

## ARCH 310 | Introduction to Digital Archaeology Fall 2026

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### 1. Course Description

Archaeological methodology has undergone a revolutionary transformation over the past decade. Traditional techniques for recording and interpreting archaeological data are increasingly supplanted by digital and computational methods, which have become integral to both archaeological projects and cultural heritage management (CHM). This course explores the latest state-of-the-art advancements in 3D modeling and photogrammetry, GIS-based spatial archaeological analysis, database management, digital archaeological illustration, remote sensing, and more.

Through a blend of lectures, hands-on projects, and student presentations, students will engage with cutting-edge technologies and methodologies, developing both theoretical knowledge and practical skills. The curriculum culminates with an examination of the ethics surrounding digital archaeology and a discussion of contemporary critical approaches to its practice. This ensures that students not only master technological tools but also critically assess the broader implications and responsibilities inherent in the digital transformation of archaeological work.

### 2. Learning Objectives

The main aim of this course is for the student to develop a comprehensive understanding of the new possibilities offered by the most recent tools and methods in analyzing the past, as well as to acquire a practical skill set, which will be useful in both archaeological fieldwork and cultural heritage management projects. Upon the successful completion of the course requirements by the end of the semester, students will have gained theoretical knowledge on and develop familiarity with:

- archaeological databases and data management;
- tablet-based digital excavation recording systems;
- nondestructive methods of archaeological exploration and remote-sensing such as LIDAR, Ground Penetrating Radar, and Thermal Imaging;
- airborne imaging and its uses in archaeology;
- international digital archaeology case studies, such as Kaymakçı, Keros, SCIP;
- the role of Geographical Information Systems (GIS) in archaeological research and interpretation of spatial data;
- online and digital publication of archaeological projects;
- the potential of AI in archaeological research;
- *big data* analysis utilizing formal ontologies and *semantics*;
- the impact of archaeological sciences in modern analysis and interpretation of the past (e.g. aDNA studies, micromorphology, zooarchaeology, paleoethnobotany).

Students will also gain practical experience in 3D modeling and photogrammetry, which is fast becoming the norm on fieldwork projects. They will also have hands-on practice of spatial recording using a total station. Upon the successful completion of the course requirements, they will be able to:

- create 3D models of excavation trenches or buildings;
- create 3D models of archaeological artifacts (statues, weapons, etc.);
- digitally record and illustrate architecture using photogrammetry-based orthophotos;
- digitally illustrate (a.k.a. ink) small archaeological artifacts like potsherds.
- fly a drone and take aerial photos;
- set-up and use a Total Station for spatial recording;
- create orthomaps and DEMs (digital elevation models), using drone photographs.

This course requires no previous archaeological fieldwork experience; however, since it is designed as a higher-level archaeology class, a substantial level of archaeological, historical, or anthropological knowledge is expected.

### 2. Course Resources and Activities

Given the ever-changing nature of the subject matter, rather than a particular textbook, we will be using chapters and articles from recent and up-to-date publications and online sources. The state of the discipline is such that half of the reading list changes every year. The readings, lecture slides, and workflows/technical tutorials for the computer-based projects will be regularly posted on Moodle as PDFs.

For the computer-based projects, the students may choose to use the computers in the CYA ARCHLab or their own computers. For the 3D modeling assignments, they can use their own DSLR cameras, or a camera provided by CYA. At the end of the semester the instructor will have the three best models 3D-printed and proudly present them to the winners.

### 3. Course Requirements

- a) Large object / Area 3D modeling:** Using the tutorial provided, you will create a 3D model of a large object or an area, such as a statue, garbage bin, the interior of your room, a tombstone or memorial monument from a cemetery, your incredibly motionless friend's body, the slope of a hill, an ancient wall from the Philopappos Hill, etc...
- b) Small object 3D modeling:** Using the tutorial provided, you will create a 3D model of a small object, such as a stone artifact or a piece of jewelry. As archaeological objects in museums cannot be photographed from all angles, neither would it be legal to do so without a permit, you will need to choose a modern object.
- c) 2D digital recording of architectural features or trench sections:** The days of architectural illustrators using their plumb bobs and rulers have long gone. In this assignment, you will learn how to use photogrammetry-based orthomosaic plans to create publication-quality 2D stone plan illustrations of architectural features or vertical trench sections.
- d) Group Project - Grant Application:** Together with your group members, you will write an official grant application for a fictional archaeological project. You will need to: i) come up with a methodology incorporating the knowledge you acquired in our course, ii) determine which advanced tools or techniques to utilize, iii) calculate your expenses, iv) justify your choices regarding the terrain, geology, topography, and history of the fictional research area, v) hopefully convince the grant committee, which consists of the instructor. No budget limits. The group members will present their projects towards the end of the semester and submit the written version to the instructor, which will be ca. 1000 words.
- e) In-class Final Exam:** Your knowledge of both technical (e.g. how do we use *thermal imaging* as a remote sensing tool in archaeology?) and theoretical/ethical (e.g. do digital methods and the pace and accuracy they provided prevent us from thinking deeply about fundamental issues?) aspects of the course will be assessed.
- f) Class participation:** The frequency and quality of the questions raised and contributions to in-class discussions and practice will determine your class participation grade.

### 4. Grading and Evaluation

Your grade for this course will be based on the following distribution:

Assignment	%
Large object / Area 3D modeling	10%
Small object 3D modeling	15%
2D architectural illustration	10%
Group Project - Grant Application	20%
Final Exam	30%
Class participation	15%

- If you intend to upgrade the course to 400-level, one additional 3D model and a research paper (4000 words) will be required.

### 7) Use of Laptops and Tablets

In-class or on-site use of laptops and other devices is permitted if that facilitates course-related activities such as note-taking, looking up references, etc. Laptop or other device privileges will be suspended if there are indications that they are not being used for class-related work.

### 8) Attendance Policy

Only **two** unexcused absences will be allowed. A third unexcused absence will lower your final course grade by one letter per *CYA Attendances and Absences Policy*. Further unexcused absences may lead to the placement of a student on academic probation. Students will need to make up missed work for any absence (excused or unexcused) by completing an additional assignment that the instructor will determine based on the nature of the missed class day. Failure to complete missed work will result in the reduction of minimum one letter grade. Illness or other such compelling

reasons which result in absences should be reported immediately to the Student Affairs Office, via the form available in the Student Portal.

### 9) AI Policy

What a lucky course! Only the Grant Application Group Project lends itself to AI usage. Within the framework of this project, you **are allowed** utilize AI to generate visuals of your hypothetical project environment, but **not** to come up with the initial concept – that should be created as part of a team brainstorming session.

Your project's technical and methodological details **must** follow the course material and **should not** be generated by AI. Unless you train an AI engine with everything that we will have done throughout the entire semester, AI comes up with very poor (C- or D level) recommendations.

### Class Schedule

1	<b>Introduction to Digital Archaeology</b> Introduction to archaeology as a discipline Introduction to course
2	<b>Archaeological Fieldwork Methodology</b> Introduction to survey methodology Principles of archaeological stratigraphy Stratigraphical analysis & Harris Matrix
	<b>MAKE UP FRIDAY: CLASS CANCELLED – Hüseyin out of country</b>
3	<b>Basic Principles of Photography &amp; 3D Modeling</b> Aperture, Shutter Speed, ISO Exposure Triangle Archaeological Photography
4	<b>Digital documentation of archaeological fieldwork I</b> Stratigraphical recording The paper form revolution Archaeological databases: what to record? Software solutions
5	<b>Photogrammetry I</b> Introduction to photogrammetry 3D modeling and field archaeology Large Object and Area photogrammetry with handheld cameras LiDAR based iPad Photogrammetry
6	<b>Photogrammetry II – VK4 – ARCHLAB</b> Introduction to ArchLab computers and software Introduction to CYA Cameras Photography practice for the area/large object assignments <i>Software workflow for large object / area models</i>
7	<b>Remote Sensing in Archaeology</b> Geophysical Methods of Remote Sensing LiDAR Thermal Imaging Satellite Imagery
8	<b>The use of drones in archaeology</b> History of aerial photography and archaeology Aerial imagery as a remote sensing tool Types of drones Drones and macro-scale 3D modeling Topographic Maps
9	<b>Archaeogaming</b> Computer Games and the Ancient World Archaeologists and Archaeology in Computer Games Archaeology of Computer Games  <b>Photogrammetry III</b> <i>Software workflow small object models – Lab practice</i>
10	<b>Digital documentation of archaeological fieldwork II</b>

	Real-time tablet-based digital documentation. Case Studies: SCIP & GAP Kaymakçı, Keros, Agora – iDIG
<b>11</b>	<b>Cultural Heritage Management and Digital Age I</b> 3D reconstructions of ancient artifacts and monuments Did a virtual museum save Palmyra? New Media: museums & archaeological sites Ethics of digital cultural heritage
<b>12</b>	<b>Field day - Old School Archaeological Illustration</b> Introduction to analog architectural drawing methods Flying a drone on Ardittou Hill
<b>13</b>	<b>Archaeological Illustration II</b> Photogrammetrical orthomosaic trench plans Photogrammetrical façade and trench section drawings <i>Software workflow for 2D digital recording of architectural features</i>
<b>14</b>	<b>Cultural Heritage Management and Digital Age II</b> The Internet, social media, and ancient studies Pseudoarchaeology wars AR and VR in archaeology
<b>15</b>	<b>GIS and Spatial archaeology I</b> GIS and spatial analysis in archaeology: Basic Concepts GIS software solutions: an overview
<b>16</b>	<b>GIS and Spatial archaeology II</b> GIS and Survey & Excavation Methodologies Case Studies
<b>17</b>	<b>New approaches in Archaeological Sciences I</b> Zooarchaeology, Paleoethnobotany, Physical Anthropology, Micromorphology and Geoarchaeology
<b>18</b>	<b>New Approaches in Archaeological Sciences II</b> Ancient-DNA Revolution and a new understanding of the human past Archaeological critique
<b>19</b>	<b>Big Data in Cultural Heritage Management and Archaeology</b> Introduction to formal ontologies, semantics, and archaeology The potential of semantics and its application
<b>20</b>	<b>AI and Archaeology</b> AI as a research tool in archaeology and ancient studies Site detection & Find Analysis
<b>21</b>	<b>Field day</b> – Setting up a Total Station Recording with a dGPS unit Lidar based iPad Photogrammetry
<b>22</b>	<b>Student Presentations</b>
<b>23</b>	<b>Theorizing Digital Archaeology</b> Critical approaches Efficiency vs Slow Archaeology Debate
<b>24</b>	<b>MAKE UP DAY:</b> General Review for the Final Exam
	<b>Final Exam</b>

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