



Lidar, photogrammetry, GIS and the use of Claude AI to explore, discover and document new archaeological sites (Pyrenees, Lleida, Spain)

1. General information

An academic training course in which students learn the most current techniques (**GIS, Lidar, photogrammetry, Claude AI**) applied to the medieval landscape of the Pyrenees, the area with the **highest density of Romanesque sites** of the 10th to 14th centuries in Spain. This rich heritage, recognised by **UNESCO**, is made up of villages, monasteries, convents, churches and hermitages, and the aim of the course is to explore, discover and document archaeological sites, whether unpublished or already known.

Islam controlled the territory of the Pyrenees, but from the year 1000 everything would change. A new stage of Christian conquest began, organized by the Church, which built **defensive towers, castles, monasteries and temples** following the new building canons of the Romanesque style, in a sense heirs of the old Roman Empire, in tune with the tradition that characterized the Christian fervor of the 6th and 7th centuries.

Romanesque is the first artistic style shared across Christian Europe, developed **between the late 10th century and the 13th century**. In architecture it is recognized by thick walls of rubble or ashlar masonry, round arches, barrel and groin vaults, semicircular apses, narrow windows and tower-shaped bell towers. In the Catalan and Aragonese Pyrenees the so-called First Romanesque or Lombard Romanesque of the 11th century predominates, with apses decorated with blind arcades and lesenes, followed by the full Romanesque of the 12th century, with sculpted portals and programs of fresco wall painting in the apses. Alongside this architecture came the arts that accompanied it: wall painting, altar frontals and baldachins painted on panel, wooden carvings of Christ in Majesty and the Virgin and Child, metalwork and illuminated manuscripts.

Its importance for the course is twofold. On the one hand, the **churches, monasteries, castles and villages** of this period are what structure the medieval settlement of the Pyrenees: around them are organized the parish cemeteries, the necropolises of **anthropomorphic rock-cut** and slab-lined tombs, the abandoned villages and the watchtowers that the course aims to locate and assess. On the other hand, the Pyrenean region preserves **an exceptional density of buildings and works of art** from this period, many of them still in situ and others gathered in museums, which makes it possible to study the phenomenon in its original territory.

Within the area covered by the course, less than an hour from Malpàs (Pont de Suert, Pyrenees), are some of the best-known Romanesque ensembles in Spain.

The group of Romanesque churches of the Vall de Boí was declared a World Heritage Site by UNESCO. In the Aragonese Ribagorza, the highlights are the 11th-century cathedral of San Vicente de Roda de Isábena, with its crypt, its cloister and the chair attributed to Saint Raymond; the monastery of Santa María de Obarra, in the Isábena gorge; and, next to Pont de Suert, the ruins of the monastery of Sant Pere de Lavaix on the shores of the Escales reservoir.

Much of the wall painting and panel painting from these churches was moved to museums at the beginning of the 20th century to prevent its sale and dispersal. The **Museu Nacional d'Art de Catalunya (MNAC)**, in the Palau Nacional on Montjuïc, in Barcelona, holds the most important collection of Romanesque wall painting in the world; a visit there is the best possible introduction to the art of the area before touring the buildings themselves. Other museums, such as the one in Barbastro, display very unusual wall paintings.

The course is run from a residential base in Malpàs, in the municipality of Pont de Suert (Lleida), in the heart of the territory with the highest density of Romanesque churches, castles and abandoned villages in the Pyrenees: the Catalan Alta Ribagorça, the Aragonese Ribagorza with the valleys of the Noguera Ribagorzana and the Isábena, and the Ésera. Within 70 minutes of the base, 37 work sites have been inventoried, 17 of them selected as outstanding and 20 abandoned villages, which are the object of the field plan of this programme.

The aim of the course is to assess territories containing the most interesting sites from an archaeological and anthropological/bioarchaeological point of view, in order to develop survey and excavation projects in the coming years.

The intention is to carry out an analytical digital-processing project that supports the fieldwork of physical reconnaissance of each of the sites chosen for observation, so that the information gathered can be processed in the laboratory work.

2. What you will learn

2.1. In the Fieldwork:

- How to access archaeological sites through preliminary documentation from historical studies, government records and online repositories from a range of sources.
- Learning to assess the importance of each site according to its characteristics: architecture, state of preservation, areas of worship and habitation, outstanding features, accessibility and signs of a necropolis or cemetery.
- How the drone is used to take aerial photographs, and the value of taking coordinates with GNSS when necessary.
- Ground-truthing the anomalies detected in the Lidar to find out whether they are unpublished or already known.

2.2. In the Laboratory

- Learning the software and its processing: GIS (QGIS or ArcGIS), Lidar handling, photogrammetry and Claude AI.
- Use of photogrammetry techniques to produce 2D and 3D plans of the most emblematic sites from the drone photographs.
- Learning Lidar processing: how to obtain the digital data, how to process it and how to interpret the anomalies.
- Building the GIS project with the archaeological map and its attributes, adding the necessary information layers: hydrology, cadastre, historical satellite imagery and cartographic maps.
- Handling the data with the Claude AI tool.
- Writing the study diary and preparing the final report on the viability of each site and on which ones will be priorities in later phases of intervention, as survey or excavation, subject to the historical heritage regulations of the autonomous communities where the future research takes place.

2.3. Theory

- General introduction to the Spanish medieval Romanesque period, focused on the Pyrenees: history, site typology, building techniques, architecture, religion and funerary anthropology.
- Documentary sources for locating sites: official heritage inventories, historical cartography, and online repositories and scientific publications.

3. Directed at

Students and graduates in archaeology, history, art history, geography, architecture or related disciplines who wish to add digital heritage-documentation techniques to their training, and anyone interested in medieval archaeology who would like a first field experience.

No prior knowledge of archaeology or of the software is required; it is compulsory to bring your own laptop.

4. Field School life & language

A normal day at the field school will begin by picking up the students from the Malpàs residence with the van or the 4x4 safari vehicle, to travel to each of the sites that must be studied in this project and assess their characteristics: architecture, state of preservation, areas of religious worship and habitation, outstanding features, degree of accessibility and signs of a necropolis or cemetery.

For this, a drone will be used to take aerial photographs, from which orthophotos and photogrammetric models are produced. In addition, coordinates will be taken with GNSS where necessary. Each archaeological site will be studied in a fieldwork session of between 30 and 120 minutes, depending on its nature and

extent, and later, after lunch at midday, in the early afternoon, laboratory work will be carried out to process what was obtained during the morning.

Students will stay in an apartment in the village of Malpàs (Pont de Suert), a residence for a maximum of six students. The course lasts 16 days, of which 9 days are fieldwork and laboratory work, two days are for travel to and from Barcelona airport and the organisation's base where the group of students will stay, one day is devoted to visits to places of interest and museums specific to the medieval and Romanesque world, one day to the preparation of the personal report, and finally 4 more days are holidays and rest days.

The usual working day (9 days) runs for 7.5 hours: 5.5 hours out in the field for reconnaissance and documentation, and 2 hours of laboratory work on personal computers to produce the digital documentation, from the processing of the drone aerial photographs, the photogrammetry projects, QGIS or ArcGIS, Claude AI and the Lidar, with which each student prepares their personal report.

Two vehicles will be used if necessary: a minibus for the routes on paved roads and another, compulsory one, a 4x4 similar to a Jeep, Land Rover, Patrol or Toyota, for dirt tracks and trails. In some cases, it will be necessary to walk to the site for a maximum of 15 to 20 minutes there and back. The daily journeys from the residential base to the sites never exceed 70 minutes, either outbound or return.

On a typical day the group leaves Malpàs and follows the routes in the 4x4, which handles the dirt tracks and trails up to the sites; in some cases, there is a walk of 15 to 20 minutes there and back. The field trip lasts 5.5 hours, and at midday two free hours are set aside for lunch, when each student decides whether to have a picnic or eat in Pont de Suert, which has restaurants, bars and supermarkets. In the afternoon, two hours of laboratory work in the apartment on personal computers: downloading and processing the drone photographs, photogrammetry of the day's site, adding the data to the GIS project, consulting the Lidar and writing the study diary. The course is taught in English.

5. Certificates

At the end of the course students receive a certificate of participation stating the hours and the activities completed. Participants with outstanding performance may request a letter of recommendation from the organization.

6. Sessions & Cost

Sessions	Dates	Cost
Session #1	2027 July 14 – July 29	\$ 2600
Session #2	2027 August 01 – August 16	\$ 2600
Session #3	2027 August 19 – September 03	\$ 2600
Session #4	2027 September 06 – September 21	\$ 2600

7. Course fee

The course fee includes:

- Tuition and teaching.
- Transfer from Barcelona airport to Malpàs on the first day and back to the airport on the last day.
- Daily transport to get as close as possible to the sites.
- Accident insurance for the fieldwork.
- Certificate of participation.
- Visit to the “Museu Nacional d’Art de Catalunya” in Barcelona and to other museums in the Pyrenees and sites of the medieval Romanesque period.
- Accommodation in the Malpàs apartment, in three shared rooms for a maximum of three people of the same sex per room, with wifi, air conditioning, bathroom, dining room, terrace with swimming pool and garden.
- Invitation letter for the Schengen visa application, if required.

Airfare not included from the student home to/from Barcelona (Spain).

Meals are not included, although we will recommend some cafés and restaurants that do not exceed the average of 23 € /day in meals

*** If you sign up for two sessions in a row that take place in Malpas, the days between sessions (3 days) you will have the accommodation for free.**

8. Spaces available

The course is limited to six participants per session, the capacity of the apartment. Reservations are only effective once payment of the registration fee is received. If for any reason the course is cancelled, the amount is refunded in accordance with the field school’s refund policy.

9. Information and reservations

Contact:

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