

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	GEOLOGIJA SEDIMENTARNIH BAZENOV
Course title:	GEOLOGY OF SEDIMENTARY BASINS

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: MIP01

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	10	30			80	6

Nosilec predmeta / Lecturer: Špela Goričan

Jezi / Predavanja / Lectures:	Slovenščina, angleščina/Slovene, English
Languages: Vaje / Tutorial:	Slovenščina, angleščina/Slovene, English

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

Prerequisites:

Končan študijski program 1. stopnje ali dodiplomski študijski program za pridobitev univerzitetne izobrazbe, sprejet pred 11. 6. 2004 s področja naravoslovja.	First-cycle Bologna degree or a university degree in the natural sciences.
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Vsebina:

Content (Syllabus outline):

<ul style="list-style-type: none"> ● Sedimentarni bazeni in njihova geodinamična okolja ● Klasifikacija bazenov glede na tektoniko plošč ● Morska in kontinentalna sedimentacijska okolja, procesi in faciesi ● Stratigrafija sedimentnih sekvenc; vpliv tektonike in klime ● Petrografija, geokemija in diageneza sedimentnih kamnin. 	<ul style="list-style-type: none"> ● Sedimentary basins and their geodynamic settings ● Classification of basin types in relation to plate-tectonic processes ● Marine and terrestrial depositional environments, processes and facies ● Stratigraphy of sedimentary sequences; impact of tectonics and climate ● Petrography, geochemistry and diagenesis of sedimentary rocks; implications for provenance studies and burial history.
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Temeljni literatura in viri / Readings:

- Nichols, G. 2009. Sedimentology and Stratigraphy (2nd edition). Wiley-Blackwell, 1-419.
- Ingersoll, R.V. 2012. Tectonics of sedimentary basins, with revised nomenclature. In: Busby, C. & Azor, A. (Eds.) Tectonics of Sedimentary Basins: Recent Advances. Wiley-Blackwell, 3–43.
- Busby, C., Ingersoll, R.V. (Eds.) 1995. Tectonics of Sedimentary Basins. Blackwell Science, 1-579.
- Reading, H.G. (Ed.) 1996. Sedimentary Environments: Processes, Facies and Stratigraphy (3rd edition). Blackwell Science, 1-704.
- Leeder, M. 1999. Sedimentology and Sedimentary Basins. From Turbulence to Tectonics. Blackwell Science, 1-529.
- Allen, P.A., Allen, J.R. 2013. Basin Analysis: Principles and Application to Petroleum Play Assessment (3rd edition). Wiley-Blackwell, 1-549.

Cilji in kompetence:

Namen predmeta je predstaviti dinamičen razvoj stratigrafskega zapisa v odvisnosti od tektonskega okolja sedimentarnih bazenov. Študenti bodo poglobili znanje stratigrafije in sedimentologije. Seznanili se bodo z osnovami analize bazenov. Vaje bodo osredotočene na sedimentno petrologijo, vključevale pa bodo tudi grafične naloge ("stacking pattern" sedimentnih sekvenc, prečni preseki čez stratigrafijo bazena, karte izopah). Na terenskih vajah bodo študenti spoznali primere sedimentov v današnjih in nekdanjih depozicijskih okoljih. Ekskurzije bodo po možnosti obravnavale različne sedimentne sekvece iz istega obdobja geološke zgodovine, tako da bodo študenti dobili vpogled v čim širše območje depozicijskega sistema. V okviru individualnega dela bo vsak študent analiziral objavljene podatke s stratigrafskih profilov izbranega območja in napisal poročilo.

Objectives and competences:

The course aims to emphasize the dynamic understanding of the stratigraphic record in relation to the tectonic setting of sedimentary basins. The students will expand their knowledge on stratigraphy and sedimentology, and will be introduced to basin analysis. Laboratory work will focus on sedimentary petrology but will also include exercises on sequence stacking patterns, stratigraphic cross sections and isopach maps. During field trips, the students will have the opportunity to inspect modern as well as ancient sediments of various depositional environments. The field trips to ancient rocks will preferentially visit different sedimentary sequences of the same age to provide an overview of a larger depositional system. As individual work, each student will analyse published stratigraphic sections of a selected area and prepare a written report.

Predvideni študijski rezultati:

Znanje in razumevanje:
Študent razume tesno povezanost med stratigrafsko evolucijo in tektonskim okoljem sedimentarnih bazenov. Iz podatkov s površinskih profilov zna oceniti hitrost sedimentacije in subsidence ter interpretirati sedimentno zaporedje v povezavi z relativno gladino morja, tektoniko in klimo. Stratigrafsko korelacijo med profili istega bazena zna uporabiti za rekonstrukcijo geometrije bazena in poteka subsidence. Po sestavi in diagenetskih značilnostih sedimentnih kamnin zna ugotavljati izvor materiala in sklepati na to,

Intended learning outcomes:

Knowledge and understanding:
The student understands the close relationship between the stratigraphic evolution and tectonic setting of sedimentary basins. He knows how to estimate accumulation and subsidence rates from outcrop data. He is able to interpret the basin-fill in terms of relative sea level, synsedimentary tectonics and climate. He knows how to use intrabasinal stratigraphic correlations to reconstruct the geometry and subsidence history of the basin. He can identify the composition and diagenetic features of sedimentary rocks and make inferences on

kako globoko so bili sedimenti pokopani. Za preiskana sedimentna zaporedja zna predlagati geodinamično okolje njihovega nastanka. Ima dovolj znanja, da lahko razpravlja o "source-to-sink" vidikih depozicijskega sistema v širšem paleogeografskem kontekstu.

sediment provenance and burial history. He is able to propose a geodynamic setting of the studied basin. He has sufficient knowledge to discuss source-to-sink aspects of the depositional system in a larger-scale paleogeographic context.

Metode poučevanja in učenja:

- Predavanja
- Praktične vaje (v laboratoriju in na terenu)

Learning and teaching methods:

- Lectures
- Practical training (laboratory and field work)

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. Pirnia, T., Sacconi, E., Torabi, G., Chiari, M., Goričan, Š., Barbero, E. 2020: Cretaceous tectonic evolution of the Neo-Tethys in Central Iran : evidence from petrology and age of the Nain-Ashin ophiolitic basalts. *Geoscience frontiers*. 11/1, 57-81. DOI: 10.1016/j.gsf.2019.02.008.
2. Goričan, Š., Žibret, L., Košir, A., Kukoč, D., Horvat, A. 2018: Stratigraphic correlation and structural position of Lower Cretaceous flysch-type deposits in the eastern Southern Alps (NW Slovenia). *International journal of earth sciences*, 107/8, 2933-2953.
3. Kukoč, D., Goričan, Š., Košir, A., Belak, M., Halamić, J., Hrvatović, H. 2015. Middle Jurassic age of basalts and the post-obduction sedimentary sequence in the Guevgueli Ophiolite Complex (Republic of Macedonia). *International Journal of Earth Sciences* 104, 435–447.
4. Celarc, B., Goričan, Š., Kolar-Jurkovšek, T. 2013. Middle Triassic carbonate-platform break-up and formation of small-scale half-grabens (Julian and Kamnik-Savinja Alps, Slovenia). *Facies* 59, 583–610.
5. Robin, C., Goričan, Š., Guillocheau, F., Razin, P., Dromart, G., Mosaffa, H. 2010: Mesozoic deep-water carbonate deposits from the southern Tethyan passive margin in Iran (Pichakun nappes, Neyriz area): biostratigraphy, facies sedimentology and sequence stratigraphy. In: Leturmy, P., Robin, C. (Eds.). *Tectonic and Stratigraphic Evolution of Zagros and Makran during the Mesozoic–Cenozoic*, Geological Society, Special Publication 330, 179–210.

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	GEOLOGIJA KVARTARJA
Course title:	QUATERNARY GEOLOGY

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: MIP02

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	10	30			80	6

Nosilec predmeta / Lecturer: Aleksander Horvat

Jeziki / Languages:	Predavanja / Lectures:	Slovenščina, angleščina/Slovene, English
	Vaje / Tutorial:	Slovenščina, angleščina/Slovene, English

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

Prerequisites:

Končan študijski program 1. stopnje ali dodiplomski študijski program za pridobitev univerzitetne izobrazbe, sprejet pred 11. 6. 2004 s področja naravoslovja.	First-cycle Bologna degree or a university degree in the natural sciences.
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Vsebina:

Content (Syllabus outline):

<ul style="list-style-type: none"> ● Definicija kvartarja: stratigrafske in podnebne osnove ● Podnebne spremembe v kvartarju: vzroki, posledice, klimatski pokazatelji, paleoklimatologija ● Vplivi podnebnih sprememb na biosfero ● Stratigrafija kvartarja: orodja in metode, izotopska stratigrafija, klimatokronologija, korelacija morske in terestrične stratigrafije, »alpska« stratigrafija ● Sedimentacijska okolja v kvartarju: vrste sedimentnih okolij, značilne kamnine in faciesi ● Geomorfološke značilnosti kvartarnih pokrajin ● Holocen: klimatske in okoljske spremembe ● Antropocen: razlogi za in proti novi epohi, antropogeni vpliv na okolje in podnebje, 	<ul style="list-style-type: none"> ● Definition of Quaternary: stratigraphic and climatic basics ● Quaternary climatic changes: causes, consequences, climatic proxies, palaeoclimatology ● Quaternary climatic change impact on biosphere ● Quaternary Stratigraphy: methods and analytical tools, isotope stratigraphy, climatochronology, correlation of marine and terrestrial sedimentary record, Alpine stratigraphy ● Quaternary sedimentary environments: main facies, rock types and sedimentary environments ● Geomorphology of Quaternary induced landscapes
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narava antropogenih depozitov in antropogena sprememba pokrajine

- Holocene climatic and environmental changes
- Anthropocene: case for and against a new epoch, anthropogenic environmental and climatic impact, nature of anthropogenic deposits and landscape modification

Temeljni literatura in viri / Readings:

Izbrana poglavja/Selected chapters

- Bradley, R. S. (1992): Quaternary paleoclimatology. Chapman & Hall, 4-45, 125-190, 285-336, 357-438, 471-506. .
- Brodwickowsky, K. & van Loon, A. J. (1991): Glacigenic sediments. Developments in sedimentology 49, 19-131. .
- Elias, S. & Mock, C. J. (eds) (2011): Encyclopedia of Quaternary Science. Elsevier - posamezna gesla. .
- Lowe, J.J. & Walker, M. J. C. (1997): Reconstructing Quaternary environments. Prentice Hall, 2nd edition, 1-161, 237-371.
- Williams, M. (2003): Quaternary environments. Arnold, 2nd edition, 1-266.
- Waters, C. N., Zalasiewicz, J. A., Williams, M. Ellis, M. & Snelling, A. M. (eds) (2014): A Stratigraphical Basis for the Anthropocene. – Geol. Soc. London, Spec. Publ. 1-54, 55-142, 211-300.

Cilji in kompetence:

Predmet obravnava podnebne spremembe v zadnji dveh milijonih let Zemljine zgodovine na podlagi raziskav različnih kontinentalnih in morskih sedimentov ter ledu, vzroke zanje, njihovo periodičnost in kronologijo ter antropogeni vpliv na podnebne spremembe. Namen predmeta je časovno in prostorsko razumeti kvartarne okoljske spremembe v odvisnosti od klime, kar se odraža v spremembi v sestavi flore in favne, pojav homininov, njegove kulture in človekov vpliv na naravno okolje. Vsebina predmeta omogoča slušatelju prepoznati, genetsko in procesno opisati kvartarne sedimente ter jih klimatokronološko opredeliti. Znanje bo znal praktično uporabiti za prepoznavanje in razumevanje antropogenih vplivov na naravno okolje.

Objectives and competences:

The course deals with climate change in the last two million years of Earth history based on research of various continental and marine sediments and ice, their causes, periodicity, and anthropogenic impact on climate change. The purpose of the course is to understand the temporal and spatial Quaternary environmental changes in relation to climate change in the composition of flora and fauna, the emergence of hominins, their culture and human impact on the natural environment. The content of the course allows students to recognize, and describe Quaternary sediments in chronological and climatic sense. Students will learn how to recognize and understand anthropogenic impact on natural environment.

Predvideni študijski rezultati:

Znanje in razumevanje:
Študent pozna osnovne vidike klimatskih sprememb in vpliva le-teh na naravno okolje. Praktično prepozna in interpretira glacigene sedimente. Razume in interpretira geomorfologijo ledeniških pokrajin. Zna

Intended learning outcomes:

Knowledge and understanding:
The student knows the basic aspects of climate change and their interaction on natural environment. He can recognize and interpret glacigenic sediments and Quaternary landscape geomorphology. He knows adequate tools and

praktično uporabiti ustrezna orodja za starostno in klimatsko opredelitev kvartarnih sedimentov.

proxies for age and climatic determination of Quaternary sediments.

Metode poučevanja in učenja:

- Predavanja
- Seminarji
- Praktične vaje
- Terensko delo

Learning and teaching methods:

- Lectures
- Seminars
- Practical training
- Field work

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
- Seminarska naloga	30	- Written paper

Reference nosilca / Lecturer's references:

1. Moro, A., Horvat, A., Tomić, V., Sremac, J. Bermanec, V. 2018: Facies development and paleoecology of rudists and corals: : an example of Campanian transgressive sediments from northern Croatia, northeastern Slovenia, and northwestern Bosnia. *Facies*, 62/19, 18-25. DOI: 10.1007/s10347-016-0471-y.
2. Moreau, L., Odar, B., Higham, T., Horvat, A., Pirkmajer, D., Turk, P. 2015: Reassessing the Aurignacian of Slovenia: Techno-economic behaviour and direct dating of osseous projectile points. – *Journal of Human Evolution*, 78, 158-180.
3. Zupančič, N., Horvat, A., Jarc, S. 2015: Environmental impact of dusting from the Koper port bulk cargo terminal on the agricultural soils – *Acta geographica Slovenica*, 55/1, 139-158.
4. Turk, J., Horvat, A. 2009: Sedimentological method for determination of palaeoenvironmental conditions at the Ljubljansko barje. Case study: Stare gmajne. – *Opera Instituti Archaeologici Sloveniae*, 16, 35-48.
5. Verbič, T., Horvat, A. 2006: Quaternary geology of the Apače Valley (NE Slovenia) – *Razprave 4. razr. SAZU*, 47/2, 133-156.

