

# A new curriculum on Computer- and Geoscience in Archaeology

## Requirements and first experiences in digital training in computer- and geoscience in archaeology

Hendrik ROHLAND, HTW Dresden, Germany

Marco BLOCK-BERLITZ, HTW Dresden, Germany

Martin OZCIPKA, HTW Dresden, Germany

Benjamin DUCKE, DAI, Germany

Christina FRANKEN, Commission for Archaeology of Non-European Cultures, DAI, Germany

Ulambayer ERDENEBAT, National University of Mongolia, Mongolia

**Keywords:** *Digital archaeology — Education — Curricula — Computer science — Data literacy*

**CHNT Reference:** H. Rohland, M. Block-Berlitz, M. Oczipka, C. Franken, B. Ducke and U. Erdenebat 2020. A new curriculum on Computer- and Geoscience in Archaeology. Requirements and first experiences in digital training for computer- and geoscience in archaeology. W. Börner and CHNT Organization Committee. Proceedings of the 25th International Conference on Cultural Heritage and New Technologies. DOI:xxxxxxx.

## An international cooperation for digital training for archaeology

Researchers of the German Archaeological Institute (DAI), the National University of Mongolia (NUM), the Christian-Albrechts University Kiel (CAU) and HTW Dresden have been successfully working together in the past in different archaeological research projects. During these projects the partners applied UAV-based mapping and 3D-reconstruction (Franken et al., in print), remote sensing (Oczipka et al., 2019), computational processing of image data (Do Duc et al., 2019) and other technologies successfully in archaeological research. At the same time, while collaborating in the campaigns in Mongolia, the participating researchers and students of archaeology, computer- and geosciences were able to learn from each other and mutually benefit from the interdisciplinary cooperation. From these endeavours arose the idea to bring the expertise of the partners together to develop a new curriculum in computer- and geoscience applications in archaeology and to provide educational resources in this field. In 2019, the HTW and NUM signed a memorandum of understanding. Both universities expressed their will to collaboratively develop a curriculum which provides training in the application of computer science methods in archaeology. This initiative was integrated into a successful grant application for the internationalization strategy of the HTW Dresden. The German Academic Exchange Service (DAAD) provides funding for the implementation of a new master's degree in computer- and geoscience in archaeology within the programme "HAW.international"<sup>1</sup>.

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<sup>1</sup> <https://www.daad.de/de/infos-services-fuer-hochschulen/weiterfuehrende-infos-zu-daad-foerderprogrammen/haw-international/>



Fig. 1. Signing of the contract on cooperation between NUM and HTW in 2019.

## Challenges of the digital transformation in archaeology

Archaeology has seen an explosion of available data during the recent decades. Even before the digital revolution, the collections in the archives of museums and heritage conservation bodies were ever-growing. Rescue excavations and research activities are piling up more and more artefacts and data while the processing, publishing and the conversion into historical narratives of these data constantly lags behind. This problem has been raised again and again and much hope was put into digital media to mitigate this fundamental problem of archaeology (Fagan, 1995: 16–17). While a lot has been invested in the development of structures for digital publishing and preservation of archaeological data, the reuse and repurposing of data still doesn't live up to the possibilities (Huggett, 2018: 1–3). Archaeologists largely keep being occupied with the collection, documentation, curation and archiving of new archaeological data and artefacts.

The archaeological workflow in many institutions has been digitised in the recent decades. Nowadays a big part of new archaeological data is “born-digital”. The increased availability of different kinds of data - e.g. remote-sensing data and repositories with open research data amongst others - and the possibility to process them by computational methods has added even more possibilities and materials to approach archaeological problems. In some cases, digital data became an important means to deal with substantial crisis such as in the case of endangered cultural heritage in Syria<sup>2</sup>.

At the same time, the ways to publish and communicate archaeology within the professional community and to the wider public are changing rapidly. The shift of many Journals from print to online is only the least part of this change. Publishing in different, less formal media formats (blogs; data-papers, interactive publications) and the publishing of primary research data in online repositories are increasingly becoming mainstream. In the field of public outreach, the ubiquity of digital and interactive media has changed the expectations of the audiences towards more interactive and visual types of knowledge presentation. Digital technologies have improved the possibilities for interaction such as citizen science e.g. in crowd-sourcing and/or crowd-funded archaeological projects (e.g. Lin et al., 2014; Bonacchi et al., 2014; Wilkins, 2020).

These developments change the way archaeology is done and reshape the job profile of many archaeological jobs. Archaeologists increasingly need digital skills to succeed tackling the challenges that the various fields of archaeological activities – ranging from research and education over cultural heritage management to community archaeology and even edutainment - pose to them. At the same time, there often is a lack of formal training in the usage of digital technologies in archaeology. Especially in Germany, where archaeology is traditionally more rooted in the humanities than in the sciences, these skills are often not or not enough part of the archaeological curricula.

<sup>2</sup> <https://arachne.dainst.org/project/syrher>

Nowadays a growing number of universities provide digital humanities curricula. However, the field of digital humanities is in the most cases focused on the more text-based subjects such as linguistics, history and literature, while archaeology developed distinct digital infrastructures and research traditions (Huggett, 2012: 87–92). There are already a few specialised curricula in computational or digital archaeology (e.g. York, London, Köln, Leiden) and specialists in computational or digital methods teach within some other archaeological institutes. However, there is a broader demand for the development of data literacy in archaeology. In connection with its aforementioned partners, the HTW Dresden will contribute its teaching and research resources in computer science and the geosciences to develop an application-oriented, international master's degree in digital archaeology. The degree is intended to be international and largely accessible remotely, to enable a wide range of archaeologists, computer- and geoscientists to develop skills in the application of digital technologies for various purposes in the field.

## First insights from a summer school on computer- and geoscience in archaeology

When the HTW and its partners announced a summer school on computer- and geoscience applications in archaeology almost 70 archaeologists at all career stages responded to the call for applications. Their letters of motivation provided at least some anecdotal evidence on the demands and motivations for seeking formal education in the field. It was puzzling, that although the event was intended for younger students at beginner levels in digital tools, many advanced students in their masters or PhD phase or even professionals applied for the event. The review of the letters of motivation also demonstrated, that there is awareness for the need of governing technologies and topics such as databases, GIS, remote sensing, research data management and for general data literacy throughout the discipline.

The paper will report on the insights gained in digital teaching computer- and geoscience applications in archaeology in an interdisciplinary virtual summer school taking place in September 2020 and draw conclusions on the implications for the development of a future curriculum in the field.

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