Universidad Zaragoza

Academic Year/course: 2024/25

60401 - Acquisiton and Organization of Geographic Information

Syllabus Information

Academic year: 2024/25
Subject: 60401 - Acquisiton and Organization of Geographic Information
Faculty / School: 103 - Facultad de Filosofía y Letras
Degree: 352 - Master's in Geographic Information Science and Technology for Land Management: Geographic Information Systems and Remote Sensing
ECTS: 10.0
Year: 1
Semester: Annual
Subject type: Compulsory
Module:

1. General information

This compulsory subject focuses on the first phase of the technological process of geographic information. It is designed for the student to acquire the theoretical and practical knowledge to prepare and enrich the spatial variables that will later be the object of analysis and modelling. Specific objectives: 1. To know the principles and elements of geographic information and its modelling. 2. To know and handle the principles, instruments and methods of spatial information collection. 3. To create and manage geographic information databases. 4. To know and manage spatial data infrastructures.
These approaches and objectives are aligned with the following SDGs: 2, 6, 11, 13, 14 and 15.

2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

1. Is able to conceptualize a problem of a territorial nature and constructs an operational model in terms of the GIS data model. In particular, the student is able to:

* Elaborate a conceptual model of a portion of the Earth's surface and express it by means of a text and by means of graphics and conventions proper to the area of scientific modelling.
* Design an operational model of a portion of the earth's surface using the principles and elements of the data models common in the scientific and technological field of GIS.
* Communicate clearly and unambiguously the design specifications of a particular model for implementation in GIS software.
* Describe the technologies associated with satellite positioning systems. In particular, students will be able to collect data with GNSS-based receivers and integrate the collected data into a GIS environment.

2. They has the necessary resources, in relation to remote sensing capture systems (satellites and sensors), to:

* Describe the different observation programs and assess the appropriateness of the images derived according to the nature of the analysis addressed.
* Locate and select the most appropriate images, using the most common search procedures (on-line satellite image servers, etc.)

3. Is able to apply field radiometry techniques for the spectral analysis of objects. More specifically, they is capable of:

* Explain in a reasoned manner what field radiometry is and describe its applications.
* Differentiate and use the different elements necessary to face a project in which field radiometry is a necessary technique.
* Apply different techniques for processing data obtained in the field, using specific computer programs for these tasks.

4. They is able to extract information from relational databases using SQL query language.

5. Handles the utilities and tools of ArcGIS for the creation and edition of elements of a GIS project. In particular, the student is able to:

* Manage the tools for creating and editing ArcGIS elements.
* Design and apply topology rules to ensure the consistency of the elements recorded in a GIS.

6. Rigorously applies remote sensing image georeferencing procedures. More specifically, they is capable of:

* Explain and differentiate the most frequent distortions and deformations of images acquired by a remote satellite and/or airborne sensor.
* Explain clearly what is meant by a georeferencing process and identify the situations in which its application is necessary.
* Differentiate between orbital and non-orbital georeferencing models and explain what type of distortions each one eliminates and what are their main advantages and disadvantages.
* Order and differentiate the phases of the georeferencing process by means of an empirical model and explain its basic aspects, arguing its choice.
* Solve a satellite image georeferencing process by applying an empirical model and using the necessary auxiliary elements.

7. Explain and handle the standards and metadata management tools in a solvent way. More specifically, they is capable of:

* Describe the basic elements of Spatial Data Infrastructures (SDI), assessing the facilities they provide for access to

geographic information.
* Argue the possibilities of creating Information Systems reusing the services and resources provided by a SDI.
* Create metadata to formally describe a geographic information resource, identifying the potential uses and benefits of that metadata.

3. Syllabus

The subject syllabus is organized in eight thematic blocks:
2.1- Geographic information and its modelling: principles and elements.
2.2- Principles, instruments and methods for collecting spatial information: GNSS systems.
2.3. (...): sensors/platforms.
2.4. (...): field radiometry.
2.5- Creation and management of geographic information databases: theoretical fundamentals of databases, database design/implementation, SQL language.
2.6. (...): creation and edition of elements in ArcMap; access to shared geographic data databases.
2.7. (...): georeferencing of remote sensing images.
2.8- Spatial data infrastructures (SDIs). Standards and metadata.

4. Academic activities

The program offers the students help to achieve the expected results and comprises the following activities that are distribute into the different thematic blocks:
1. Theoretical master classes.
2. PRACTICAL SESSIONS.
3. Supervised practical work.
4. Personal study.
5. Assessment

5. Assessment system

First Call:

Continuous assessment

This subject is evaluated separately according to the thematic blocks that compose it, participating in the final grade as follows: 2.1- 7.5%; 2.2: 10%; 2.3: 10%; 2.4: 12.5%; 2.5: 20%; 2.6: 15%; 2.7: 10%; 2.8: 15%. A minimum grade (≥4 points) in each block is required for averaging. The evaluation will take place within the class period.

The evaluation consists of the following tests: 2.1: paper (100%); 2.2: exam (30%) and group work (70%); 2.3: exam (50%) and individual work (50%); 2.4: exam (60%) and paper (40%); 2.5: exam (100%); 2.6: paper (100%); 2.7: exam (50%) and paper (50%); 2.8: paper (100%). The written tests are multiple-choice or, mostly, open-response exams of short/medium length.

Evaluation criteria: mastery of concepts, use of terminology, precision and degree of structuring of approaches, coherence in argumentation, clarity, justification of the approach adopted, originality of the approach, ability to relate concepts and formal correctness.

Global assessment.

Same type of tests and criteria as in the continuous test. It will be held on the date of the examination period set by the Faculty.

Second Call:

Overall evaluation: identical to that of the first call.

6. Sustainable Development Goals

2 - Zero Hunger
6 - Clean Water and Sanitation
11 - Sustainable Cities and Communities