol. 54, no. 2, str. 169-176.

ROGAN ŠMUC, Nastja, DOLENEC, Tadej, SERAFIMOVSKI, Todor, TASEV, Goran, DOLENEC, Matej. Distribution and mobility of heavy metals in paddy soils of the Kočani Field in Macedonia. *Environmental earth sciences*, 2010, vol. 61, no. 5, str. 899-907.