VNIVERSITAT DE VALÈNCIA

Course Guide
41056 Modelling techniques and geographical information systems

COURSE DATA

Data Subject	
Code	41056
Name	Modelling techniques and geographical information systems
Cycle	Master's degree
ECTS Credits	10.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2001 - M.D. in Environmental and Territorial Management Techniques	Faculty of Geography and History	1	Second term

Subject-matter

Degree	Subject-matter	Character
2001 - M.D. in Environmental and Territorial Management Techniques	4 - Methods and techniques applied to land use planning	Optional

Coordination

Name	Department
ZORNOZA GALLEGO, CARMEN	195 - Geography

SUMMARY

The main objective of this subject is that the student learns to elaborate studies and analyses applied to territorial planning, based on quantitative and qualitative techniques. The main tool will be geographic information systems, which will be used for the management of geographic information, representation and spatial modelling. The qualitative techniques studied will be those related to the evaluation of Policies, Plans, Programmes and Projects, and techniques based on social participation and conflict resolution.

The first part of the course begins by introducing tools for on-line cartography, so that students acquire the skills to effectively share different network projects, improving cartographic communication strategies. Subsequently, the student will begin to use GIS as a spatial modelling tool to carry out studies and analyses applied to different objectives: studies of the reception capacity of a territory, projects for the location of facilities and infrastructures, analysis of markets and establishments aimed at carrying out location and management proposals in a business environment.

The second part of the subject deals specifically with two specific topics related to urban and territorial studies: demographic analysis and sustainable urban mobility. Demographic analysis provides students with the basic tools for the study of population, socio-demographic problems and their applications in spatial planning at different scales. On the other hand, urban and territorial problems related to the daily mobility of the population are addressed. Tools for analysis and intervention in the territory are introduced, with emphasis on Sustainable Urban Mobility Plans.

Thirdly, the course focuses on qualitative techniques. Initially, we work on project monitoring and evaluation techniques, which have become an important issue following the obligation imposed by the European Union to establish monitoring and evaluation mechanisms in the implementation of policies and programmes designed and / or funded by it. Finally, the course aims to facilitate the learning of the principles and techniques of negotiation in order to create skills in students, which will enable them to resolve conflicts, take advantage of opportunities and make decisions in the context of planning. Methodological learning is framed in the elaboration of participation and communication plans linked to planning, territorial and environmental management instruments.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

None

OUTCOMES

2001 - M.D. in Environmental and Territorial Management Techniques

- Capacidad de organización, planificación y gestión de la información ambiental y territorial
- Técnicas de análisis cuantitativo
- Manejo de Sistemas de Información Geográfica aplicados a los problemas medioambientales y territoriales
- Conocer y aplicar las teorías, enfoques y técnicas de concertación y participación sociocomunitaria.
- Capacidad de realizar la planificación territorial: análisis, diagnóstico y propuestas.
- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.

LEARNING OUTCOMES

- Lerning how to use on-line mapping tools.

- Being able to design Territorial Information Systems.

- Learning to carry out geomarketing studies and proposals.

- Knowing how to carry out projects for the location of services and activities.

- Knowing the basic aspects of negotiation and conflict management in order to use them appropriately in the design and management of planning tools.

- Knowing the theories, approaches and techniques of concertation and socio-community participation.

- Learning to carry out studies and design tools for public participation in plans and projects.

- Knowing how to apply the main techniques for social participation and consultation.

- Applying the appropriate quantitative techniques for socio-demographic analysis.

- Knowing the basic elements that determine people's mobility.

- Developping knowledge of sustainable mobility plans.

DESCRIPTION OF CONTENTS

1. 'On line' cartography

Dissemination of cartography via the Internet.
Improvement of cartographic communication models.

2. Analysis of environmental factors with raster and vector GIS

Operations for the analysis of environmental factors.
Generation of models.
Geostatistical techniques.
Modelling using non-parametric estimation techniques.
Kernel type estimation.
Landscape analysis techniques using extended neighbourhood operations on raster models.

Analysis of the carrying capacity of the territory.

3. Location of facilities and infrastructures

Models for the location of facilities and services
Public facilities and services
Determination of areas of influence and market potential of private establishments
Models for the location of private services
A professional application: geomarketing

4. Statistical analysis with GIS

Basic indicators of spatial statistics
Spatial pattern detection: Average Nearest Neighbour, General G Getis-Ord, Ripley's Function K, Moran's I global
Ripley's Function K, Global Moran's I
Cluster Detection: Anselin local Morans I, Getis-Ord Hot Spot Analysis or GI *.
Grouping Analysis

5. Socio-demographic analysis at local level

Population dynamics and structure.
Analysis of social vulnerability.
Urban mobility.

6. Techniques of social participation and conflict resolution

Participation and decision-making techniques and experiences
Consultation techniques
Practical application of techniques and demonstration of skills
Participation in social scenarios
Analysis of the case of the Strategic Plan.
Analysis of the case of participatory budgets
Conflict: notion, classification and resolution
Stages and strategies for conflict resolution
Analysis of the case of the beavers

7. Qualitative techniques for the evaluation of policies, plans, programmes and projects

Qualitative methodology VS. quantitative. The qualitative method Subjectivity and rigour in qualitative analysis.
Fieldwork in qualitative analysis.
Techniques of qualitative analysis: interviews VS. surveys.
Evaluation: objectives and criteria.

Evaluation techniques: focus groups.
Examples of focus groups: METAPLAN and SAP method.
Reporting and communication of results.

WORKLOAD

ACTIVITY	Hours	% To be attended
Computer classroom practice	60,00	100
Tutorials	2,00	100
Study and independent work	90,00	0
Preparation of evaluation activities	70,00	0
Resolution of case studies	28,00	0
TOTAL	**250,00**	

TEACHING METHODOLOGY

All classes take place in the computer room, and have a theoretical and practical focus. Theoretical content and the use of IT tools will be explained.

Classes will be supplemented by individual work aimed at performing simplified applications with real data and with the results shown as reports. To prepare this work, outside of class time students have access to a fully equipped classroom, as well as a virtual classroom.

Seminars: designed to show practical experience and present and discuss student work.

EVALUATION

The evaluation model is:

- Attendance at seminars (minimum requirement of 80 % attendance).

- Examination: 25 %.

- Guided work: 70 %.

- Complementary activities: 5 %.

REFERENCES

Basic

- ANDER-EGG, E. (1989). Introducción a las técnicas de investigación social. Buenos Aires.
- BOSQUE, J. (1994). Sistemas de Información Geográfica: prácticas con PC ARC/INFO e IDRISI. Ra-Ma.
- BOSQUE, J., y MORENO, A. (2004). Sistemas de Información Geográfica y localización de instalaciones y equipamientos. Ra-Ma.
- CARVAJAL, B. C., & CARVAJAL, M. (2020). Triangulación de métodos en ciencias sociales. Mayéutica Revista Científica de Humanidades y Artes, (8), 170-196.
- DELGADO, J. M., y GUTIÉRREZ, J. (coord.) (1994). Métodos y técnicas cualitativas de investigación en ciencias sociales. Síntesis.
- GARCÍA, J. (2004). Políticas y programas de participación social. Síntesis.
- GIVEN, L. M. (Ed.). (2008). The Sage encyclopedia of qualitative research methods. Sage publications.
- GÓMEZ, M., y BARREDO, J. I. (2005). Sistemas de información geográfica y evaluación multicriterio en la ordenación del territorio. Ra-Ma.
- JELLICOE, G., y SUSAN, D. (1995). El paisaje del hombre. La conformación del entorno desde la prehistoria hasta nuestros días. Gustavo Gili.
- LEAL, J. (coord.) (2004). Informe sobre la situación demográfica en España. Fundación Fernando Abril Martorell.
- LUNE, H., & BERG, B. L. (2017). Qualitative research methods for the social sciences. Pearson.
- SÁNCHEZ, M., FERNÁNDEZ, M., y DÍAZ, J. (2021). Técnicas e instrumentos de recolección de información: análisis y procesamiento realizado por el investigador cualitativo. Revista Científica UISRAEL, 8(1), 107-121.

Additional

- ADSUARA, X. ET AL. (2000): Criterios generales para la integración del planeamiento urbanístico y territorial en un Sistema de InformaciónTerritorial (SIT), Ciudad y Territorio. Estudios Territoriales, nº 124, pp.183-208
- AGUIRRE MURÚA, G. (2005): La valoración de los riesgos en la ordenación del territorio: Metodología práctica, Boletín de la A.G.E. N.º 40, págs. 393-405
- AMAGO, F.S. (2000): Logística y marketing geográfico. Geomarketing para tomar decisiones visualmente, Barcelona, Logis Book
- CHASCO IRIGOYEN, C. (2003): El Geomarketing y la distribución comercial,Investigación y Marketing, nº 79, pp.6-14, http://www.cartografia.cl/download/geomar_comercial.pdf
- CHOU, Y.-H. (1996): Exploring spatial analysis in geographical information systems. Santa Fe, On Word Press.

- CONESA GARCÍA, C., ÁLVAREZ ROGEL, Y. y GRANELL PÉREZ, C. (2004, eds.): El empleo de los SIG y la teledetección en la planificación territorial: aportaciones al XICongreso de Métodos Cuantitativos, SIG y Teledetección. Murcia, Universidad de Murcia.
- DEL POZO, F., BOSQUE SENDRA, J., GÓMEZ DELGADO, M. Y MORENO JIMÉNEZ,A. (2000): Hacia un sistema de ayuda la decisión espacial para la localización de equipamientos, Estudios Geográficos, Vol. 61, Nº 241, 2000 ,pags. 567-598
- GUTIÉRREZ PUEBLA, J., GARCÍA PALOMARES, J.C., ALVENTOSA, C., REDONDO ,J.C. Y PANIAGUA, E. (2002): Accesibilidad peatonal a la red sanitaria de asistencia primaria en Madrid, Anales de Geografía de la UniversidadComplutense, Vol. Extraordinario, pp.269-280
- MORENO JIMÉNEZ, A. Y PRIETO FLORES, M.E. (2004): ¿Cómo afecta la unidad espacial a la visualización y modelado del área de mercado con sistemas de información geográfica?: Implicaciones para el geomarketing, EstudiosGeográficos, vol. 65, n. 257, p. 617-636
- TUDELA SERRANO, M. L. Y MOLINA RUIZ, J. (2005): Estudio de viabilidad ambiental para la localización de parques eólicos en un municipio de la región de Murcia, Papeles de Geografía, 41-42; pp. 225-236
- VALLEJO VILLALTA, I. y JOAQUÍN MÁRQUEZ PÉREZ, J.(2006): SIGCOMSE: Un sistema de información geográfica aplicado al comercio en la ciudad deSevilla, GeoFocus (Informes y comentarios), nº 6, p. 28-38, http://geofocus.rediris.es/2006/Informe3_2006.pdf
- LLOYD, C.D. (2010): Spatial Data Analysis. An Introduction for Gis Users, Oxford University Press, Oxford
- ALLEN D.W. (2011): GIS tutorial. Spatial Analysis Workbook. Esri Press, Redlands. California