

**Technology Applied to Humanities and Heritage
Studies I: Digitalising the Past Virtual, Augmented
and Mixed Realities**

Code: 44253
ECTS Credits: 6

Degree	Type	Year	Semester
4317127 Digital Humanities and Heritage	OT	0	2

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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Use of Languages

Principal working language: spanish (spa)

Other comments on languages

Bibliography mostly in English. Some complementary lectures can be given in Catalan

Prerequisites

To attend these studies, the general prerequisites of the MA degree on Humanities and Digital Heritage are necessary. In general, the student should have already some studies at BA-level on Humanities and / or Social Sciences disciplines. The course can also be useful to computer science graduates who want to specialize in the use of digital technologies in the field of Humanities and cultural studies, although they do not have previous experience on Humanities nor Cultural studies. Familiarity, at use level, with computers and standard office software is required. Although not mandatory, prior training, at a basic level, in the use of computerized databases, computer-assisted cartography, digital photography and statistics is recommended.

The basic and reference bibliography is in English, as well as the software to be used. Knowledge of English at the level of specialized reading is therefore recommended.

Objectives and Contextualisation

Introduction to the use of modern virtual reality technology, with special emphasis on the reconstruction of archae

Examples of extended realities (virtual, augmented and mixed) are presented and the didactic and scientific use:

("serious games"). The notion of artificial society and computer social simulation is introduced in agent-based sy

Competences

- Act in a creative and original way with solidarity and spirit of scientific collaboration.
- Analyse and extract relevant scientific information from documents and historical, artistic and literary digitized materials.
- Critically analyse a particular scientific problem based on specific documentation.
- Design and plan impact and cultural innovation projects which use the possibilities offered by information and computer technologies.
- Design extended reality systems for use in social and humanistic studies and cultural projects.
- Ensure value and quality, self-discipline, rigour and responsibility in scientific work and dissemination.
- Evaluate the possibilities offered by technology in the production of new forms of cultural, social and humanistic creation and co-creation.
- Incorporate educational methodologies for communication and learning of the content of the projects related to digital humanities and heritage.
- Incorporate the use of computer technology in the communication and transmission of culture to specialist and non-specialist audiences and evaluate the results.
- Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
- Manage cultural projects that use information and computer technologies in any area.
- Recognise and use the appropriate computer tools for the acquisition, digitization, indexing and processing of documents and historical, artistic and literary materials.
- Recognise and value the social consequences of the work carried out, taking into account the diversity of human communities in questions of gender, identity and multiculturalism.
- Recognise the main challenges in the area of study of digital humanities and heritage.
- Students can communicate their conclusions and the knowledge and rationale underpinning these to specialist and non-specialist audiences clearly and unambiguously.
- That students are able to integrate knowledge and handle complexity and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
- That students have the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
- That the students can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- Work in interdisciplinary teams.

Learning Outcomes

1. Analyse the teaching sequence that should be used in the script of a computer game with humanistic and cultural content.
2. Analyse the workings of systems of virtual, augmented and mixed reality and their application in humanities and cultural studies.
3. Apply criteria of scientific rigour in the production of academic and professional work.
4. Apply ethical aspects in the analysis of cultural needs for a broad range of audiences.
5. Construct computer simulations different social processes.
6. Create a script on what forms the basis of animated virtual reconstruction of a historical scene.
7. Demonstrate efficiency in the extraction of social and cultural information from humanistic documents using computer simulation technologies.
8. Evaluate and justify the use of 3D scanner in the area of digital heritage.
9. Evaluate educational needs that can be satisfied by a system of extended reality.
10. Evaluate the real possibilities of reaching the public through cultural action.
11. Evaluate the use of a focus based on educational games for designing a system of extended reality.
12. Form part of multidisciplinary working teams in which academic reflections and procedures are central.
13. Highlight ethical aspects in cultural projects and respect for different opinions and way of being and doing things.
14. Include proposals and reflections of work carried out linked to the perspectives of: gender, universal accessibility, multiculturalism and intergenerationality.
15. Include virtual reconstruction of archaeological objects, historical monuments and other heritage elements in a cultural project.

16. Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
17. Make innovations incorporating creativity and originality in humanistic and cultural studies with a clear commitment to quality.
18. Make use of computer tools that allow co-design of computer games and participation of the user community for these designs.
19. Make use of computer tools that promote co-creation of computer simulations.
20. Propose innovative and competitive ideas based on knowledge acquired in fields which are not directly related a priori .
21. Reason and justify the technologies needed in the area of creating hyper-realistic models.
22. Reason and justify the technologies needed in the area of telepresence and haptic environments.
23. Rehearse the use of incrusted and/or ubiquitous computation mechanisms.
24. Rehearse the use of visual and audio person-computer interaction in a system of extended reality.
25. Solve practical problems related to the virtual reconstruction of archaeological objects, historical monuments and other heritage elements.
26. Students can communicate their conclusions and the knowledge and rationale underpinning these to specialist and non-specialist audiences clearly and unambiguously.
27. Summarise advanced knowledge existing in the field.
28. That students are able to integrate knowledge and handle complexity and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
29. That students have the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
30. That the students can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
31. Theorise the focuses based on artificial intelligence to increase accessibility of systems of extended reality.

Content

ARTIFICIAL INTELLIGENCE IN ARCHEOLOGY (examples and methodologies). Case studies with 3D scanner. Metrology and Shape Analysis. Classification. Interpretation. Reverse engineering
 FROM THE FRAGMENT TO THE ARTIFACT. RECONSTRUCTION. Virtual anastilosis in reconstruction of buildings. Computer vision techniques for reconstruction. Artificial intelligence techniques in reconstruction
 CREATION OF VIRTUAL MODELS. Solid modeling, textures and rendering. Scene composition. Creation of virtual landscapes

ANIMATION AND CUSTOMIZATION OF VIRTUAL MODELS. "Avatars" and characters in video games. Simulation of human movement. What is an "agent"? Interaction between agents in a virtual environment
 VIRTUAL MODELS IN ARCHEOLOGY. Study cases

INTRODUCTION TO THE VIRTUAL MUSEUM. Use of mixed and augmented reality systems in museums and archaeological sites.

"SERIOUS GAMES" AND ANIMATIONS IN ARCHEOLOGY AND HISTORY. Study cases

ARTIFICIAL SOCIETIES. Agent Based Models. Introduction to NetLogo. Validation of a social simulation.

MODEL EVALUATION. Study of the reliability, impact and relevance of a digital model from the past.

Methodology

Guided activities: theoretical classes with an explanation of computer techniques and their theoretical and methodological foundations. Seminars of critical discussion of specialized texts.

Supervised activities: Presentation of computer equipment. Practical work with hardware and software. Individualized tutorials to monitor the activities and work entrusted, and to apply the knowledge and skills acquired in the final work of the module.

Autonomous activities: search for documentation, elaboration of databases, exercises of application of the studied analysis techniques, reading of texts, writing of works.

Problem-based learning. Case-based learning. Classroom practical work. Seminars. Workshops. Debates. Elaboration of written essays. Personal study

Guided activities may be in person or online.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Explaining digital technologies and their applications	36	1.44	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 14, 15, 12, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10
Type: Supervised			
Practical work with computer hardware and software	25	1	1, 23, 24, 8, 5, 6, 19, 18, 14, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 11
Type: Autonomous			
Reading specialized literature and reference work	81	3.24	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 15, 17, 12, 28, 30, 29, 22, 27, 16, 31, 9, 10

Assessment

Individual test on the topics explained in class (30%).

Reports and written work (individually or in groups). They can be a prospective study that assesses the need to apply any digital technology in the field of humanities or cultural heritage studies, a critical bibliographic study on computer methodology and its theoretical implications, where a practical application of one of the techniques explained with students' own data (25% of the final grade).

Written summaries of the practical sessions, emphasizing the positive and negative aspects of the techniques and methods explained (25% of the final grade).

Critical commentary of specialized texts, from the bibliography that will be suggested at the beginning of the course (25% of the final note).

Class participation (face-to-face or online), attendance at tutorials (face-to-face or online). 10% of the final grade.

Participation in conferences scheduled for the coordination of the master's degree and other complementary activities (10%).

At the time of carrying out / delivering each assessable activity, the teacher will inform (Moodle, SIA) of the procedure and date of review of the grades.

The student will receive the grade of No evaluated as long as he / she has not taken the individual test on the topics explained in class and has not delivered more than 50% of the summaries of the practical sessions and text comments. In the event that the student commits any irregularity that could lead to a significant variation in the grade of an assessment act, this assessment act will be graded with 0, regardless of the disciplinary process that may be instructed. In the event of several irregularities in the evaluation acts of the same subject, the final grade for this subject will be 0.

In the event that the tests cannot be done in person, their format will be adapted (maintaining their weighting) to the possibilities offered by the UAB's virtual tools. Homework, activities and class participation will be done through forums, wikis and / or exercise discussions through Moodle, Teams, etc. The teacher will ensure that the student can access it or offer alternative means, which are available to them.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Conference attendance and complementary activities	10%	4	0.16	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 19, 18, 14, 15, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10
Lesson attendance and active participation	10%	0	0	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 19, 18, 14, 15, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10
Presentation of reports and written essays	25%	0	0	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 19, 18, 14, 15, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10
Theoretical exams (written or oral presentation)	30%	4	0.16	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 19, 18, 14, 15, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10
Written comments of specialized literature	25%	0	0	2, 1, 3, 4, 23, 24, 8, 5, 6, 7, 13, 19, 18, 14, 15, 17, 12, 20, 28, 30, 26, 29, 22, 21, 25, 27, 16, 31, 11, 9, 10

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Stanco, Battiato, Gallo, Digital Imaging for Cultural Heritage Preservation. 2011, CRC Press

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Software

During the teaching sessions different software will be used. It will be communicated to students