AE1052   3D data och visualisering inom arkeologi och kulturarvstudier, 15 högskolepoäng

3D Data and Visualization in Archaeology and Cultural Heritage Studies, 15 credits
Grundnivå / First Cycle

Fastställande

Kursplanen är fastställd av Institutionen för historiska studier 2023-04-19 att gälla från och med 2023-08-28, höstterminen 2023.

Utbildningsområde: Humanistiskt 50 % och Naturvetenskapligt 50 %
Ansvarig institution: Institutionen för historiska studier

Inplacering

Stand-alone course, orientation course, open to anyone who is eligible to attend higher education.

Huvudområde	*Fördjupning*
Arkeologi	G1N, Grundnivå, har endast gymnasiala förkunskapskrav

Förkunskapskrav

Grundläggande behörighet.

Lärandemål

Efter godkänd kurs ska studenten kunna:

Kunskap och förståelse
- produce their own 3D data in line with best practice guidelines
- know how to use visualisation and post-processing techniques for research, publication, and outreach

- understand the theoretical and ethical implications of the production and use of 3D data

Färdigheter och förmåga
- discuss the relevance of 3D data for research projects, publications, and outreach projects
- analyse artefacts, sites, and landscapes using 3D applications, visualisation tools, and 3D data

Värderingsförmåga och förhållningssätt

analyse and discuss the advantages and disadvantages of 3D data
evaluate the quality of 3D data
Identify research problems in archaeology and cultural heritage studies that can be solved using 3D data

Innehåll

The course introduces students to the theory and methods of creating and using 3D models in archaeology and cultural heritage. The teaching will be hands-on with students creating their own models. The course will acquaint students with techniques like laser scanning, photogrammetry, 3D modelling, etc. that can be used by archaeologists and cultural heritage professionals alike. The skills learned here are transferable, and can be used by individuals in other fields and by those interested in creating 3D data. Furthermore, problems with 3D modelling and how visualization techniques can help to enhance research and outreach will be discussed. Another aspect of the course will be an introduction to the critical use of models. The course will also serve as an introduction to the wider field of Digital Archaeology - a rapidly expanding field with a growing scope, literature, and job opportunities. Since the course focuses on transferable skills, the teaching offers long-term sustainability for the participants.

The course will be open to international students and will be given in English. There will be two course moments.

Delkurser

1. **Ackvisition av 3D data - Avhämtning och användning** *(Acquisition of 3D data – Collection and use),* 7,5 hp

   Betygsskala: Utmärkt (A), Mycket bra (B), Bra (C), Tillfredställande (D), Tillräcklig (E) och Underkänd (F)
   This part of the course deals with different methods of creating 3D models of artefacts, heritage sites, and cultural landscapes. It will teach students different techniques through practical work in the field. They will learn to collect 3D data of landscapes, like ancient shorelines, barrows, rock art and archaeological materials in cooperation with museums and the private sector. Another aspect will be the

---

usability of 3D recording methods to engage in Public Archaeology, especially with photogrammetry. This course moment will also introduce the students to handling, analysing, and using the data in accordance with best practice guidelines. A critical outlook on 3D data will be included and the students will be introduced to general theories of digital archaeology. After this course moment, students will be able to acquire 3D data, formulate appropriate research questions, and understand their data in a critical manner. The methods taught in this course moment are: Photographic methods - including Structure from Motion and Reflectance Transformation Imaging, Laser Scanning, LiDAR, Image stacking.

The course will include field moments in Gothenburg and Västra Götaland as well as study visits to museums and other public and private heritage institutions.

2. **Visualisering av 3D models - teori och metod** *(Visualization of 3D models -theory and method),* 7,5 hp

Betygsskala: Utmärkt (A), Mycket bra (B), Bra (C), Tillfredställande (D), Tillräcklig (E) och Underkänd (F)
This part of the course deals with the visualization opportunities of 3D models to enhance the collected data for research, dissemination, and public outreach. It will begin with the general theory on human vision and perception and the way this affects the use of 3D data. Afterwards, the students will learn to use several techniques for the visual enhancement of the collected data. This will again be a hands-on approach to learning. This course moment will teach students to reflect on the way they transform and manipulate data, and to foster a critical approach to their own work with 3D data. The teaching will also include discussion about how the visualizations can be used not just for research, but also for public engagement.

The methods taught in this course are D-Stretch, GIS-aided approaches (i.e. Local Relief Modelling, Red Relief), and 3D reconstruction of objects, sites, and landscapes (construction and texturing in 3ds Max, Substance, Unreal). In addition, the students will be introduced to more advanced data modelling techniques such as Agent-Based Modelling and Artificial Intelligence approaches.

Former för undervisning
The course will be taught with lectures, method training exercises, seminars, and study visits.

Undervisningsspråk: engelska
To foster international participation in line with the Policy for Internationalisation (Dnr V 2014/474) at the University of Gothenburg, the course will be taught in English.

Former för bedömning

The course is examined through individual project work including a written description, methods, work steps, analysis, and critical reflection. In the seminars, small groups will present a small, self-created projects that includes the use of 3D data.

Should a student who has failed the same examination twice wish to change examiner before the next examination opportunity, a written request must be submitted to the department and approved if there are no specific reasons against this (HF 6 kap § 22).

An examination opportunity is counted as consumed if a student has formally failed the examination. If a student who participated in the examination does not report results, i.e. hand in the required work, the examiner *can* decide to, for example, "submit blank", this is not counted as a used examination opportunity.

A student does not have the right to revoke his or her written exam and thus avoid being graded.

In the event that a course has ceased or undergone major changes, the student shall be guaranteed at least three examination opportunities (including the ordinary examination opportunity) for a period of at least one year, but not more than two years after the course has ended / changed. With regard to practical work and VFU, the corresponding applies, but with only one further examination opportunity.

Swedish/Svenska

Om student som underkänts två gånger på samma examinerande moment önskar byte av examinator inför nästa examinationstillfälle, ska sådan begäran inlämnas skriftligt till institutionen och bifallas om det inte finns särskilda skäl däremot (HF 6 kap § 22).

Ett examinationstillfälle räknas som förbrukat om en student har blivit formellt underkänd på examinationen. Om en student som deltagit i examinationen inte redovisar resultat som examinator kan bedöma, till exempel "lämnar in blankt" räknas detta ej som ett förbrukat examinationstillfälle.

En student har inte rätt att återkalla sin inlämnade tentamen och på så sätt undvika att betygssättas.

I det fall en kurs har upphört eller genomgått större förändringar ska student garanteras minst tre examinationstillfällen (inklusive ordinarie examinationstillfälle) under en tid av minst ett år, dock som längst två år efter det att kursen upphört/förändrats. Vad avser praktik och VFU gäller motsvarande, men med begränsning till endast ett ytterligare examinationstillfälle.

Betyg
På kursen ges något av betygen Utmärkt (A), Mycket bra (B), Bra (C), Tillfredställande (D), Tillräcklig (E) och Underkänd (F).

Kursvärdering
Students have the opportunity to evaluate the course. The result and any changes in the

course structure should be communicated to both the students who completed the evaluation and to the students who will start the course.

Swedish/Svenska

Studenten ges möjlighet att göra utvärdering av kursen. Resultatet och eventuella förändringar i kursens upplägg ska förmedlas både till de studenter som genomförde värderingen och till de studenter som ska påbörja kursen.