

Academic Year/course: 2021/22

30749 - Graphical Representation of Heritage

Syllabus Information

Academic Year: 2021/22

Subject: 30749 - Graphical Representation of Heritage

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 470 - Bachelor's Degree in Architecture Studies

ECTS: 6.0

Year: 5

Semester: Second semester

Subject Type: Optional

Module:

1. General information

1.1. Aims of the course

Acquire the necessary knowledge and skills to approach rigorously and effectively the documentation process of heritage architecture, using photogrammetry as the main basis.

To achieve this, the course is based on the knowledge and understanding of photogrammetric techniques oriented to architectural surveying, applying these processes to obtain documentation of a proposed model.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDG, of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific goals, in such a way that the acquisition of the learning outcomes of the subject provides training and competence to the student to contribute to some extent to their achievement. In particular:

- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
 - Target 11.4 Redouble efforts to protect and safeguard the world's cultural and natural heritage

1.2. Context and importance of this course in the degree

The subject is located in the fifth degree's year. It is an elective course of specialization in the field of graphic techniques for heritage intervention.

1.3. Recommendations to take this course

Basic knowledge of digital camera use.

2. Learning goals

2.1. Competences

- "C.E. 95.OP - Capacidad para adquirir datos de espacios reales, desde la realización de croquis, mediciones, fotografías o levantamientos digitales."
- "C.E. 96.OP - Capacidad para tratar de forma digital datos geométricos, en una representación grafica avanzada."

2.2. Learning goals

In order to pass this course, the student must be able to:

- perform the geometric calibration of a standard digital camera.
- plan a photographic record for a photogrammetric reconstruction.
- make a geometric and photorealistic model from digital images using photogrammetric software.
- build a virtual model of a building with complex geometries.
- edit a 3D geometry generated through photogrammetry.

2.3. Importance of learning goals

The results obtained give the student a specialisation in the scientific techniques of intervention and representation of the architectural heritage.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The assessment will consist of two parts:

- practices throughout the course, both in the laboratory and in the classroom and in field sessions. The total value of the assessment of these practices is 30% of the final grade.
- a work that includes the main contents of the subject, and that will be delivered on the official exam day. Its value is 70%.

Students who do not attend the weekly practices can deliver some practice reports that reflect their contents and procedures, as proof of understanding the course contents. They should contact the teacher for details for the work, whose delivery will take place on the official exam day.

The assessment criteria remain the same: 30% for the practice reports, 70% for the final course work.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, and practice sessions.

The course is eminently oriented to practice so that both the teaching (primarily workshop sessions) and the activities proposed are practical.

At the beginning of the course, a calendar with the contents of the sessions and the planned activities is given. However, activities outside the classroom (related to the analysis of urban public spaces or buildings) may be substituted for other locations or similar buildings, according to the needs of the course or other external factors such as permissions, weather forecast, etc.

4.2. Learning tasks

This course is organized as follows:

- A01 Theory sessions
- A02 Seminars
- A09, A11 Practice sessions
- A13 Supervised assignments

Additionally, activities outside the classroom (for the photographic documentation of real architectural or urban environments) will take place. The students also have at their disposal tutorials with the teachers on schedule to be defined, depending on their learning needs.

4.3. Syllabus

This course will address the following topics:

- Acquisition of images
- Photogrammetric reconstruction. Scaling, referencing and measurement
- Basic reconstruction
- Camera model calibration
- Epipolar geometry
- Advanced reconstruction
- Photogrammetric reconstruction
- Precision analysis
- Handling of points and precision tables
- Geometric constraints
- Reconstruction from a single view
- Automatic matching
- Targets Calibration

- Photogrammetry and laser scanner
- Image capture and image processing
- Creation of point clouds and meshes from digital images
- Dimensioning and editing photogrammetric models
- Management of 3D models and generation of 2D documents
- Integration of photogrammetric models in 3D environments

4.4. Course planning and calendar

The equipment and materials to be used by the students are a laptop, camera, and photogrammetric software.

The course includes theory and practice sessions. The first are placed mainly on the first half of the course, and will give basic knowledge related to the tools used in the practice sessions.

The aim of the practice sessions is to obtain photorealistic models using digital photogrammetry. For this, the following activities are carried out:

- Tutored tasks in the computer lab
- Field sessions of data capturing in architectural environments
- Supervised sessions for the development of the assigned work/s, based on digital tools and on the data taken by the students themselves.

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the College of Higher Engineering and Architecture (EINA) website (<https://eina.unizar.es/>) and Moodle.