UAB
Universitat Autònoma de Barcelona

Applied Technologies I: from Data to Information

Code: 44250
ECTS Credits: 6

2024/2025

Degree	Type	Year
4317127 Digital Humanities and Heritage	OB	0

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

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

This module aims to introduce students to the design of databases and information systems and the processing of cultural and documentary information. Furthermore, the notion of "Big Data" is introduced and the possibilities of current applications in artificial intelligence and "Deep Learning" for information processing are evaluated. The applicability of computer techniques and tools is emphasized, so that they know their diversity and learn to use some of them in carrying out a specific project.

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.
- Ensure value and quality, self-discipline, rigour and responsibility in scientific work and dissemination.
- 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 multiculturality.
- 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 practical problems deriving from the application of computerised data analysis in the field of humanities and cultural studies.
2. Apply criteria of scientific rigour in the production of academic and professional work.
3. Apply ethical aspects in the analysis of cultural needs for a broad range of audiences.
4. Demonstrate efficiency in the extraction of social and cultural information from humanistic documents using data management technology.
5. Design the basic element of an information system using the ontologies and conceptual models of reference in humanities and digital heritage.
6. Evaluate the real possibilities of reaching the public through cultural action.
7. Explain computer technology for data base management in different areas of humanities and cultural studies.
8. Explain computer technology for statistical processing and data mining in different areas of humanities and cultural studies.
9. Form part of multidisciplinary working teams in which academic reflections and procedures are central.
10. Highlight ethical aspects in cultural projects and respect for different opinions and way of being and doing things.
11. Include proposals and reflections of work carried out linked to the perspectives of: gender, universal accessibility, multiculturality and intergenerationality.
12. Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
13. Make innovations incorporating creativity and originality in humanistic and cultural studies with a clear commitment to quality.
14. Make use of languages for data consultation based on the current standards in humanities and digital heritage.

15. Propose innovative and competitive ideas based on knowledge acquired in fields which are not directly related a priori .
16. Resolve practical problems related to data analysis and processing.
17. Students can communicate their conclusions and the knowledge and rationale underpinning these to specialist and non-specialist audiences clearly and unambiguously.
18. Summarise advanced knowledge existing in the field.
19. 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.
20. That students have the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
21. 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.
22. Theorise the use of multimedia technologies and focuses based on artificial intelligence to increase accessibility and communicability of data processing and analysis.

Content

INTRODUCTION TO DATABASES. Basic concepts. Historical evolution. Advantages and disadvantages of a database system.

INTRODUCTION TO EXISTING DATABASES AND TYPOLOGIES. Database architectures. Client / Server Architectures. Database typologies: relational and non-relational. Introduction to database management tools: Oracle, MongoDB, etc.

RELATIONAL DATABASES: THE ENTITY-RELATION MODEL. The entity-relationship model. Design criteria of an entity-relationship system. Design phases of a database. Capture and analysis of requirements. Analysis of the entity-relationship design of various documentary databases.

BASIC CONCEPTS OF RELATIONAL DATABASES. Data structure. Integrity rules. Data manipulation. Query languages. Introduction to SQL.

NON-RELATIONAL DATABASES. Introduction to non-relational databases. Introduction to object-oriented databases.

PRESERVATION OF FILES AND INTERNET. Preservation, durability and security of files of digitized information and digitally-born information. Access control and security. Concurrency control. Database recovery. Accessing data in the age of the Internet. Services "in the cloud".

ARTIFICIAL INTELLIGENCE AND DATA ANALYSIS. Big Data, artificial intelligence and data analysis. Introduction to machine learning and "Deep learning".

DATABASES IN HUMANITIES AND SOCIAL SCIENCES: DATA MODELS AND BIG DATA SOURCES. Europeana, CIDOC-CRM, ARIADNE-EU, ODOCH (Open Data and Ontologies for Cultural Heritage). Examples of structure of a social science database.

SPACIAL DATABASE. Introduction to Geographic Information Systems.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			

Theory sessions	36	1.44	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Type: Supervised			
problem solving	25	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Type: Autonomous			
Reading specialized literature and reference work	40	1.6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
SQL queries module	41	1.64	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

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. SQL practices with the auto-evaluation module.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Active participation in class	10	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Final synthesis questionnaire on contents covered during the classes	30	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Practical exercise on methodologies covered in class (I)	20	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Practical exercise on methodologies covered in class (II)	20	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Practical exercise on methodologies covered in class (III)	20	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

This subject does not allow single round evaluation.

- 3 practical exercises - individual and/or collective - on methodologies covered in class (each exercise accounts for 20% of the final grade).

- 1 final synthesis questionnaire on contents covered during the classes (30%).

- Active participation in class can be worth up to 10% of the grade.

At the time of completion/submission of each assessment activity, the faculty will inform (Moodle, SIA) about the review procedure and date of grades.

Students will receive the qualification of Not Evaluable if they have not taken the final test on the topics explained in class and have not submitted more than 50% of the exercises.

If a student engages in any irregularities that may significantly affect the grading of an assessment activity, that activity will be graded with a 0, regardless of any disciplinary proceedings that may be initiated. In the event of multiple irregularities in the assessment activities of the same subject, the final grade for that subject will be 0.

If the exams cannot be conducted in person, their format will be adapted (maintaining the weighting) to the possibilities offered by the virtual tools of UAB. Homework, activities, and class participation will be carried out through forums, wikis, and/or exercise discussions via Moodle, Teams, etc. The faculty will ensure that students can access these platforms or provide alternative means within their reach.

Bibliography

A. Silberschatz, H.F. Korth, S. Sudarshan, Fundamentos de Bases de Datos, 5a edición, *McGraw-Hill*, 2006.

C.J. Date, Introducción a los sistemas de Bases de Datos, Vol.1, 7a edición, *Prentice Hall*, 2001.

P.Rob, C. Coronel, Sistemas de Bases de datos. Diseño, implementación y administración, *Thomson-Paraninfo*, 2004.

M. Marqués, J.I. Aliaga, S. García, G. Quintana, SQL y desarrollo de aplicaciones en ORACLE 8, *Col.lecció; "Treball d'Informàtica i Tecnologia*, 9*, Universitat Jaume I*, 2001.

Bruseker, G., Carboni, N., & Guillem, A. (2017). Cultural heritage data management: the role of formal ontology and CIDOC CRM. In Heritage and Archaeology in the Digital Age (pp. 93-131). Springer, Cham.

da Silva, J. R. (2019). CIDOC-CRM. In Digital Libraries for Open Knowledge: 23rd International Conference on Theory and Practice of Digital Libraries, TPDL 2019, Oslo, Norway, September 9-12, 2019, Proceedings (Vol. 11799, p. 99). Springer Nature.

Software

- Oracle Server
- Oracle Client (SQLDeveloper)
- MongoDB server: (https://www.mongodb.com)
- MongoDB client: nosqlBooster (https://nosqlbooster.com)

Language list

Name	Group	Language	Semester	Turn

(SEMm) Seminars (master)	1	Spanish	first semester	afternoon