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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Digitalna arheologija
Course title:	Digital archaeology

Študijski program in stopnja **Study programme and level**	**Študijska smer oz. modul** **Study field or module**	**Letnik** **Academic year**	**Semester** **Semester**
Primerjalni študij idej in kultur, doktorski študij 3. stopnje	Tisočletja med Jadranom in Podonavjem		
Comparative study of ideas and cultures, doctoral study 3rd cycle	Millenia between the Adriatic and the Danube		

Vrsta predmeta / Course type	Izbirni/Elective
Univerzitetna koda predmeta / University course code:	100

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
60	15	15			90	6

Nosilec predmeta / Lecturer:	doc. dr. Edisa Lozić

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenščina/Slovenian Angleščina/English
	Vaje / Tutorial:	Slovenščina/Slovenian Angleščina/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v 1. letnik	Matriculation to the 1st academic year

Vsebina:	**Content (Syllabus outline):**
• pregled uporabe digitalnih metod v arheologiji in kulturni dediščini • izbrane metode digitalne arheologije; študent izbere eno ali več metod (na primer zračno lasersko skeniranje oz. LiDAR, umetna inteligenca/strojno učenje/globoko učenje, podatkovna znanost, 3D modeli, GIS	• an overview of the digital methods in archaeology and cultural heritage • selected methods of digital archaeology; the student chooses one or more methods, including but not limited to airborne LiDAR and remote sensing, artificial intelligence/machine learning/deep learning, data science, 3D models, GIS.

Temeljni literatura in viri / Readings:

- Bahn P. G., Renfrew C. (2018). Archaeology essentials, theories, methods, practice, Thames & Hudson College, London. (Chapters 1 and 3).
- Chapman, H., (2006) Landscape archaeology and GIS. The History Press Limited, Stroud.
- Conolloy J., Lake M. (2006). Geographical Information Systems in Archaeology, Cambridge: Cambridge University Press.
- Dell'Unto N., Landeschi G. (2022). Archaeological 3D GIS. London: Routledge.
- Garstki, K. (2020). Digital innovations in European archaeology. Cambridge University Press, Cambridge.
- Garstki, K. (ed.) (2022). Critical Archaeology in the Digital Age. 12th IEMA Visiting Scholar Conference. Cotsen Insititute of Archaeology Press, Los Angeles, CA.
- Lock G. (2003). Using Computers in Archaeology, Towards Virtual Pasts. Routledge, London.
- Lock, G.R., Hacıgüzeller, P., Gillings, M. (eds.) (2019). Re-mapping archaeology: critical perspectives, alternative mappings. Routledge, Abingdon, Oxon ; New York, NY.
- Lozić, E. (2021). Application of Airborne LiDAR Data to the Archaeology of Agrarian Land Use: The Case Study of the Early Medieval Microregion of Bled (Slovenia). Remote Sensing 13(16), 3228.
- Lozić, E., Štular, B. (2021). Documentation of Archaeology-Specific Workflow for Airborne LiDAR Data Processing. Geosciences 11(1), 26.
- Forte M., Campana S., eds., (2016). Digital Methods and Remote Sensing in Archaeology. Archaeology in the Age of Sensing. Springer.
- - Parcak, S.H., (2009). Satellite Remote Sensing for Archaeology. Routledge, London ; New York.

Cilji in kompetence:

Digitalna arheologija se ukvarja z digitalnimi podatki za arheološke raziskave ter z računalniškimi metodami in orodji, ki so potrebni za njihovo zbiranje, analizo in upravljanje.

Uporaba računalnikov v arheologiji sega v šestdeseta leta 20. stoletja, danes pa je arheologija ena najbolj digitaliziranih disciplin med zgodovinskimi in družbenimi vedami. Računalniška orodja, kot so prostorske analize, 3D modeliranje, simulacije, analiza arheoloških načrtov so odprla nove poti za arheološko raziskovanje in znatno razširila naše razumevanje človeške preteklosti. Naše strokovno znanje in izkušnje na področju raziskav, daljinskega zaznavanja, prostorskih analiz in upravljanja podatkov pokrivajo celoten potek arheoloških raziskav.

Cilji predmeta so usposobiti študente za samostojno raziskovalno delo na področju arheologije z uporabo relevantnih digitalnih orodij.

Objectives and competences:

Digital archaeology is concerned with digital data for archaeological research as well as the computational methods and tools necessary to collect, analyse, and manage them.

The use of computers in archaeology dates back to the 1960s, and archaeology is currently one of the most digitised fields in humanities. Computer tools such as spatial analysis, three-dimensional modelling, simulations, and the analysis of archaeological plans have opened up new avenues for archaeological research and significantly increased our knowledge of the past. Our proficiency in surveying, remote sensing, spatial analysis, and data management encompasses the total workflow of archaeological research.

The objectives of the course are to train students for independent research work in the field of archaeology using relevant digital tools.

Kompetence, ki jih bodo študentje pridobili so: uporaba splošnih digitalnih orodij, na primer digitalnih podatkovnih zbirk, in uporaba drugih izbranih digitalnih orodij, na primer uporaba LiDARskih podatkov, uporaba GIS-ov.	The competences that students will acquire are: the use of general digital tools, such as digital databases, and the use of other selected digital tools, such as the use of LiDAR data, the use of GIS.

Predvideni študijski rezultati:	Intended learning outcomes:
Študenti digitalne arheologije se bodo naučili zbirati digitalne podatke na terenu z našo najsodobnejšo geodetsko opremo ter obdelovati, vizualizirati, analizirati, interpretirati, upravljati in predstavljati digitalne podatke v našem računalniškem laboratoriju. Naša mreža nacionalnih in mednarodnih partnerjev zagotavlja veliko priložnosti za praktično usposabljanje in izmenjavo. Večina novih orodij prinaša pozitivne spremembe v arheologijo, a potreben je kritičen pristop k uvajanju novih metod. Ali 3D modeli res odgovarjajo na raziskovalna vprašanja? Ali so zapletene računalniške metode vedno potrebne za organizacijo podatkov? Pri predmetu bodo študentje pridobili kompetence za samostojno uporabo in kritično presojo vključevanje sodobnih tehnoloških orodij v arheologijo. Študent bo posoben samostojno izvesti projekte z uporabo GIS orodji, poznal uporabljati strojno in programsko opremo za digitalizacijo in zbiranje podatkov, analizo, modeliranje in vizualizacijo podatkov ter informatizacijo kartografskega gradiva.	Students of Digital Archaeology will learn how to collect digital data in the field using our cutting-edge surveying equipment, as well as how to process, visualise, analyse, interpret, manage, and present digital data in our computer laboratory. Our network of national and international partners offers numerous opportunities for hands-on training and exchange, as well as access to specialised equipment. The majority of digital tools are bringing positive changes to archaeology, but the introduction of new methods requires a critical approach. Do 3D models actually provide answers to research questions? Are sophisticated computational methods always required for data organisation? Students will acquire the skills necessary to independently apply and evaluate the incorporation of contemporary technological tools in archaeology. Students will be able to independently complete projects utilising GIS tools, as well as use hardware and software for data digitisation and collection, data analysis, modelling and visualisation, and computerisation of cartographic material.

Metode poučevanja in učenja:	Learning and teaching methods:
Oblike dela: ☐ Frontalna oblika poučevanja ☒ Delo v manjših skupinah oz. v dvojicah ☒ Samostojno delo študentov ☒ e-izobraževanje Metode (načini) dela: ☒ Razlaga ☒ Razgovor/ diskusija/debata ☐ Delo z besedilom	Types of learning/teaching: ☐ Frontal teaching ☒ Work in smaller groups or pair work ☒ Independent students work ☒ e-learning Teaching methods: ☒ Explanation ☒ Conversation/discussion/debate ☐ Work with texts

☒ Proučevanje primera	☒ Case studies
☐ Igra vlog	☐ Roleplay
☐ Druge vrste nastopov študentov	☐ Different presentation
☐ Reševanje nalog	☐ Solving exercises
☒ »Terenske vaje« (npr. obiski podjetij)	☒ Field work (e.g. company visits)
☐ Vključevanje gostov iz prakse	☐ Inviting guests from companies

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment
Krajši pisni izdelki		Short written assignments
Daljši pisni izdelki	70	Long written assignments
Javni nastop ali predstavitev	20	Presentations
Končno ocenjevanje (pisni/ustni izpit)	10	Final examination (written/oral)
Drugo		Other

Reference nosilca / Lecturer's references:

- ŠTULAR, B., LOZIĆ E., EICHERT S. 2023, Interpolation of airborne LiDAR data for archaeology, Journal of Archaeological Science: Reports 48, p.p. 103840. https://doi.org/10.1016/j.jasrep.2023.103840
- Štular, B., Lozić, E., Belak, M., Rihter, J., Koch, I., Modrijan, Z., Magdič, A., Karl, S., Lehner, M., Gutjahr, Ch. 2022, Migration of Alpine Slavs and machine learning: Space-time pattern mining of an archaeological data set, Plos One, September 2022, https://doi.org/10.1371/journal.pone.0274687
- ŠTULAR, Benjamin, LOZIĆ Edisa, Airborne LiDAR data in landscape archaeology. An introduction for non-archaeologists. – Journal it - Information Technology, july 2022.
- LOZIĆ, Edisa, Funerary Monuments in the Interior of the Roman Province of Dalmatia. – E-monographiae Instituti archaeologici Sloveniae, 11, 2021. 978-961-05-0097-1. ISBN 978-961-05-0541-9. https://zalozba.zrc-sazu.si/p/V116.
- ŠTULAR, B., EICHERT S, LOZIĆ E., Airborne LiDAR Point Cloud Processing for Archaeology. Pipeline and QGIS Toolbox, Remote Sensing 2021, 13, no. 16: 3225. https://doi.org/10.3390/rs13163225
- LOZIĆ Edisa, Application of Airborne LiDAR Data to the Archaeology of Agrarian Land Use. The Case Study of the Early Medieval Microregion of Bled (Slovenia). – Remote Sens. 2021, 13, 3228. https://doi.org/10.3390/rs13163228.
- ŠTULAR Benjamin, LOZIĆ Edisa, EICHERT Stefan, Airborne LiDAR-Derived Digital Elevation Model for Archaeology, Remote Sens. 2021, 13(9), 1855; https://doi.org/10.3390/rs13091855.
- LOZIĆ, E., ŠTULAR, B. 2021, Documentation of Archaeology-Specific Workflow for Airborne LiDAR Data Processing, Geosciences 2021, 11(1), 26; https://doi.org/10.3390/geosciences11010026
- ŠTULAR, B.; E. LOZIĆ 2020, Comparison of Filters for Archaeology-Specific Ground Extraction from Airborne LiDAR Point Clouds. – Remote Sensing 2020 (12), DOI: 10.3390/rs12183025.
- LAHARNAR, B., E. LOZIĆ, A. MIŠKEC 2020, Gradišče nad Knežakom. – V: J. Horvat, I. Lazar, A. Gaspari (ur.), Manjša rimska naselja na slovenskem prostoru / Minor Roman settlements in Slovenia, Opera Instituti Archaeologici Sloveniae 40, 2020, 123–140.
- LAHARNAR, B., E. LOZIĆ 2019, Ulaka and Nadleški hrib (Slovenia) : sites of military conflict from the last decades BC. – V: E. Strigberger (ur.), Fachgespräch "Schlachtfelder: Fundstellen und

Denkmale" am 23. August 2018, Mauerbach (Niederösterreich), Fundberichte aus Österreich, Bd. 56 (2017), 62–66. [COBISS.SI-ID - 10197088].

- LAHARNAR, B., E. LOZIĆ, B. ŠTULAR 2019, A structured Iron Age landscape in the hinterland of Knežak, Slovenia. – V: D. C. Cowley, M. Fernández-Götz, T. Romankiewicz & H. Wendling (ur.). Rural Settlement. Relating buildings, landscape, and people in the European Iron Age (Leiden 2019: Sidestone Press), 263–272. [COBISS.SI-ID - 9811040].
- • LOZIĆ, Edisa, Proizvodnja nagrobnih spomenikov v notranjosti rimske province Dalmacije. – E-monographiae Instituti archaeologici Sloveniae, 9, 2018. 978-961-05-0097-1. ISSN 2335-2930. https://zalozba.zrc-sazu.si/p/1524.