

# Intelligent Data Development

Fall Term - 3 ECTS

Elective Course

This course will present several case studies of data science support for decision making. Students will engage with the different elements of the data process from data generation over data analysis to how this data is used for decision making in four broad areas:

- **Supply chain:** Market volatility, emergence of new channels of communication and digital disruptors are increasing customer expectations and generating new demands which exceed the traditional supply chain capabilities. This creates the need of reimagining the supply chain in order to deliver customer requirements with speed, specificity and scale. In today's disruptive marketplace however, having only a data-driven strategy is not enough to support old and new business models. More and more companies start creating a new data ecosystem on the cloud. This part of the course will showcase how data on the cloud can empower traditional supply chain problems such as inventory optimization, pricing or forecasting and will be tackling how unexpected events, agility and new realities can be incorporated into the existent data process to enable organizations to make smarter, faster and automated business decisions that better fit their needs.
- **Two-sided matching platforms:** Centralized two sided platforms are used to assign a large number of resources: rooms to individuals, colleges to students, etc. Algorithms shall be designed to facilitate the visualization of the good to be matched to facilitate the creation of efficient and fair matches. A combination of economic theory, behavioral economics and data analysis shall help us fine tune the design of the algorithms shaping these markets.
- **Allocation of couriers at a food delivery service.** The forecast team at Glovo ensures we have the right amount of couriers always and everywhere in the most automatic way. That means being able to forecast variables like demand or delivery times in more than 300 cities all over the world, both in normal conditions and extraordinary ones (e.g. storms, new season of GoT or COVID burst). It also means finding the optimal balance between courier earnings and customer delivery times. All in all, using machine learning, mathematical optimization and engineering to support decision making at Glovo.
- **Public health evaluation of green spaces and gentrification for policy decision making.** The use of nature prescription and of the health argument to justify increased nature provision in cities contrasts with concerns on who really benefits from these interventions. Data collection and modelization is used to understand these health benefits and justify and/or evaluate health practices and policies. Using mixed-effect models, spatial restricted regressions and health impact assessments can be some useful tools.

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Students will be able to apply the different skills they have acquired throughout the MSc to real industry use cases and will gain more in depth knowledge on:

- Cloud Service Integration of their Projects
- Time Series Forecasting with Machine Learning
- Data Collection and Aggregation in Public Health
- “*Man composed with Machine*” Learning Processes to Identify Successful Visualizations
- Market Design and Algorithmic Game Theory

More importantly, this course will help students develop a wider eye-span when tackling problems by giving them the opportunity to understand why there is no one-size-fits-all methodology and how different methods can or cannot reply to a wide set of real-life use cases.

## Prerequisites to Enrol

None.

## Overview and Objectives

The main objective of the course is to apply the knowledge learnt throughout the masters to real-life applications. Professors will provide real examples from their professional experiences of data collection, processing and presentation for decision making. Evaluation will be entirely based on projects done individually or in groups.

## Course Outline

### **Part I. Intelligent Data Driven Applications on the Cloud**

- I.i. Data-driven Intelligence
- I.ii. AWS as a catalyst for data driven intelligence
- I.iii. Things change. Know why - Use Case Example(s) - TBD

### **Part II Learning optimal visualization for decision making: how to show rooms to reduce inefficient congestion**

- II.i. Identifying inefficient congestion
- II.ii. Learning how to reduce congestion using economic techniques
- II.iii. Learning how to visualize rooms using Man composed with Machine learning processes

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## Part III. Time series forecasting: forecasting demand at Glovo

- III.i. Differences between time series forecasting and other predictive tasks.
- III.ii. Understanding and visualising time series data.
- III.iii. Forecasting methods for time series data (heuristics, statistical and ML methods).

## Part IV. Public health data for policy decision making

- IV.i. Data collection/analysis in public health research
  - IV.i.i. Example 1: PHENOTYPE experimental study
  - IV.i.ii. Example 2: GREENLULUS ecological study
- IV.ii. Health impact assessment

## Evaluation

Individual and team-based homework.

## Materials

### Mandatory readings:

Triguero-Mas et al. (2017) The effect of randomised exposure to different types of natural outdoor environments compared to exposure to an urban environment on people with indications of psychological distress in Catalonia. Plos One.  
<https://doi.org/10.1371/journal.pone.0172200>

### Recommended readings:

Triguero-Mas et al. (2015) Natural outdoor environments and mental and physical health: Relationships and mechanisms. *Enviro Int.* <https://doi.org/10.1016/j.envint.2015.01.012>

Mueller et al. (2017) Health impacts related to urban and transport planning: A burden of disease assessment. *Enviro Int.* <https://doi.org/10.1016/j.envint.2017.07.020>