Universitat Autònoma de Barcelona

2021/2022

Geographical Information Systems

Code: 43060
ECTS Credits: 6

Degree	Type	Year	Semester
4313784 Interdisciplinary Studies in Environmental, Economic and Social Sustainability	OT	0	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: english (eng)

Prerequisites

No prior knowledge is required.

Objectives and Contextualisation

The main aim of this introductory course is to present the basic concepts and spatial analysis tools provided by the Geographic Information Systems (GIS) derived from the needs in socio-environmental planning and management.

Our general goal is that each student develops skills to interpret and use digital spatial data and set the grounds for further (self-) training in GIScience. The specific objectives are:

- Know basic georeferencing methods, main reference systens abd the tools needed to change the system when needed.
- Study of main GIS data models and their characteristics. Remote sensing data use.
- A starting knowledge of data sources and formats useful for geographical studies of all kinds, given special attention to the available standards.
- Introduce the knowledge of basic GIS operations such as mosaic, clipping, changes in spatial resolution and map projection and reference systems (ED50 to ETRS89, for example), raster /vector conversion. Buffer and distance analysis, etc. Introduction to interpolation.
- Present and extend the GIS analysis tools knowledge in the context of real-world applications shown on this course, including spatial dynamics with remote sensing, both urban growths as forest fires, etc.

Competences

- Analyse how the Earth functions on a global scale in order to understand and interpret environmental changes on the global and local scales.
- Apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of Environmental Studies.
- Continue the learning process, to a large extent autonomously.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Work in an international, multidisciplinary context.

Learning Outcomes

1. Apply spatial analysis results to particular environmental planning and risk evaluation cases.
2. Apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of Environmental Studies.
3. Continue the learning process, to a large extent autonomously.
4. Evaluate the processes of transformation of the territory and the population by applying methodologies and instruments associated with reference theories, which can measure intervention mechanisms and results.
5. Show mastery of cartographic expression of territorial information.
6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
7. Use Geographical Information Systems (GIS) both conceptually and when applied to problem solving in environmental and regional planning.
8. Work in an international, multidisciplinary context.

Content

The diverse lessons to develop in the course are:

- Lesson 1: Geographic information
  - Information on the territory and on phenomena located in the territory
  - Geographical and non-geographic entities
  - Nature of geographic information
- Lesson 2: Georeferencing
  - Localization as a factor of relationship
  - Basic methods of georeferencing
  - Main reference systems
- Lesson 3: GIS data models
  - The raster model
  - The vector model
  - Data types, data formats, publishing on the Internet
  - Remote sensing and GIS
- Lesson 4: Spatial analysis
  - Overlay
  - Buffer and maps of distances
  - Introduction to interpolation

The application of the concepts and tools covered by the course in use case exercises will be developed throughout the course, in an integrated manner.

Methodology

The course content will be developed through the following activities:

- Oral expositions from the teacher
- Reading book chapters or articles (individual activity of students, complementary to classroom work)
- Practical classes guided by the teacher
- Work done independently by students based on teacher proposals
- Oral expositions from the students

For the realization of the course some different GIS software will be used.

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			
1. Professor's Lectures	18	0.72	
2. Practical exercises guided by the teacher	24	0.96	
Type: Supervised			
1. Resolution guided practice	25	1	
2. Monitoring oral presentation	15	0.6	
Type: Autonomous			
1. Reading theoretical literature	15	0.6	
2. Practical exercises independently developed by students	28	1.12	
3. Final project development	15	0.6	

Assessment

The course evaluation will be obtained from practical exercises made in the classroom and at home (30% of final qualification), a brief oral presentation (30%) and a short final exam (40%).

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1. Final exam	40%	2	0.08	4, 5
2. Oral presentation	30%	3	0.12	5, 6, 7
3. Practical exercises	30%	5	0.2	1, 2, 3, 8

Bibliography

- Bonham-Carter, G.F. (1994) Geographic information systems for geoscientists modelling with GIS, Pergamon. Kidlington. 398 p.
- Burrough, P.A., McDonnel, R.A. (1998) Principles of Geographical Information Systems (2nd Edition). Oxford University Press.
- Malczewski, J. (1999) GIS and Multicriteria Decision Analysis. John Wiley & Sons. Inc., New York, 392 p.
- Laurini, R., Tompson, D. (1992) Fundamentals of Spatial Information Systems Academic Press. Londres. 680 p.
- Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2005), Geographical Information Systems and Science. Wiley.
- Maguire, D.J., M.F. Goodchild, Rhind, D.W. (eds.) (1991) Geographical Information Systems. Principles and Applications. 2 Vol. Longman Scienti Technical. Essex. 649+447 p.
- *International Journal of Geographical Information Science*: http://www.tandfonline.com/loi/tgis20

Software

ArcGis and MiraMon.