

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	GEOSTATISTIKA IN NUMERIČNO MODELIRANJE GEOLOŠKIH PROCESOV
Course title:	GEOSTATISTICS AND NUMERICAL MODELLING OF GEOLOGICAL PROCESSES

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Vede o Zemlji in okolju, magistrski študij 2. stopnje	Paleobiologija in sedimentarna geologija		
Earth and environmental sciences, Master study 2nd level	Palaeobiology and Sedimentary geology		

Vrsta predmeta / Course type

Izbirni/ Elective

Univerzitetna koda predmeta / University course code:

MIP03

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30		40			80	6

Nosilec predmeta / Lecturer:

Franci Gabrovšek

Jeziki /

Predavanja/ Lectures:

Slovenščina, angleščina/Slovene, English

Languages:

Vaje / Tutorial:

Slovenščina, angleščina/Slovene, English

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

Končan študijski program 1. stopnje ali dodiplomski študijski program za pridobitev univerzitetne izobrazbe, sprejet pred 11. 6. 2004 s področja naravoslovja.

Prerequisites:

First-cycle Bologna degree or a university degree in the natural sciences.

Vsebina:

- Statistične metode v geoloških znanostih
- Multivariatne metode
- Analiza podatkov v paleontologiji
 - Morfometrija
 - Filogenetske analize
- Analiza časovnih vrst
- Kvantitativna biostratigrafija
- Modeliranje geomorfoloških sistemov
- Numerično modeliranje sedimentarnih sistemov

Content (Syllabus outline):

- Statistical methods in geological sciences
- Multivariate Methods
- Analysis of the data in paleontology
 - Morphometry
 - Phylogenetic analysis
- Time Series Analysis
- Quantitative biostratigraphy
- Modelling of geomorphological systems
- Numerical modeling of sedimentary systems

<ul style="list-style-type: none"> ● Deterministični in stohastični stratigrafski modeli 	<ul style="list-style-type: none"> ● Deterministic and stochastic stratigraphic models
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Temeljni literatura in viri / Readings:

Izbrana poglavja iz knjig in članki/Selected chapters from books and papers

- McKillup S, Darby Dyar M (2010) *Geostatistics Explained. An Introductory Guide for Earth Scientists*. Cambridge University Press.
- Guex J, Galster F, Hammer Ø (2016) *Discrete Biochronological Time Scales*. Springer
- Paola C (2000) Quantitative models of sedimentary basin filling. *Sedimentology* **47**: 121-178.
- Burgess PM, Wright VP (2003) Numerical forward modeling of carbonate platform dynamics: An evaluation of complexity and completeness in carbonate strata. *Journal of Sedimentary Research* **73**: 637-652
- Hammer Ø, Harper DAT (2008) *Paleontological Data Analysis*. Wiley/Blackwell.

Cilji in kompetence:

Namen predmeta je študentu prikazati možnosti, prednosti in posebnosti uporabe statističnih analiz in numeričnega modeliranja na področjih paleontologije, stratigrafije sedimentologije ter geomorfologije in procesov na zemeljskem površju. Slušatelj se nauči pravilnega zajema podatkov, njihove matematične obdelave in interpretacije rezultatov. Sposoben je uporabiti različne računalniške programe oz. sam napisati preprostejše programe oz. makroje. Sposoben je razumeti in uporabiti literaturo, ki temelji na geostatistiki in numeričnem modeliranju.

Objectives and competences:

The purpose of the course is to demonstrate the possibilities, advantages and particularities of statistical analysis and numerical modeling in the fields of paleontology, sedimentology, stratigraphy and geomorphology/Earth surface processes. Student will learn the proper sampling procedures, mathematical processing of numerical data and interpretation of results. He is able to use various computer programs and himself write simpler programs or macros. He is able to understand and utilize the literature, based on geostatistics and numerical modeling.

Predvideni študijski rezultati:

Znanje in razumevanje:
Študent se zaveda pomena pridobivanja numeričnih podatkov. Zna izbrati, meriti in uporabiti ustrezne spremenljivke glede na zadani raziskovalni problem. Sposoben je izbrati in izvesti ustrezne statistične oz. numerične analize z razpoložljivimi računalniškimi programi. Rezultate izvedenih analiz zna uporabiti za interpretacijo geoloških in bioloških procesov. Pozna sodobne dosežke uporabe geostatistike in numeričnih metod na področjih geologije.

Intended learning outcomes:

Knowledge and understanding:
The student is aware of the importance of acquiring numerical data. He is able to select, measure and use the appropriate variables in relation to the stated research problem. He is able to select and implement appropriate statistical or numerical analysis with computer programs. He can use the results of the analyzes to interpret the geological and biological processes. He is familiar with up to date achievements in the use of geostatistics and numerical methods in the fields of geology.

Metode poučevanja in učenja:

- Predavanja
- Praktične vaje

Learning and teaching methods:

- Lectures
- Practical training

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
- Pisni ali ustni izpit	70	- Written or oral exam
- Naloge	30	- Coursework

Reference nosilca / Lecturer's references:

1. Blatnik, M., Culver, D. C., Gabrovšek, F., Knez, M., Kogovšek, B., Kogovšek, J., Liu, H., Mayaud, C., Mihevc, A., Mulec, J., Aljančič, M., Otoničar, B., Petrič, M., Pipan, T., Prelovšek, M., Ravbar, N., Shaw, T. R., Slabe, T., Šebela, S., Zupan Hajna, N. 2020.: Karstology in the classical karst, Springer, Advances in karst science, 222 pp. DOI: 10.1007/978-3-030-26827-5.
2. Dreybrodt, W., Gabrovšek, F. 2019: Dynamics of wormhole formation in fractured limestones. Hydrology and earth system sciences, 23/4, 1995-2014. DOI: 10.5194/hess-23-1995-2019.
3. Gabrovšek, F., Häuselmann, P., Audra, P. 2014. 'Looping caves' versus 'water table caves': the role of base-level changes and recharge variations in cave development. Geomorphology, 204, 683–691.
4. Gabrovšek, F., Stepišnik, U. 2011. On the formation of collapse dolines: a modelling perspective. Geomorphology, 134 (1-2), 23–31.
5. Gabrovšek, F., Dreybrodt, W. 2010. Karstification in unconfined limestone aquifers by mixing of phreatic water with surface water from a local input: A model. Journal of Hydrology 386: 130–141.