

## **28721 - Cartography, Geographical Information Systems and Remote Sensing**

### **Syllabus Information**

**Academic year:** 2023/24

**Subject:** 28721 - Cartography, Geographical Information Systems and Remote Sensing

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia

**Degree:** 423 - Bachelor's Degree in Civil Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### **1. General information**

The objective of this subject is that the student is able, after an analysis of the theoretical principles of cartographic projections, to be able to map, to effectively handle essential tools in civil engineering such as G.I.S. and remote sensing.

These two tools are fundamental in the knowledge and management of the terrain in engineering projects.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>), to the extent that thematic mapping is a tool that allows to visualize the information and spatial distribution of different phenomena that can reflect and analyze the degree of achievement of all SDG targets.

### **2. Learning results**

- Ability to prepare significant cartographic documents for civil engineering problems, Ability to elaborate and interpret the graphic documentation of a project, referring to the cartography that can be used in it the same.
- Ability to work with the different types of cartographic materials currently used in civil engineering.
- Ability to evaluate the usefulness and quality of cartographic documents.
- Principles, concepts and elements of geographic information modeling for incorporation and management of geographic information in the GIS, describing the analysis functions of this technology in a reasoned manner
- Ability to explain the conceptual aspects of remote sensing as a tool for geographic analysis in relation to planning and land management.

### **3. Syllabus**

#### **Unit 1: Geodesy.**

1.1 Concept and definition of Geodesy

1.2 Geometry of the Ellipsoid and the Geoid

1.3 Geodetic Networks

1.4 Reference and Coordinate Systems. Datum and fundamental point

#### **Unit 2: Cartographic Projections**

2.1 Mathematical concept of projection

2.2 Classification of projections

2.3 Most commonly used projections

2.4 UTM projection

#### **Unit 3: Geographic Information Systems**

3.1 Concept of G.I.S. Computer applications

3.2 Mapping resources

3.3 Data types in G.I.S. and computer file formats.

3.4 Vector and Raster Analysis Tools.

#### **Unit 4: Remote sensing.**

4.1 Concept and classification of remote sensing

4.2 Nature of electromagnetic radiation

4.3 Characteristics of satellites and sensors.

4.4 Raster analysis tools applied to remote sensing.

#### **4. Academic activities**

Lectures: 24 hours

Practical classes: 20 hours

Evaluation Tests: 6 hours.

Preparation of individual work: 90 hours

#### **5. Assessment system**

The subject will be assessment through two possible modalities to be chosen by the student by means of the following activities. In both modalities it will be necessary to obtain a 5 to pass the subject.

##### **Modality 1. Continuous Assessment.**

Theoretical exams (50% of the grade).

Partial exam 1 - (25% of the grade). Topics 1 and 2.

Partial exam 2 - (25% of the grade). Topics 3, and 4.

Practice (50% of the grade)

Practice Report - (20% of the grade)

QGIS Final Project Report - (30% of the grade).

This modality implies MANDATORY attendance to all practices.

Maximum of two DULY EXCUSED absences

Theory and practical parts are independent, if one of them is passed it is kept during the term.

A minimum of 3 must be obtained in each of the two parts, as well as in each of the two exams.

##### **Modality 2. Non-Continuous Assessment.**

Final theoretical exam (50% of the grade). Topics 1, 2, 3 and 4.

QGIS practical final exam (50% of the grade).

Theory and practical parts are independent, if one of them is passed it is kept during the term.

A minimum of 3 must be obtained in each of the two parts.