UAB
Universitat Autònoma de Barcelona

Spatial Analysis and Models

2026/2027

Code: 104256
Credits: 6

Degree programme	Type	Course
Geography, Environmental Management and Regional Planning	OB	3

Contact lecturer

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Teaching staff

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Group languages

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

Prerequisites

To take this course, students must have a command of Catalan and/or Spanish at level B2 or higher.

Objectives

Space Analysis and Models is taught in the third course in the Degree *Geografia, Medi Ambient y Planificació Territorial*.

The objectives are:

- Use the scientific method in the formalization, resolution and interpretation of Geography Models.
- To achieve the different levels of abstraction that models provide as a tool for interpreting geographical and social phenomena.
- To formulate and solve cases of spatial analysis using the different types of geographical models.
- Use of geographical information at various scales, performing the interpretation of results.
- Develop the skills of self-employed and teamwork.

Learning outcomes

- CM21 (Carry out group work combining Network Theory, Interaction Models and Location-Assignment Models.) Carry out group work combining Network Theory, Interaction Models and Location-Assignment Models.
- KM31 (Recognise the main spatial analysis models used in spatial planning.) Recognise the main spatial analysis models used in spatial planning.
- SM25 (Solve exercises in the classroom and in the computer laboratory based on statistical information on theoretical situations and/or on real cases related to territorial planning at different levels.) Solve

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Contents

BLOCK 1. Introduction to Modeling and the Scientific Method

1. Models: concept and types. P. Haggett's Nodal Region models.
2. The scientific method. Deductive and inductive. Scale in geographical analysis. Positivist and normative approaches.
3. Theoretical, normative, methodological, technical, and instrumental assumptions of models.

BLOCK 2. Network Theory

1. Networks and topological graphs: concepts and techniques. Comparing the properties of connectivity and accessibility.
2. Connectivity models.
3. Topological accessibility models.
4. Non-topological accessibility models.

BLOCK 3. Interaction Models

1. Concept of Interaction. Variables and parameters. Types of models. The friction of distance.
2. The gravity model: Definition and types (unconstrained, production-constrained, attraction-constrained, doubly-constrained).
3. The Population Potential model. Single Circle (MCU) and Double Circle (MCD).
4. The Breaking Point model.

BLOCK 4. Assignment Models

1. Assignment Models (1). General approach to assignment models.
2. Assignment Models (2). Resolution.

BLOCK 5. Linear Programming and the Simplex Method

1. Linear Programming (1). Introduction.
2. Linear Programming (2). Solution using the graphical method.
3. Linear Programming (3). Simplex Method.
4. Linear Programming (4). LINDO software.

BLOCK 6. Transport Models

1. Transport model (1). Theoretical approach.
2. Transport model (2). Prototype example.
3. Transport model (3). Prototype example with LINDO.

BLOCK 7. Applied Location-Allocation (L-A) Model

1. Theoretical approach to L-A Models.
2. Development of the L-A model.
3. Resolution of an L-A practical case.

Non-sexist language with a gender perspective will be used in the various problems featured as examples.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Own study, plannning and execution of exercices and course work	75	3	CM21, KM31
Master classes and exercices	44	1.76	KM31, SM25
Supervision of exercices and course work	25	1	CM21, KM31

The course is structured around directed, supervised, and autonomous activities where students will learn to engage interactively with the course content under the guidance of the teaching staff at various levels. The contents of the course will be developed through the following activities:

- Lectures by the teaching staff.
- Reading books and articles (individual student activity complementary to classroom work).
- Conducting practical sessions in the classroom and the computer lab, based on both theoretical situations and real-world cases.
- Group coursework related to the class syllabus.

The practical activity will be of two types:

- Guided and tutored practical exercises for each of the topics. Activities may vary, including: text commentary, validation of methodological and theoretical knowledge, or problem-solving (both manually and using specific software).
- Completion of a group project combining different topics covered in class, such as Network Theory, Interaction Models, and Location-Allocation Models (resolution will be done both manually and using specific software).

Gender perspectives will be taken into account in the various examples studied throughout the course.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Course exercices	30%	0	0	CM21, KM31, SM25
Assistance	5%	0	0	KM31, SM25
Exam	40%	6	0.24	KM31, SM25

Course work	25%	0	0	CM21, KM31, SM25

A) ASSESSMENT ACTIVITIES:

1 - Theoretical and practical exam for the assessment of course content. It consists of four exams, each lasting one and a half hours, with a weight of 40% of the final grade.

Exam assessment: The theoretical midterms will assess the relevance of the answer and the level of knowledge achieved on the subject. The practical part will assess the approach, the resolution and interpretation of the results, as well as the correct performance of calculations. To calculate the average across the four midterms, a grade of 5 must be obtained in each exam.

2 - Since this is a Continuous Assessment course, the practical work will be submitted throughout the semester:

- 2.1 - 10 Individual assessment practicals with a weight of 30% of the grade. *Assessment of practicals:* Formal aspects, the correct calculation of indicators (provided this is the objective of the assignment), the proper execution of a structured analysis of the obtained results, and their interpretation. In the specific case of text analysis, special value will be placed on the ability to extract and present the most relevant information and relate it to the course content. Only one of the practical assignments may be retaken. Practicals must be submitted in hard copy (on paper).
- 2.2 - Course project in groups of two people with a weight of 25% of the grade. *Assessment of the project:* Formal aspects, the formulation of objectives, the problem statement, the models used for improving service planning, the definition of analysis variables, the resolution of results, their interpretation, conclusions, and their public presentation. It cannot be retaken.
- 2.3 - Participation in classroom practicals with a weight of 5% of the grade. *Assessment of classroom practicals:* Engagement and tracking of the subject matter in class will be assessed. They cannot be retaken.

B) OTHER ASPECTS TO CONSIDER

- To calculate the average alongside the assignments and the course project, it is COMPULSORY to pass the exams (both theoretical and practical). If an exam is failed, it will not be averaged with the other grades.
- Continuous assessment makes the submission of all learning activities COMPULSORY in order to pass the course.
- Activities submitted after the deadline will receive a maximum grade of 5.
- To be eligible to sit the exam, it is COMPULSORY to have submitted all practical assignments. Practicals CANNOT be submitted on the day of the exam or afterwards.

C) NON-ASSESSABLE (NO AVALUABLE)

Students who have not submitted more than 30% of the assessment activities will receive a grade of "No Avaluable" (Non-Assessable).

D) REVIEWS

At the time each assessment activity is conducted, the professor will inform students (via Moodle) about the procedure and the date for grade reviews.

E) RETAKES (RECUPERACIÓN)

* Any failed theoretical and practical exams will be retaken, regardless of the previous grade.

- An exam can only be retaken if it has been previously failed.
- Regarding the assessment activities (course project, individual practicals, and classroom practicals), only the individual practical assignment may be retaken; the rest cannot be retaken.
- If an activity is failed as a result of plagiarism, copying, or the fraudulent use of AI, the grade for that activity will be zero, and the option to retake it will be excluded. Furthermore, if multiple irregularities are committed, the final grade for the course will be zero.

F) PLAGIARISM

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.

G) SINGLE ASSESSMENT

This course does not provide a single assessment system option.

H) AI

This course permits the use of Artificial Intelligence (AI) technologies exclusively for tasks involving [***bibliographical research or information searches, text correction, or translations, at the discretion of the teaching staff]. In the case of courses within philology degrees, the use of translation tools must be authorized by the professor. Other scenarios may be considered, always subject to the professor's approval.

The student must:

1. Identify the parts that have been generated using AI.
2. Specify the tools used.
3. Include a critical reflection on how these tools influenced the process and the final outcome of the activity.

A lack of transparency regarding the use of AI in an assessable activity will be considered a breach of academic honesty, resulting in a grade of 0 for the activity with no option to retake it, or greater sanctions in severe cases.

I) EXCHANGE STUDENTS

Exchange students requesting to take an exam ahead of schedule must present the professor with a written document from their home university that justifies their request.

Bibliography

The references will be complemented during the semester.

Basic References

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Complementary References

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PÁSZTO. Vít (2020). \"Economic Geography\". Vít Pászto, Carsten Jürgens, Polona Tominc, Jaroslav Burian (eds). *Spationomy.* Londres: Springie; 173-192
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THOMAS, R.W. y HUGGET, R.J. (1980). *Modelling in geography. A mathematical approach*. London: Harper & Row, Publishers.

Software

Software:

LINDO

AracGis Pro

QGis

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	11	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	11	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	12	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	12	Catalan	second semester	morning-mixed