Geographical Information Systems

Code: 106944
ECTS Credits: 6

2025/2026

Degree	Type	Year
Management of Smart and Sustainable Cities	OB	3

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Teachers

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Teaching groups languages

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

Prerequisites

In order to follow this subject without any difficulties, it is important to have gained the knowledge of the first year's subject Bases per a la Geoinformació (Basis for the Geoinformation), as well as having IT abilities, especially of office software and statistics

Objectives and Contextualisation

Theoretical and practical subject that provides an introduction to the field of Geographic Information Systems (GIS). One of the main objectives is to gain a good knowledge of how to deal with and analyse the located data on the land, by consolidating the theoretical aspects and the use of specific programs. The objective of teaching Geographic Information Systems is to gain some knowledge based on the conceptual and methodological basis. When finishing this subject, students need to know how to apply the acquired abilities to the needs required in other subjects through the consolidation of both the theoretical and practical aspects that have been developed. This implies knowing not only how to use GIS, but also to understand what is done when we work with them and why they are used.

Therefore, a double objective related to the theoretical and practical content of the subject is set: The conceptual context around GIS and all the abilities that require the use of GIS. At a general level, the main aim is to know and understand what GIS are, why they are used, how they work and when you need to use them within the framework of Gestió de Ciutats Intel·ligents i Sostenibles (Management of Intelligent and Sustainable cities).

At a conceptual level, the following objectives are set:

- Understanding the nature of geographic information and the tools needed for its use
- Knowing and understanding the two data structures used for modelling the reality

- Knowing how to introduce, structure and store geographic information, as well as the main handling and analysis functions of GIS
- Knowing the main data sources of GIS
- Understanding and knowing how to make the most of information systems as a tool to obtain answers to specific types of questions
- Knowing what types of actions are correct in each case in order to solve specific needs
- Gaining practical experience in solving problems typically found in the field

In the second case, the acquisition of skills, it is expected to provide students with the methodological tools that enable them to use GIS so they know what can be done, how it can be done and where it can be applied:

- Understanding and knowing how to make the most of information systems as a tool to obtain answers to specific types of questions
- Knowing what types of actions are correct in each case in order to solve specific needs
- Gaining practical experience in solving problems usually found in the geographic and territorial field.

From the objectives defined before, we are aiming to achieve a continuous interaction between theory and practice.

Learning Outcomes

1. CM10 (Competence) Develop projects related to the management, equity and sustainability of cities by applying elements of technological innovation, such as information and communication technologies.
2. KM14 (Knowledge) Apply cartographic conventions that allow for an appropriate design of maps as a means of transmitting information.
3. SM13 (Skill) Develop management platforms, integration of citizen services and governance based on the use of geoinformation.

Content

Block 0: GIS background

GIS History

Definition, components and GIS functions

Block 1: Geographic information

Information on the land and on phenomena in the land

Geographic and non-geographic organisations

Nature of the geographic information

The value of georeferenced information

Block 2: Data models in GIS

Raster model

Vector model

Data sources and publishing on the Internet

Block 3: Introduction to GIS use. Spatial analyst

Cartographic modelling and analysis

Proximity analysis

Block 4: Georeference

Localisation as a connecting factor

Basic georeference methods

Main reference systems

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes	18	0.72	CM10, KM14, SM13, CM10
Practical tasks in class guided by the teachers	32	1.28	CM10, KM14, SM13, CM10
Type: Autonomous			
Creation of practical tasks using specific programs and the recommended bibliography. Self-study	54	2.16	CM10, KM14, SM13, CM10

The theoretical knowledge is introduced and reinforced by the teacher in class and also through the students' own individual work when they study the specific materials or with dynamic learning activities set by the teacher of this subject. Students will also need to read a book, book chapter/s or an article (students' individual follow-up activity outside the class).
The technical and instrumental knowledge will be developed through a number of guided practical tasks during the class and other individual practical tasks and/or in small groups that students will need to do on their own. In these activities, we will work with the competences that enable students to gain the ability to prevent and solve problems, adapt oneself to unexpected situations and take decisions. They will also need to communicate efficiently, both orally and in writing, their knowledge, results and abilities by using their own IT tools correctly.

All the subject's data and materials will be available on the Virtual Campus through an IT platform used by the teachers (Moodle) that provides a Virtual Learning Environment to support the studies.
It is intended for the students to use specific GIS programs to develop their practical tasks: ArcGisPro (commercial) and MiraMon (free license for students).
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.

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Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Mid-term practical exams	25%	3	0.12	CM10, KM14, SM13
Mid-term theory exams	25%	3	0.12	CM10, KM14, SM13
Practical exercises delivered throughout the subject	50%	40	1.6	CM10, KM14, SM13

Evaluation
The evaluation process is continuous and it includes four evaluation activities distributed throughout the course:
Mid-term theory exams (25%)
Mid-term practical exams (25%)
Practical exercises (50%)
The average between the theory and practical exams is done through the following conditions:
A minimum qualification of 3 on the average of the two theoretical exams
A minimum qualification of 3 on the average of the practical exams
The students will only pass the exams if the average of their qualifications is at least a 5.
Single Evaluation
This subject does not provide for single evaluation system.

The final grade for a subject will be rounded to the nearest whole number when it is within one-tenth of a value that would result in a change to a higher qualitative grade.

Reevaluation
Once the normal evaluation finishes, students will have the possibility to do a reevaluation exam within the dates set by the Faculty. In order to do this retake exam, students need to be evaluated previously in a number of activities. The weight of these activities has to be equivalent to at least two thirds of the total qualification of the subject or module. (This condition is adapted to the legislation of UAB's evaluation system in the Article 112 ter. Retake http://www.uab.cat/doc/Modificacio_normativa_academica_CG120717).
Review of Qualifications

or each assessment activity, a place, date and time of review will be indicated where the student can review the activity with the teacher. In this context, complaints can be made about the grade of the activity, which will be evaluated by the teacher responsible for the subject. If the student does not submit to this review, this activity will not be reviewed at a later date.
Not Evaluated
If the student has not delivered anything, not attended to any laboratory session and not done any exam, the corresponding result will be "not evaluated". In any other case, "not delivered" counts as a 0 for the weighted average that will be maximum a 4.5. Therefore, if students participate in an evaluated activity, it impliestaking into account the "not delivered" in other activities as zeros. For instance, if a student has not attended a laboratory session, s/he will obtain a zero in that activity.
First Class Honours
First class honours will be awarded to those students that obtain a result of 9.0 or over in each part, up to 5% of those registered following a descending order of the final result.
Repeats Students
Students who are repeating the subject will not be treated differently.
Copies ans Plagiarisms
When we talk about copies, we refer to the evidence that the project or the exam has been partially or totally created without the intellectual contribution of the author. In this definition, we also include the proven attempt to copy in the exams and delivered projects and the violation of the laws that assure intellectual authorship. Plagiarisms refer to the projects and texts from other authors that someone pretends to be his/her own

creation. It is a crime against intellectual property. In order to avoid committing plagiarism, quote all the sources that you use when writing the report of a project. According to UAB's law, copies and plagiarisms or any other attempt to alter the results of one'sown evaluation or someone else's -allowing to copy, for example, implies a result ofthe corresponding part (theory, problems or practical tasks) of a 0 and in this case, the student will fail the subject. This does not limit the right to take academic and legal actions against those who have participated.

Use of AI

In this course, the use of Artificial Intelligence (AI) technologies is not permitted at any stage. Any work that includes fragments generated by AI will be considered a breach of academic honesty and may result inapartial or total penalty on the activity grade, or more severe penalties in serious cases.

Bibliography

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Oyala, Victor. (2011). Sistemas de Información Geográfica. http://wiki.osgeo.org/wiki/Libro_SIG.

Software

ArcGisPRO, MiraMon

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn

(PAUL) Classroom practices	1	Catalan	first semester	afternoon
(PAUL) Classroom practices	2	Catalan	first semester	afternoon
(PLAB) Practical laboratories	1	Catalan	first semester	afternoon
(PLAB) Practical laboratories	2	Catalan	first semester	afternoon
(PLAB) Practical laboratories	3	Catalan	first semester	afternoon
(TE) Theory	1	Catalan	first semester	afternoon