

Sustainable Mobility and Ecocities

Code: 43064
ECTS Credits: 9

Degree	Type	Year	Semester
4313784 Interdisciplinary Studies in Environmental, Economic and Social Sustainability	OT	0	2

Contact

Name: Carme Miralles Guasch
Email: Carme.Miralles@uab.cat

Use of Languages

Principal working language: spanish (spa)

Teachers

Oriol Marquet Sarda
Johannes Langemeyer
Francesc Baró Porrás
Carlos Martínez Gasol

Prerequisites

There are no specific recommendations

Objectives and Contextualisation

The cities on the planet, although they only occupy less than 3% of the total surface area, concentrate more than 50% of the population and have 80% of the greenhouse gas emissions associated. Construction and mobility represent more than 75% consumption of energy resources. In this module, the student is approached to new scenarios for the future of eco-cities through tools and methods for the environmental improvement of cities as well as the management of mobility and transport in an urban environment.

1. Form theoretical concepts about sustainable mobility and eco-cities.
2. Approach students to the new scenarios of the future of the urban world from the new paradigms of sustainability.
3. Facilitate the integration of environmental, social and economic aspects in the analysis of cities.
4. Present tools and methodologies for the environmental improvement of cities at different scales: buildings, neighbourhoods and urban environments.
5. To train students in the urban metabolism and in the social, environmental and economic costs that daily mobility implies.
6. Introduce the student methods, tools and actions prevention of environmental impacts of cities and their transport models against hegemonic public policies.
7. Present instruments for management, cross-cutting strategies and citizen participation in sustainable mobility and eco-cities through case studies.

8. Work in an international and multidisciplinary context.

Competences

- Analyse, summarise, organise and plan projects related to the environmental improvement of product, processes and services.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Work in an international, multidisciplinary context.

Learning Outcomes

1. Design research projects that contain proposals and contributions to knowledge of sustainable mobility.
2. Formulate action plans and environmental improvement plans.
3. Know the Agenda 21 tools for sustainable urban development.
4. Know the tools of eco-innovation that are applicable to urban environments.
5. Propose and assess self-sufficiency strategies in cities.
6. Support the strengthening of the social capacity of public and private bodies, at different levels, by providing knowledge towards the task of seeking out solutions to a wide variety of situations within the urban space, from an environmental perspective.
7. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
8. Work in an international, multidisciplinary context.

Content

There are two parts: **PART 1 SUSTAINABLE MOBILITY & PART 2 ECO-CITIES**

PART 1 (4.5 ECTS)SUSTAINABLE MOBILITY (Prof. Dr. Carme Miralles-Guasch & Dr. Oriol Marquet)

In recent years, mobility and transport, both in academia and in public policies, have been the object of an enormous analytical and applied transformation. The subject under study has shifted from transport to everyday mobility, which implies changing the analytical focus from the supply side to the demand perspective. At the same time, a dialectical or congruent methodological approach has been incorporated, replacing the more traditional causal approach, all framed within the innovation that has meant moving on from the paradigm of modernity to that of sustainability. These changes began in the 80s of the 20th century, after the great economic crisis of the 70s, when oil began to show signs of being a finite energy source and public transport policies had to be rethought, especially in cities and metropolitan areas. In recent years, we have witnessed a transformation process that has implied the abandonment of the modernity paradigm, which largely shaped the twentieth century, and the adoption of that of sustainability, which is regarded as the guiding principle of the 21st century.

Sustainable mobility is expressed through daily trips that pollute less and that use less energy, that is, the non-motorized transport modes (walking and cycling). However, these transport modes require urban characteristics that allow their use: adequate public spaces and destinations close enough for you to get on a bike or walk, within a reasonable time and with an adequate effort. The urban variables that allow this type of mobility come together under the concept of compactness, a dense urban space, where density and mixture of urban functions is the most appropriate.

1. The analysis of urban mobility under the new paradigms of the 21st century.
 - From modernity to sustainability.
 - From transport to mobility.
 - The dialectic between mobility and the city.

1. Urban planning and daily mobility.

- The genesis of modern everyday mobility.
- Modern urbanism and mobility.
- Sustainable cities, less polluting transport.

1. Sustainable mobility. New scientific framework and new political challenge.

- Energy consumption of transport modes.
- Characterization of transport emissions.
- The modal split and the costs of mobility.
- European policy and sustainable mobility.

1. The impacts of mobility

- The environmental impacts.
- Social impacts.
- The costs.

1. The challenges of mobility

- Towards a sustainable mobility.
- Accessibility.

1. The instruments to manage mobility and citizen participation

- La Catalan Mobility Law.
- Mobility Plans.
- Social participation in the diagnosis of mobility.
- Mobility forums.

PART 2 ECO-CITIES (prof. Dr. Carles Martínez Gasol, Dr. Francesc Baró, Dr. Johannes Langemeyer)

The cities on the planet, although they only occupy less than 3% of the total surface, concentrate more than 50% of the population and have 80% of the greenhouse gas emissions associated. In some European countries the cycle of construction and mobility represent more than 75% consumption of energy resources. In this context, urban ecology is key to improving future regional development and urban systems. The objectives of this module are the application of tools to facilitate urban sustainable development. Classes will be articulated in the following sub-blocks:

1. ECO-CITIES. (Professor: Dr. Carles Martínez)

- Urban answers to complex situations. The urban ecosystem. Ecosystem analysis. Data, tools, and preliminary concepts. Tools for urban sustainable development: urban metabolism.

1. THE FERTILE CITY. (Professor: Dr. Carles Martínez, Dr. Francesc Baró and Dr. Johannes Langemeyer)

- Urban agriculture is the backbone of the cities of the future. Tools: LCA and carbon footprint applied to quantify the impact of food production in cities.

1. ECOINNOVATION PUBLIC SPACE. (Professor: Carles Martínez)

- Application of eco-design tools and Life Cycle Assessment in the improvement of urban elements. Energy characterization of urban spaces: SIG + ACV.
- Ecosystem services (Professor: Dr. Francesc Baró and Dr. Johannes Langemeyer)
- Concepts, methodologies and instruments for research and applied use.

1. BUILDING. ECOINNOVATION IN BUILDINGS. (Professor: Dr. Carles Martínez)

- Energy renovation. Energy efficiency. Water saving and rainwater management, waste management and biodiversity. Eco-innovation in sustainable construction. Use of materials with low energy content. Self-sufficient buildings.

Methodology

Master classes and problem solving and case studies.
Learning based on real cases.
Presentation and oral presentation of research works developed.
Participation in complementary activities.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Complementary activities	13	0.52	
Lessons	54	2.16	
Type: Supervised			
Final work	71	2.84	
Reading of papers	30	1.2	
Reading of teaching material	12	0.48	
Type: Autonomous			
28/5000 Readings related to the subject	20	0.8	

Assessment

Evaluation of the first part (Sustainable Mobility)

- Class attendance, active participation, field work and complementary activities (30%);
- Exam (70%)

Evaluation of the second PART (Ecocities)

- Delivery of papers (comment of papers) (60%)
- Oral defense of the same (20%)
- Written test (20%)

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assistance and active participation in class	10%	5	0.2	3, 4, 6, 7, 8
Assistance to field work and complementary activities	10%	15	0.6	4, 6, 7, 8
Course work	60%	0	0	3, 4, 1, 6, 2, 5, 7, 8
Defense of course work	20%	5	0.2	3, 4, 1, 6, 2, 5, 7, 8

Bibliography

PART 1

ABERCROMBIE P. (1944) The Greater London Plan (1944), Country Hall, Westminster bridge, London.

ALBERTOS PUEBLA, J. (2007) Presentación. Transporte, Movilidad y Sostenibilidad. Cuadernos de Geografía ,nº 81-81,1-5.

ALONSO, W. (1964) Location and land use, toward a general theory of land rent Cambridge (Mass), Harvard University Press.

ALONSO, W. (1970) The economics of consumption, daily life, and urban form Berkley, University of California Institute of Urban and Regional Development.

ALTSHULER, A. (1979) The urban transportation system Cambridge (Mass), The MIT Press.

ASCHER, F. (2004), Los nuevos principios del urbanismo. Alianza Ensayo. Madrid.

ASSOCIATION OF AMERICAN GEOGRAPHERS (2002) Trends in the geography of mobility III 98th annual meeting 19-23 march. Los Angeles.

BANISTER, D. y Hall P. (Eds.) (1981). Transport and public policy planning. London: Mansell.

CEBOLLADA, A. Y MIRALLES-GUASCH, C. (2004) Mobility and urban transport in metropolitan Barcelona:accessibility versus exclusion, Ethologia europea vol. 34:2, Copenhagen, pp.19-29.

ESTEVEAN, Antonio & SANZ, Alfonso (1996) *Hacia la reconversión ecológica del transporte en España* Madrid, Los libros de la catarata.

GARCÍA, Ernest (1999) La sostenibilidad de las ciudades y la organización social de la movilidad. *Ecología Política* 17: 55-68.

HAUGHTON, Graham & HUNTER, Colin (1994) *Sustainable Cities*. Melksham, Wiltshire.

HENSHER, D.A.i BUTTON, J.B. (Ed.) (2003), *Handbook of Transport and the Environment*. Elsevier: Oxford

LÓPEZ DE LUCIO, R. (1993) *Ciudad y urbanismo a finales del siglo XX*. València, Servei de Publicacions de la Universitat de València.

LUCAS, K., GROSVENOR, T., et al. (2001) *Transport, the environment and the social exclusion*. Layerthorpe, Joseph Rowntree Foundation.

MIRALLES GUASCH, Carme (2002) *Ciudad y transporte. El binomio imperfecto* Barcelona, Ariel.

MIRALLES i GUASCH, C. (1999) "La irrupción del transporte privado en la ciudad. Barcelona como ejemplo." *Ecología Política* 17: 7-16.

MIRALLES-GUASCH, C (2011) Dinámicas metropolitanas y tiempos de la movilidad. La región metropolitana de Barcelona, como ejemplo. *Anales de Geografía*, Volumen: 31 (núm.1) Páginas: 125-145. Departamento Geografía. Complutense Madrid

MIRALLES-GUASCH, C (2012) Las encuestas de movilidad y los referentes ambientales de los transportes. *EURE VOL 38, Nº 115,* pp. 33-45

MIRALLES-GUASCH, C. (2005) El transporte en la articulación del tejido urbano. *Revista de Occidente* nº 284. Págs. 135-149.

MIRALLES-GUASCH, C.; AVELLANEDA, P.; POLO, D. (2008) Metodologia d'avaluació de propostes en l'àmbit de la mobilitat ocupacional, Consell del Treball Econòmic i Social de Catalunya (CTESC), Barcelona

MIRALLES-GUASCH, C; MARTINEZ MELO, M; MARQUET SARDA, O. (2012) El uso del transporte privado, percepciones individuales y contradicciones colectivas en un marco de sostenibilidad ambiental y social. ACE Arquitectura, ciudad y entorno, 19 Página revista electrónica cpsv.upc.es/ace/Articles_n19/articles_pdf/ACE_19_SE_21.pdf

MÓDENES, J.A (2008) Movilidad especial, habitantes y lugares: retos conceptuales y metodológicos para la geodemografía. Estudios Geográficos, vol. LXIX, núm. 265, 157-178

OYÓN, J.L. (1999) Transporte público y estructura urbana. De mediados s. XIX a mediados del s. XX: Gran Bretaña, España, Francia y Países Germánicos. In Ecología política pp. 17-36.

PART 2

- Adriaanse, A., Bringezu, S., Hammond, A., Moriguchi, Y., Rodenburg, E., Rogich, D., Schürz, H. (1997) "Resource Flows: The material Basis of Industrial Economies", World Resource Institute, Washington USA, Wuppertal Institute, Wuppertal Germany, Netherlands Ministry of Housing, Spatial Planning and Environment, The Hague Netherlands, National Institute for Environmental Studies, Tsukuba, Japan. ISBN 1-56973-209-4.
- Ayres, R. U. and Ayres, L. W. (2002) "Industrial Ecology. Towards Closing the Materials Cycle", Edward Elgar, Cheltenham, UK, Northampton MA, USA.
- Eurostat. 2001. Economy-wide material flow accounts and derived indicators: A methodological guide. Luxembourg: Eurostat, European Commission, Office for Official Publications of the European Communities.
http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/publications/economy_wide_n
- Ceron-Palma I, Sanyé-Mengual E, Oliver-Solà J, Montero JI, Rieradevall J. (2012) Towards a green sustainable strategy for social neighbourhoods in Latin America: Case from social housing in Merida, Yucatan, Mexico. In press, Habitat International.
- Joan-Manuel F. Mendoza, Jordi Oliver-Solà, Xavier Gabarrell, Alejandro Josa, Joan Rieradevall (2012) Life cycle assessment of granite application in sidewalks. Int J Life Cycle Assess (2012) 17:580-592
- Joan-Manuel F. Mendoza, Jordi Oliver-Solà, Xavier Gabarrell, Joan Rieradevall, Alejandro Josa (2012). Planning strategies for promoting environmentally suitable pedestrian pavements in cities. Transportation. Research Part D 17 (2012) 442-450
- Ceron-Palma I, Oliver-Solà J, Sanyé-Mengual E, Montero JI, Rieradevall J (2012) Barriers and opportunities regarding the implementation of Rooftop Greenhouses (RTEG) in Mediterranean cities of Europe. Journal of Urban Technology, in press (DOI:10.1080/10630732.20).
- Sanyé-Mengual E, Ceron-Palma I, Oliver-Solà J, Montero JI, Rieradevall J (2012) Environmental analysis of the logistics of agricultural products from Roof Top Greenhouse (RTG) in Mediterranean urban areas. Journal of the Science of Food and Agriculture (online first). DOI: 10.1002/jsfa.5736
- Farreny R, Oliver-Solà J, Escuder-Bonilla S, Roca-Martí M, Seigné E, Gabarrell X, Rieradevall J (2012) The metabolism of cultural services. Energy and water flows in museums. Energy and buildings 47:98-106.
- Sanyé E, Oliver-Solà J, Gasol CM, Farreny R, Rieradevall J, Gabarrell X (2012) Life cycle assessment of energy flow and packaging use in food purchasing. Journal of Cleaner Production 25:51-59.
- Farreny R, Morales-Pinzón T, Guisasola A, Tayà C, Rieradevall J, Gabarrell X (2011) Roof selection for rainwater harvesting: Quantity and quality assessments in Spain. Water Research 45 (10): 3245-3254
- Farreny R, Gabarrell X, Rieradevall J (2011) Cost-efficiency of rainwater harvesting strategies in dense Mediterranean neighbourhoods. Resources, Conservation and Recycling (55) 686-694
- Angrill S, Farreny R, Gasol CM, Gabarrell X, Viñolas B, Josa A and Rieradevall J (2011) Environmental analysis of rainwater harvesting infrastructures in diffuse and compact urban models of Mediterranean climate. The International Journal of Life Cycle Assessment DOI: 10.1007/s11367-011-0330-6.
- Farreny R, Oliver-Solà J, Montlleó M, Escibà E, Gabarrell X, Rieradevall J (2011) Transition Towards Sustainable Cities: Opportunities, Constraints and Strategies in Planning. A Neighbourhood Eco-Design Case Study in Barcelona (Spain) Environment and Planning A 43(5) 1118 - 1134

- Farreny R, Oliver-Solà J, Montlleó M, Escribà E, Gabarrell X, Rieradevall J (2011) The ecodesign and planning of sustainable neighbourhoods: the Vallbona case study (Barcelona). *Informes de la Construcción*. Vol. 63, EXTRA, 115-124
- Oliver-Solà J, Josa A, Arena AP, Gabarrell X, Rieradevall J (2011) The GWP-Chart: An environmental tool for guiding urban planning processes. Application to concrete sidewalks. *Cities*, 28(3): 245-250
- Rives J, Rieradevall J, Gabarrell X. LCA comparison of container systems in municipal solid Waste management. *Waste Management*, Volume 30, Issue 6, June 2010, pages 949-957.
- Martínez-Blanco J, Colón J, Gabarrell X, Font X, Sánchez A, Artola A, Rieradevall J. The use of life cycle assessment for the comparison of biowaste composting at home and full scale. *Waste Management*, Volume 30, Issue 6, June 2010, pages 983-994.
- Núñez, M., García-Lozano, R., Boquera, P., Gabarrell, X., Rieradevall, J., 2009. Temporary structures as a generator of waste in covered trade fairs. *Waste Management* 29: 2011-2017
- Iriarte, A., Gabarrell X., Rieradevall, J., LCA of selective waste collection systems in dense urban areas. *Waste Management*. Volume 29, Issue 2. February 2009, pages 903-914.
- Oliver-Solà, J., Josa, A., Gabarrell, X., Rieradevall, J., 2009. Environmental optimization of concrete sidewalks in urban areas. *The International Journal of Life Cycle Assessment* 14(4), 302-312.
- Oliver-Solà, J., Rieradevall, J., Gabarrell, X., 2009. Environmental impacts of the infrastructure for district heating in urban neighbourhoods. *Energy Policy* 37(11): 4711-4719.
- Oliver-Solà, J., Gabarrell, X., Rieradevall, J., 2009. Environmental impacts of natural gas Distribution networks within urban neighborhoods. *Applied Energy* 86(10), 1915-1924.
- Dagmar Haase, Neele Larondelle, et al (2014). A quantitative review of urban ecosystem service assessments: concepts, models, and implementation. *Ambio*, 43 (4), 413-433.
- Francesc Baró, Lydia Chaparro, Erik Gómez-Baggethun, Johannes Langemeyer, David J Nowak, Jaume Terradas, 2014. Contribution of ecosystem services to air quality and climate change mitigation policies: the case of urban forests in Barcelona, Spain. . *Ambio*, 43 (4), 466-479.
- Johannes Langemeyer, Monika Joanna Latkowska, Erik Nicolas Gómez-Baggethun, 2016. Ecosystem services from urban gardens. *Urban Allotment Gardens in Europe*; Bell, S., Fox-Kämper, R., Keshavarz, N., Benson, M., Caputo, S., Noori, S., Voigt, A., Eds. 115-141
- Núñez, M., Oliver-Solà, J., Rieradevall, J., Gabarrell, X., 2009. Water Management in Integrated Service Systems: Accounting for Water Flows in Urban Areas. *Water Resources Management*, Published online 02 October 2009.
- Demertzi M, Sierra-Pérez J, Paulo JA, et al (2017) Environmental performance of expanded cork slab and granules through life cycle assessment. *JCleanProd* 145:294-302. doi: 10.1016/j.jclepro.2017.01.071
- Liu L, Li H, Lazzaretto A, et al (2017) The development history and prospects of biomass-based insulation materials for buildings. *Renew Sustain Energy Rev* 69:912-932. doi: 10.1016/j.rser.2016.11.140
- Mastrucci A, Popovici E, Marvuglia A, et al (2015) GIS-based Life Cycle Assessment of urban building stocks retrofitting A bottom-up framework applied to Luxembourg. 47-56.
- Sierra-Pérez J, Boschmonart-Rives J, Dias AC, Gabarrell X (2016a) Environmental implications of the use of agglomerated cork as thermal insulation in buildings. *J Clean Prod* 126:97-107. doi: 10.1016/j.jclepro.2016.02.146
- Sierra-Pérez J, López-Forniés I, Boschmonart-Rives J, Gabarrell X (2016b) Introducing eco-ideation and creativity techniques to increase and diversify the applications of eco-materials: The case of cork in the building sector. *J Clean Prod* 137:606-616. doi: 10.1016/j.jclepro.2016.07.121