

**Geographic Information Systems**

Code: 104239  
ECTS Credits: 6

Degree	Type	Year	Semester
2503710 Geography, Environmental Management and Spatial Planning	OB	1	2
2504216 Contemporary History, Politics and Economics	OT	3	2
2504216 Contemporary History, Politics and Economics	OT	4	1
2504216 Contemporary History, Politics and Economics	OT	4	2

## Contact

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## Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

## Teachers

Josep Gili Prat

## Prerequisites

In order to follow this subject without any difficulties, it is important to have gained the knowledge of the first semester subjectt Introduction to the cartography.

## 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.

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.

## Competences

Geography, Environmental Management and Spatial Planning

- Combine distinct techniques and methods of representation and spatial analysis in elaborating materials for transmitting results.
- Critically analyse the relationship between society and the region applying the conceptual and theoretical framework of geography.
- Explain and represent territorial processes using statistical techniques, and graphic, cartographic and geographical information representations.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

Contemporary History, Politics and Economics

- Analyse the sociodemographic, geoeconomic and environmental dynamics at different territorial scales.
- Distinguish between and analyse the type of relations that have been established over the last century among the different social, political and economic agents on national, regional and international frameworks.
- Relate fundamental questions of the current economic situation with previous economic developments on the basis of the main elements of contemporary economic history.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.

## Learning Outcomes

1. Apply GIS for understanding territorial, economic, social and historical phenomena.

2. Combine distinct techniques and methods of representation and spatial analysis in elaborating materials for transmitting results.
3. Consider problems of inequality, population distribution and urbanisation in the world, among other things.
4. Contrasting and comparing several interpretations of geographical maps. And differentiate between different cartographical information systems.
5. Describing the spatial relationships, on different territorial scales, of the physical, economic, social and cultural territorial diversity.
6. Differentiate between different cartographical information systems.
7. Explaining the structure of today's world from a geographical point of view.
8. Perceive GIS as an instrument to provide results for specific questions.
9. Process and analyse local and regional data.
10. Recognise the two models of data used to represent reality (vector and raster data models)
11. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
12. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
13. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
14. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
15. Undertake basic image processing, from their acquisition to their use for category-type thematic cartographical use.

## **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

## Methodology

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. Moreover, a final synthesis practical task of this subject will be created.

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.

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.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes with IT support	15	0.6	6, 8, 12, 10
Practical tasks in class guided by the teachers	24	0.96	2, 6, 8, 14, 13, 12, 10, 9
Type: Supervised			
Individual and collective work tutored by teachers	30	1.2	2, 6, 8, 14, 13, 12, 10, 9
Type: Autonomous			
Creation of practical tasks using specific programs and the recommended bibliography. Self-study	75	3	2, 6, 8, 14, 13, 12, 10, 9

## Assessment

Mid-term theory exams (30%): there will be two partial theoretical exams, one halfway through the course and the other at the end of the course. The grades of these two exams will be averaged between them without a minimum grade.

Mid-term practical exams (30%): there will be two partial Practical exams, one halfway through the course and the other at the end of the course. The grades of these two exams will be averaged between them without a minimum grade.

Practical exercises (40%): 4/5 practical exercises will have to be delivered during the course. The planned delivery schedule will be presented at the beginning of the course.

The average between the grade of the theoretical exam (average of the two theoretical parts) and the grade of the practical exam (the average of the two practical parts) is only computed if a minimum grade of 4 is reached in both parts, and students will only pass the exams if the average of their qualifications is at least a 5. It is mandatory to hand in the practical exercises. Students cannot take an exam if all the practical exercises have been delivered. An extraordinary delivery date will be defined for the practical tasks not delivered within the originally established deadline, or delivered on time but suspended. Practical exercises delivered within this extraordinary period will be scored with a maximum grade of 5.

On carrying out each evaluation activity, lecturers will inform students (on Moodle) of the procedures to be followed for reviewing all grades awarded, and the date on which such a review will take place.

This subject/module does not incorporate single assessment.

#### RESIT EXAM

Once the ordinary assessment has been completed, students will have the opportunity to take a resit exam within the dates scheduled by the Faculty. To participate in this exam the students must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of 2/3 of the total qualification of the subject.

#### 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 assessed". 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 implies taking into account the "not delivered" in other activities as zeros.

#### FIRST CLASS HONOURS

First class honours will be awarded to those students that obtain a result of 9.5 or over in each part, up to 5% of those registered following a descending order of the final result.

#### REPEAT STUDENTS

Students who are repeating the subject will not be treated differently.

#### COPIES AND PLAGIARISMS

In the event of a student committing any irregularity that may lead to a significant variation in the grade awarded to an assessment activity, the student will be given a zero for this activity, regardless of any disciplinary process that may take place. In the event of several irregularities in assessment activities of the same subject, the student will be given a zero as the final grade for this subject. Those evaluation activities in which there have been irregularities cannot be reassessed.

### Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1 Theory exams	30%	3	0.12	6, 8, 10
2 Practical exams	40%	3	0.12	1, 2, 4, 15, 8, 14, 13, 12, 9
3 Practical exercises delivered throughout the course	30%	0	0	1, 2, 4, 5, 6, 7, 15, 8, 3, 14, 13, 11, 12, 10, 9

## Bibliography

### Reference

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Bosque Sendra, J. García, R.C. (2000), El uso de los sistemas de información geográfica en la planificación territorial. *Anales de Geografía de la Universidad Complutense*, 20: 49-67.  
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Laurini, R. y Thompson, D. (1992) Fundamentals of Spatial Information Systems Academic Press. Londres. 680 p.

Longley, P.A. Goodchild, M.F. Maguire, D.J. Rhind, D.W. (2001), Geographical Information Systems and Science. Wiley.

Maguire, D.J., M.F. Goodchild y D.W. Rhind (eds.) (1991) Geographical Information Systems. Principles and Applications. 2 Vol. Longman Scientific Technical. Essex. 649+447 p.

Oyala, V. (2011). Sistemas de Información Geográfica. <https://volaya.github.io/libro-sig/>

## Software

Specific software for Geographic Information Systems (GIS): ArcMap, MiraMon and/or QGIS.