

Degree	Type	Year	Semester
2503743 Management of Smart and Sustainable Cities	OT	3	2

## Contact

Name: Fernando Luis Vilariño Freire  
Email: FernandoLuis.Vilarino@uab.cat

## Use of Languages

Principal working language: english (eng)  
Some groups entirely in English: Yes  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

## Teachers

Angel Cebollada Frontera

## Prerequisites

There are no prerequisites for this subject.

## Objectives and Contextualisation

In the subject "Models of Urban Innovation and Citizen Science", a set of practical case studies will be developed by the students. The course delves and deepens into the Open Innovation methodologies and tools, which will be applied in the case studies developed in the territory. It is a subject with a practical vision that studies real examples of multi-stakeholder citizen-centric Open Innovation, and its connection with the generation of knowledge through Citizen Science.

The specific objectives are:

- To deepen into the theoretical corpus on open innovation.
- To develop the analytical capacity of students on the challenges of innovation in cities and rural areas from a sustainability perspective.
- To provide a critical approach, from a practical perspective, on the processes of transformation of cities -mainly the digital transformation- and its consequences of social transformation.
- To develop a critical approach about the impact of innovation on the citizen, and on the role of the citizen in the innovation processes through a multi-stakeholder citizen-centric approach.
- To provide students with the context of development, tools, and experience for the design, management and the scaling-up of the results of Citizen Science processes.
- To develop the ability of students to design, develop and scale up the results of the tasks associated with open innovation processes, in the context of Living Labs as research and innovation infrastructures.

The generic objectives are:

- To prepare future leaders and managers responsible for the development of open innovation processes from a perspective of technical quality.

- To provide the future leaders of urban innovation processes with a critical vision of the role of the citizen and the socio-economic transforming power of multi-stakeholder citizen-centric innovation.
- To provide a practical basis for the learning framework of students around innovation management processes.

## Competences

- Analyse and model urban and regional dynamics using methodological instruments for qualitative and quantitative analysis.
- Conceive, design and manage the implementation of smart applications for geospatial information for urban and regional management.
- Design platforms of management, integration of public and government services applying technologies and systems of sensorization, acquisition, processing and communication of data.
- Identify and interpret social, economic, technological and sustainability challenges in different areas such as: town planning, infrastructures, mobility, urban economies, services and equipment, cultural diversity and social inequality, energy and natural resources, waste, etc.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Work cooperatively in complex and uncertain environments and with limited resources in a multidisciplinary context, assuming and respecting the role of the different members of the group.

## Learning Outcomes

1. Analyse citizen science data and its application in the professional and academic fields.
2. Develop data-management platforms.
3. Organise and lead design-thinking sessions with a diverse group of actors.
4. Propose, design and implement intelligent applications for the capture and analysis of data from citizen participation.
5. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
6. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
7. Use information from sensors or individuals for the quantitative analysis of territorial dynamics.
8. Value and comprehend social knowledge deriving from citizen science.
9. Work cooperatively in complex and uncertain environments and with limited resources in a multidisciplinary context, assuming and respecting the role of the different members of the group.

## Content

1. Context of the Challenges of Sustainable Development.
2. Paradigms of Open Innovation.
  1. Classical models and levels of innovation.
  2. Open Innovation
  3. Agile methodologies for innovation management.
    1. The design process
  5. Rapid and sprint-based prototyping.
4. Innovation ecosystems.
  1. Models.
  2. Innovation evaluation: measuring the impact of innovation
  3. The Multiple Helix
6. Multi-stakeholder citizen-centric innovation: Living Labs
  1. User-centric innovation
  2. Methodological approach.
  3. Implementation examples

4. Governance models.
5. Sustainability models.
6. User panel management.
7. Scalability of open innovation.
8. Citizen participation processes for user-centric processes
  1. Data generated by the individual: ownership, access and use of the data generated collectively (digital common good).
  2. Participatory infrastructures.
  3. Processes and engagement tools.
  4. Generic tools: design thinking and action research.
10. Citizen science.
  1. Generation and collective analysis of data in the scientific context.
  2. The transversal participation in the scientific process.
  3. Citizen science infrastructures.
  4. Science in the neighborhoods.
  5. Models of citizen science scalability.
  6. Management of intellectual property.
12. Impact on the territory
  1. Instruments of integration of public administration in innovation processes.
  2. Instruments for the integration of start-ups in innovation processes.
  3. The canvas model.
14. Sustainability and business models
  1. Financing instruments based on public policies.
    1. The European framework of Science and Innovation.
    2. Regional and local financing.
  3. Sponsorship and patronage.

## Methodology

The course is based on a practical implementation aimed at solving problems.

The teaching will be based around 4 representative cases of urban innovation processes. The students will receive the theoretical contents contextualized in these 4 cases. Renowned experts will provide open discussions during class hours with the aim of generating a modern and real-world critical vision.

Students will participate actively through field trips, in real open innovation and citizen science projects in urban environments, through the 4 case studies. Students will participate in all parts of the project's life-cycle, and will have assigned specific roles, so that their teaching experience will be implemented in a living lab model approach.

From these actions, students will perform a sprint process based on agile methodologies to generate a deliverable for each case study, interacting with stakeholders under the supervision of the teaching staff. The student must support the case studies with individual and group work in order to obtain 4 deliverables (1 for each case) that will be evaluated separately. From these deliverables, an evaluation of contents and impact of the project will be carried out, in such a way that students must demonstrate their ability to manage the innovation process, and measure its socio-economic and transformation impact.

This methodological vision allows working cooperatively in complex or uncertain environments and with limited resources, in a multidisciplinary context, assuming and respecting the role of the different members of the team.

The analysis of the case studies will allow developing creativity, initiative, and sensitivity towards social and environmental issues. The high practical content allows generating innovative and competitive proposals in their future professional **activities**, since all the processes are carried out within projects of real cities and rural surroundings. This allows to prevent and solve problems, adapt to unforeseen situations, make decisions, and critically assess the work done demonstrating a spirit of improvement to develop innovation-led growth and positive social transformation hand in hand.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Analysis of the Case Studies	10	0.4	1, 3, 6, 5, 7, 8
Lectures of Theoretical Foundations	15	0.6	1, 4, 6, 8
Open Debates with Specialists	10	0.4	6, 5, 8
Project Development	18	0.72	1, 2, 3, 4, 9, 7, 8
Type: Supervised			
Impact Analysis of the Innovation Process (individual and collective)	32	1.28	1, 6, 5, 9, 7, 8
Type: Autonomous			
Development of the Case Studies (individual and collective)	37	1.48	1, 6, 5, 7
Individual Estudi	20	0.8	1, 5, 7, 8

## Assessment

There will be 2 types of evaluation activities:

1) Deliveries on the 4 cases of study:

1. Case study 1 (L1)
2. Case study 2 (L2)
3. Case study 3 (L3)
4. Case study 4 (L4)

2) Exam on the theoretical contents of the subject (E) - to be delivered at the end of the course.

The final grade will be the result of applying the following formula:

$$L = (L1 + L2 + L3 + L4) / 4$$

$$\text{FINAL MARK} = L * 0.75 + E * 0.25$$

To pass, it is necessary that the evaluation of each of the parties exceeds the minimum required (5) and that the total evaluation exceeds 5 points. In case of not passing the subject, the numerical note of the student's file will be the lower value between 4.5 and the weighted average of the notes.

Positive contributions in the discussions will round up the decimals. To qualify for the Matrícula d'Honor (with honors) it is necessary to have a participative attitude in the class discussions. The maximum number of Matriculas d'Honor is restricted by the UAB regulation to a maximum of 5% of the students enrolled in the subject. They can only be granted to students who have obtained a final grade equal to or greater than 9.

In case of not passing in any of the deliveries, the student will have the opportunity to recover the partial mark by sending back the corrected document before the day determined by the teacher. Repeating students may validate the parts approved in previous years.

The non-presentation to the final exam (EF) implies a "Not Evaluable" in the student's file.

Finally, there will be an extraordinary test that will allow the students to pass in the Theory part in case of having failed the final exam (E).

All exams will be adjusted according to the School's calendar.

The dates for continuous evaluation and submission of works will be published on the website Caronte (<http://caronte.uab.es>) and may be subject to changes for reasons of adaptation to possible incidents. Caronte will always inform about these changes since it is understood that the Caronte website is the usual mechanism for exchanging information between teacher and students.

For each evaluation activity, a place, date and time of revision in which the student can review the activity with the teacher will be indicated. In this context, claims may be made on the activity grade, which will be evaluated by the faculty responsible for the subject. If the student does not appear in this review, this activity will not be reviewed later.

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, any irregularities carried out by the student that could lead to a variation of the grade of an evaluation act will be scored with a zero. Thus, plagiarizing, copying or allowing a document to be copied or any other evaluation activity will involve failing with a zero and will not be able to be passed in the same academic year.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Deliverable on the case studies	75%	7	0.28	1, 2, 3, 4, 6, 5, 9, 7, 8
Exam on the theoretical contents developed	25%	1	0.04	1, 6, 5, 8

## Bibliography

- Eric von Hippel. Democratizing Innovation. MIT Press 2005.
- Henry Chesbrough, Wim Vanhaverbeke and Joel West. Open Innovation: researching a new paradigm. Oxford University Press. 2006.
- Ash Maurya. Running Lean. O'Reilly 2012.
- Tim Brown. Change by Design. Harper Collins, 2009.
- Thomas Lockwood. Design Thinking. Integrating Innovation, Costumer Experience, and Brand Value. Alworth Press. 2009.
- Anna Ståhlbröst and Marita Holst. The Living Lab Methodology Handbook. Luleå University Press. 2012.
- Penny Evans, Dimitri Schuurman, Anna Ståhlbröst and Koen Vervoort. Living Lab Methodology Handbook. U4IoT Consortium. 2017.
- Citizen Science: Innovation in Open Science, Society and Policy. UCL Press. 2018.