

URBAN AND INDUSTRIAL ECOLOGY

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This major is an introduction to the field of Urban and Industrial Ecology (UIE) as a multidisciplinary effort to evaluate anthropogenic systems, minimizing their negative effect on our planet. The students are taught the methods, tools and strategies within UIE, aimed to recreate our urban and industrial system in such a way that it can be sustainable and in harmony with the rest of the natural ecosystem.

The main course in this major is divided in three blocks:

Block 1. Tools and methods. The objectives of this block are:

Understand the concepts of UIE, its framework as a multidisciplinary area of research based on system theory; resources: environmental goods and services, externalities. Understand how thermodynamics is a conceptual framework.

for IE, and be able to apply thermodynamics at different scales for system evaluation. Understand Material Flow Analysis (MFA), Carbon Footprint, Life Cycle Assessment (LCA) and be able to apply this tool to different systems, such as a product, process or region. Apply the fundamentals of these approaches to be used for various analyses (e.g., GHG, pollution, water, land, toxics, materials use, etc.)

Block 2. Eco-design and Life Cycle Analysis.

This being one of the most important methods and system analysis of IE, it deserves a block all to itself. The main objectives are: Inventory databases such as Ecoinvent, understand the concept of eco-design and LCA theoretical aspects, regulations and legal framework. Apply eco-design and LCA using free or commercial software such as Simapro in a practical case study.

Block 3. Sustainable urban systems. This block is, at the same time, divided in two parts. The first one deals with sustainable mobility in relation to the urban environment. It is aimed to understand the new paradigms upon which mobility analysis is based and its relation to environmental costs. It also provides tools to evaluate and suggest new urban scenarios where sustainable means of transport have a leading role.

The second part, seeks to understand the opportunities of applying tools and methods in urban systems. Understand the basic principles of urban metabolism. Learn about the process of urban planning of an eco-neighbourhood. Apply LCA software to estimate the impacts of water-food nexuses as well as urban infrastructures (pavements, distribution networks,...) The specialization also offers the course Geographic Information System. This course allows the student to learn about the required cartographic techniques to apply the acquired knowledge.