

Tool II: GIS - Geoinformation Analysis

Code: 106758
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Sciences	OB	2

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

No prerequisites are required

Objectives and Contextualisation

The aim of the subject is to provide the basic knowledge necessary for the interpretation and production of spatial data, that is to say of Geoinformation, which allow the analysis and modeling of the environmental state. It will have a double theoretical-practical aspect: firstly, to provide conceptual knowledge associated with Cartography, in general, and Geographic Information Systems (GIS), in particular; later, practical activities related to the treatment, application and representation of Geoinformation will be developed.

At a conceptual level, the following objectives are formulated:

- To understand the nature of GIS (definition and characteristics)
- To know and understand the two data structures used to model reality (vector and raster)
- To know and understand how geographical information is entered, structured and stored
- To know and understand the main GIS manipulation and analysis functions carried out to solve different questions
- To know the main data sources and GIS applications

At a practical level, they are defined as follows:

- To understand and know how to take advantage of GIS as an instrument to obtain answers for certain types of questions
- To know which types of procedures are appropriate in each case to solve certain needs
- To acquire practical experience in solving problems characteristic of the discipline

So, the aim is not to show technique for technique's sake, but to make students aware of what can be done, how to do it and what to apply it to, continuously interacting theory and practice.

Learning Outcomes

1. CM27 (Competence) Assess factors related to the Sustainable Development Goals when undertaking environmental impact studies.
2. CM29 (Competence) Work independently on the resolution of environmental problems and practical cases that require statistical, cartographic or impact analysis.
3. KM37 (Knowledge) Identify the uses of geographic information systems, impact assessment techniques and communication and dissemination methodologies in the environmental field.
4. SM34 (Skill) Collect, analyse, measure and appropriately represent both qualitative and quantitative data, geographic information and observations of environmental impact.
5. SM35 (Skill) Apply the knowledge acquired to solve problems through the use of geographic information systems and impact assessment techniques.
6. SM36 (Skill) Use techniques and materials related to statistical analysis, the preparation of cartographic material and the drafting of environmental impact reports in the classroom and/or laboratory safely and effectively.

Content

The basic contents of the subject are:

Block 1: geographic information

- Basic principles of geospatial representation
- Main reference systems
- Basic georeferencing methods

Block 2: Main geographical sources

- Data models in a GIS
- Main geographic sources and geoportals: formats and standards
- Types of errors

Block 3: Data models

- Raster models: digital terrain models and other products. Basic treatment of remote sensing images
- Vector models

Block 4: The value of geographic information

- The value of georeferenced information
- Spatial integration of geographic information
- Evaluation of spatial relationships

Block 5: Use of GIS

- Spatial analysis functions in GIS: basic operations
- Digital terrain models and derivatives: spatial interpolation

- Application of GIS to socio-environmental problems
- Symbolization and cartographic design

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practices	28	1.12	
Theory	22	0.88	
Type: Supervised			
Resolution of practices and follow-up of doubts during the course	25	1	
Type: Autonomous			
Autonomous resolution of practices	35	1.4	
Preparation and presentation of results	35	1.4	

The subject is splitted into theoretical and practical materials. The theoretical material (fundamental and support concepts for applied knowledge) will be provided by the teacher through the Virtual Campus (Moodle) and it will require an independent work of reading and reviewing by the student. The teacher will make a synthetic presentation of the theoretical content of each topic in class. It will also incorporate bibliography and references in the Virtual Campus and in class complementary digital webs.

Applied knowledge (technical and instrumental, using computer programs) will be developed through a set of guided practices, carried out during the class. The digital material will be offered at practical classrooms with the Faculty's computers as well as in the Virtual Campus.

Note: 15 minutes of a class will be reserved, within the calendar established by the center/degree, for students to fill in surveys to evaluate the performance of the teaching staff and to evaluate the subject /module.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery of practices	50%	2	0.08	CM27, CM29, KM37, SM34, SM35
Exams	50% (25% theor. and 75% pract.)	3	0.12	SM36

The continuous assessment of learning is based on the results of three grades, from the theoretical exam, the final practical exam, and the practices delivered during the course.

Delivery of the practices is mandatory and in order to make an average with the rest of the grades you need to hand over at least 80%. If this requirement is not met, the final mark will be "not assessable". The total value of all practices is 50% of the final grade.

The exams will be worth 50% of the remaining final grade; there will be two, one theoretical and one practical. The theoretical exam of the first part is compulsory and it will consist of a series of theoretical questions, which will be worth 25% of the final grade of the exam. The final practical exam is compulsory and it will be carried out on a computer, which it will be worth 75% of the remaining grade. To be able to take the final exam, you must have submitted the minimum number of practices mentioned above, and to average the rest of the grades you must get a minimum score of five. In case of not appearing for both exams, the final mark will be "not assessable".

If you do not reach a minimum grade of five considering the partial theoretical exam and the final practical exam, you can attend to make up for it. To be able to attend, the student must have previously been assessed for continuous assessment activities that are equivalent to 2/3 of the final grade. The minimum grade for the theoretical and practical exam to be able to take the retake is 3.5. If this minimum grade is not reached, the subject will be directly suspended.

In the event that the student commits any irregularity that could lead to a significant variation in the grade of an assessment act, this assessment act will be graded with 0, regardless of the disciplinary process that may be instituted. In the event that several irregularities occur in the evaluation acts of the same subject, the final grade for this subject will be 0.

Bibliography

Bolstad, P. (2016) GIS Fundamentals. Available in: <https://www.paulbolstad.net/gisbook.html>

Burrough, P.A., McDonnell, R.A., Lloyd, C.D. (2015) Principles of Geographical Information Systems (3rd Edition). Oxford University Press. 352 p.

Longley, P.A. Goodchild, M.F. Maguire, D.J. Rhind, D.W. (2010) Geographical Information Systems and Science. 3rd edn. New York, John Wiley & Sons. 560 p.

Nunes, J. (2018) Terminologia de la cartografia i els sistemes d'informació geogràfica.
<https://publicacions.iec.cat/repository/pdf/00000261/00000048.pdf>

Nunes, J. (2013) Sistema d'Informació Geogràfica. Institut Cartogràfic i Geològic de Catalunya.
<https://www.icgc.cat/Ciutada/Informa-t/Diccionaris/Sistema-d-informacio-geografica>

Nunes, J. (2012). Diccionari terminològic de sistemes d'informació geogràfica. Enciclopèdia Catalana i Institut Cartogràfic de Catalunya, Barcelona. 551 p. Consultable a http://www.termcat.cat/ca/Diccionaris_En_Linia/197

Olaya, Víctor (2020) Sistemas de Información Geográfica. 2 volums. <http://volaya.github.io/libro-sig/>

Pons, X., Arcalís A. (2012). Diccionari terminològic de Teledetecció. Enciclopèdia Catalana i Institut Cartogràfic de Catalunya, Barcelona. 597 p. Consultable a http://www.termcat.cat/ca/Diccionaris_En_Linia/197

Rabella, J.M., Panareda, J.M., Ramazzini, G. (2011). Diccionari terminològic de cartografia. Enciclopèdia Catalana i Institut Cartogràfic de Catalunya, Barcelona. 417 p. Consultable a http://www.termcat.cat/ca/Diccionaris_En_Linia/197

Webgraphy:

ArcMap learning guide:

<https://desktop.arcgis.com/en/arcmap/latest/get-started/introduction/a-quick-tour-of-arcmap.htm>

QGIS learning guide: https://docs.qgis.org/3.22/en/docs/training_manual/

QGIS training manual: https://docs.qgis.org/2.14/es/docs/user_manual/index.html

MiraMon reference manual: <https://www.mirammon.cat/help/cat/mm32/manualrf.htm>

Software

The programs used in class will be the following:

ArcMap, QGIS and MiraMon

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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
(PLAB) Practical laboratories	1	Catalan	second semester	afternoon
(PLAB) Practical laboratories	2	Catalan	second semester	afternoon