UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Smart Mobility

2627-2-FDS02Q038-FDS02Q03801

Aims

The goal of the module is to teach **knowledge** related to typical mobility issues in highly urbanized environments and **competences** in the tools for processing mobility data. Libraries and practical instruments for the acquisition, elaboration, analysis, and visualization of geographic and mobility describing information will be introduced and exemplified. The joint project with the other module of the Data Science Lab On Smart Cities cultivates **critical thinking skills**, independent learning abilities – particularly in researching and evaluating scholarly sources and utilizing appropriate software tools – and **effective communication skills**. Students will demonstrate these competencies through a written project report adhering to established academic standards and an oral presentation defending their work, potentially supported by visual aids.

Contents

- Towards the data-driven city
- Smart Mobility: Technology Enablers and Disruptors
- Mobility as a Service
- Mobility analytics with GeoPandas
- Case studies

Detailed program

- Towards the data-driven city - Challenges, main elements, the augmented city
- Smart Mobility - Foundational Technologies - Introduction to smart mobility - the technological aspects of smart mobility - foundational technologies

- Smart Mobility - Technology Enablers - The technological aspects of smart mobility - Technology Enablers
- Smart Mobility - Disruptors / Mobility as a Service - The technological aspects of smart mobility - Disruptors - Mobility as a Service model
- Case studies
- Lab session 1: Introduction to GeoPandas
- Lab session 2: Spatial relationships and operations with GeoPandas and Shapely
- Lab session 3: OpenStreetMap and Street Network Analysis
- Lab session 4: Mobility Analytics

Prerequisites

Basic knowledge of the Python language, virtual environments and Jupyter

Teaching form

12 hours conducted in in-person delivery mode
12 hours of laboratory conduted in interactive delivery mode

Textbook and teaching resource

Slides and notes provided by lecturers

Semester

Second semester

Assessment method

The course will be evaluated through an essay and an oral presentation on a self-selected smart city topic. Students, in groups of two, will write an essay in English, covering problem description, data analytics, visualization, and policy recommendations. The essay should address relevant indicators, data selection, cleaning, spatial and temporal analysis, and prediction or classification models if needed. Ethical and social implications should also be considered. An oral presentation of the essay is required. Evaluation criteria include clarity and

coherence of problem description, quality and relevance of data, accuracy and validity of analysis and visualization, robustness and reliability of models, effectiveness of policy suggestions, consideration of ethical and social implications, overall essay quality, quality of the in-person presentation.

Office hours

Wednesday from 9:30 to 11:30 or other days/times always by appointment, potentially also via teleconferencing systems.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | INDUSTRY, INNOVATION AND INFRASTRUCTURE | SUSTAINABLE CITIES AND COMMUNITIES