LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

FAKULTÄT FÜR KULTURWISSENSCHAFTEN

INSTITUT FÜR DIGITALE KULTURERBE STUDIEN

Institute for Digital Cultural Heritage Studies (IDCHS)
Winter School Methods in Digital Heritage
Syllabus 2026
(4.0 ECTS or 6.0 ECTS)

Instructors: Prof. Dr. Nicola Lercari and Dr. Anastasia Eleftheriadou

Instructor Emails: n.lercari@lmu.de

Tutors: Moritz Baiter and Francesca Chessari

Tutor Emails: moritz.baiter@yahoo.de; f.chessari@campus.lmu.de

Time and Location: from Monday, March 16 to Friday, March 27 (see details in section VI. Schedule).

Classroom/Computer Lab: CIP Pool 02 - Akademiestr. 7 (internal courtyard).

Moodle Self-enrollment: find the course e-learning webpage at https://moodle.lmu.de, sign in with the LMU credentials you received upon enrollment, find the course (MDH Winter School 2026), then use the code WS-MDH26.

Social Media Hashtag: #WSMDH26

Course Description

Heritage professionals and archaeologists have long employed digital imaging and laser scanning techniques to document, analyze, and digitize museum collections, historic buildings, and archaeological sites. In this course, students will develop competencies in digital photogrammetry and 3D scanning applications related to cultural heritage and archaeology through a combination of fieldwork and computer lab activities. These experiences will introduce essential principles and toolsets. The exercises will cover a range of workflows, including image acquisition and processing (digital photogrammetry), object digitization planning and processing of raw data (3D scanning), creating derived products (such 3D mesh models, and digital elevation models), and data visualization for analysis and dissemination purposes. Students will compile their work into a portfolio, which will be graded as their final exam, and present their projects at the Institute for Digital Cultural Heritage (IDCHS) VR Lab. Two data acquisition sessions will take place at partner museums in Munich: the Museum für Abgüsse Klassischer Bildwerke München and the Staatliche Museum Ägyptischer Kunst. These activities will complement the laboratory work and expose students to a real case study.

I.Topics:

The first week of this intensive course covers key concepts and toolsets in digital photogrammetry applications for cultural heritage and archaeology. The topics include: digital photography (e.g., focus; focal length; depth of field; shutter speed; color calibration; framing; sensors; image resolution; lighting; file formats; storage); drone photography; digital photogrammetry image acquisition techniques (e.g., accuracy and precision; calibrated versus non-calibrated cameras; recommended lenses; collinearity; image orientation; image matching; control points; point-source lighting with constant radius from subject, light

probes, common mistakes); data preparation (e.g., file batch renaming; format conversion; color profiles; image-enhancing); data processing (e.g., dense stereo matching, structure from motion; desktop versus cloud digital photogrammetry processing; proprietary versus open-source software; georeferencing); basic considerations on data analysis for research-driven applications (e.g., segmentation, filtering, transforming, and enhancing various photogrammetric products for further study in a Geographic Information System (GIS); basic visualization principles and tools.

The second week of the winter school introduces participants to structured-light 3D scanning for cultural heritage and archaeology. Using the Artec Leo and Artec Spider II, the course covers the principles of structured-light technology, the advantages and limitations of different handheld scanners, and considerations for choosing appropriate tools. Participants will gain hands-on experience in planning and executing scans of objects and collections, focusing on workflow design, data management, and capture strategies. Training will emphasize operational practice, including calibration, resolution, accuracy, and color capture, as well as common challenges such as occlusions and reflective surfaces. The week also addresses processing workflows—aligning scans, cleaning and filtering data, generating meshes, and preparing models for visualization and analysis. By the end of the week, participants will understand how to produce accurate, high-quality 3D models suitable for both research and heritage documentation.

II. Format, Procedures, and Workload:

The course structure is: (2) intensive weekly exercise sessions. You will inform us of your ECTS preference during our first meeting.

Format 4.0 ECTS: assigned readings, tutorials, digital assignments, hands-on sessions at our partner museums, LMU Moodle. The final exam is structured as follows: 1) a portfolio compiling all the digital material and written reports produced during the winter school and 2) a final presentation at the Institute for Digital Cultural Heritage VR Lab.

Format 6.0 ECTS: assigned readings, tutorials, digital assignments, hands-on sessions at our partner museums, and data capture practica in Munich city center, LMU Moodle. The final exam is structured as follows: 1) a portfolio compiling all the digital material and written reports produced during the winter school, 2) a final presentation at the Institute for Digital Cultural Heritage VR Lab, and 3) a 10-15-page term paper reflecting on one of the digital techniques learned during the winter school and its applications. **The term paper is due twenty days after the end of the winter school and must be submitted electronically through the LMU Moodle page for the course**.

Certificate of completion:
Students who select the 4.0 ECTS format will receive a printed certificate before they return home.

Students who opt for the 6.0 ECTS format will receive a digital copy (PDF) of their certificate after their term paper is evaluated.

III. Tutorials

Tutorials and digital assignments for this course are complex. They require a lot of commitment and a good understanding of the course methods. This is why you must complete the assigned tutorials according to schedule and submit your digital assignments on time.

In each exercise, you will read and follow step-by-step tutorials, create digital material, and a three-page written report.

You will also receive freely accessible online discussions (on Moodle) to share comments, ideas, and reflections with your classmates and instructors.

IV. Mandatory Readings (please read text one before the beginning of the Winter School and text two before the start of the second course week):

1. Chapters 1,2, 3 from Bedford, Jon. 2017. Photogrammetric Applications for Cultural Heritage: Guidance for Good Practice. Swindon: Historic England. http://historicengland.org.uk/images-books/publications/photogrammetric-applications-for-cultural-heritage/.

2. Jeffrey Ian Wilson. 2025. https://jeffreyianwilson.com/courses/3d-scanning-masterclass/lessons/introduction-to-structured-light-scanning/ (accessed on 01.10.2025)

A complete list of readings, tutorials, and exercises will be posted on Moodle during the workshop.

VI. Winter School 2026 – Extended Schedule

DATE	ACTIVITY/WHERE	PERSONNEL	TO DO
Friday, March 13	Arrival in Munich & Registration at accommodation	MISU Staff	
Saturday, March 14			
11:00-13:00 LMU Main Building	Meet & Greet at LMU Main Building, Geschwister-Scholl-Platz 1 (in front of main entrance). Tour the Institute for Digital Cultural Heritage and LMU StuBistro and LMU Mensa (lunch there at the end of the tour)	Tutor 1 (Mauritz Baiter) & Tutor 2 (Francesca Chessari) + Mina Yacoub	Key Moritz for IDCHS & CIP
Sunday, March 15	Optional excursion to Schloss Neuschwanstein OR free time	Book with MISU	
Monday, March 16			
9:00-9:20 Welcome & Introduction	Meet at Akademiestr. 7, CIP Pool 02 - Welcome address by Prof. Dr. Nicola Lercari + Dr. Anastasia Eleftheriadou + each student introduces him/herself	Prof. Lercari + Dr. Eleftheriadou	Give out LMU merchandise – Slides on Intro to Digital Heritage + Intro Digital Photogrammetry
9:20-11:00 Computer Lab (CIP Pool 02)	Prof. Lercari's presentation "Cultural Heritage in the Digital Age and introduction to Digital Photogrammetry"	Prof. Lercari	Dr. Eleftheriadou and Mina Yacoub prepare Drone & RealityScan
11:00-12:45	Tour of the IDCHS	Prof. Lercari & IDCHS staff	VR Lab + Research Lab
11:20-12:45	IDCHS Research project presentations in AKA Rm. 302	IDCHS staff	Add slides to Google Slides + book room
12:45-14:00	Lunch Break* - LMU Mensa at Leopoldstr. 13		
14:00-14:15	Group photo with Ms. Weihmüller in front of Akademie Bild.	Ute Weihmüller	Request for using Photos of all students (Print)/ask

			ECTS – News1: start W.S.
14:15-18:00	Lessons & supervised exercises (complete digital photogrammetry lab assignment 1 – statue reconstruction in RealityScan)	Dr. Calderone + Moritz	explain that seating in CIP pool is fixed
15:45	Tutors 1 & 2 bring equipment to MfA	Moritz + Mia	Meet with Herr Ziegler
Tuesday, March 17			
9:00-14:00** Abgüsse Museum	Digital photogrammetry at Abgüsse Museum (meet at scheduled time slot at Katharina von Bora Str. 10 – Gartensaal) (complete lab 2 – capture photos of MfA object)	Prof. Lercari, Dr. Calderone, Mina, Tutors 1 (meet up at (8:30)	Group 1 leaves with mina to CIP Pool to start Lab – News2: W.S. MfA
14:00-15:00	Lunch Break* split in Group 1 and 2 if Mina needs more time for data - LMU StuBistro on Adalbertstraße 5		
15:00-18:00	Lessons & supervised exercises (complete lab 3 – reconstruct MfA object in RC)	Prof. Lercari, Dr. Eleftheriadou	
Wednesday, March 18 to Friday, March 20			
9:00-12:45 Computer Lab (CIP Pool 02)	Lessons & supervised exercises complete lab 4 (archaeological context reconstruction in RC) and lab 5 (drone mapping in RC)	Prof. Lercari, Dr. Eleftheriadou	Possible News working in CIP Pool – Wed 18 slides on Heloros (90 mins)
12:45-14:00	Lunch Break* - LMU StuBistro on Adalbertstraße 5		
14:00-18:00	CIP pool of institute available for group work projects	Tutor 1	Mina & tutors prepare scanner for Monday
Friday, 20	Staff Meeting 13:00 to plan for Week 2		
Monday, March 23			
9:00-14:00** SMAEK	3D scanning with Artec Leo at Staatlichen Museum Ägyptischer Kunst (SMAEK) (meet at scheduled time slot at Gabelsbergerstraße 35, 80333 München – main lobby) (complete lab 6 capture 3D scans of SMAEK object)	Prof. Lercari, Dr. Eleftheriadou + Mina Yacoub, Tutors 1 & 2 (pick up equipment at IDCHS)	News3: SMAEK Artec Leo
14:00-15:00	Lunch Break* - LMU StuBistro on Adalbertstraße 5		
15:00-18:00	Lessons & supervised exercises (start lab 7 post-process SMAEK object in Artec Studio)		
Tuesday, March 24			
9:00-14:00** (CIP Pool 02)	Lessons & supervised exercises (finalize lab 7 post-process SMAEK object in Artec Studio)	Prof. Lercari, Dr. Eleftheriadou + Mina Yacoub, Tutors 2	Tutor 1 & 2 grade assignments
14:00-15:00	Lunch Break* - LMU StuBistro on Adalbertstraße 5		
15:00-18:00	3D scanning with Artec Spider at CIP Pool (complete lab 8 capture 3D scans of small demo object + start lab 9 post-process demo object in Artec Studio)		Tutor 1 & 2 grade assignments
Wednesday, March 25 to Thursday, March 26			
9:00-12:45	CIP pool 02 available for participants (work on & complete lab 7 and lab 9 assignments + prepare final project presentation)	Tutor 2	Mina prepares final presentations + Tutor 1 & 2 grade assignments
12:45-14:00	Lunch Break* - LMU StuBistro on Adalbertstraße 5		
14:00-18:00	CIP pool 02 available for participants (work on & complete lab 7 and lab 9 assignments + prepare final project presentation)	Tutor 1 & 2	Tutor 1 & 2 grade assignments + prepare & print certificates
Friday, March 27			

10:00-14:00	Final presentation (VR Lab) and discussion of participants' projects, final reception and delivery of the certificates (lunch break as usual)	Prof. Lercari, Dr. Eleftheriadou, Tutors 1 & 2 help setup VR Lab)	News 4: Publish final presentations+
Saturday, March 28	Departure		

* To ensure we can resume sessions on time and reduce your meal costs, we recommend having lunch at the LMU StuBistro on Adalbertstraße 5. Find more LMU dining options and open hours at https://www.studierendenwerk-muenchen-oberbayern.de/mensa/standorte-und-oeffnungszeiten/muenchen/

* We will organise turns to complete your assignments at partner museums due to available photographic or laser scanning equipment. A schedule will be shared in class or on Moodle the day before.