Course unit: Data and analytics

** Beware! Under construction. **

Course metadata

- Title in French: Analyses et données
- Course code: tba
- Type: specialized course
- ECTS credits: 4
- Semester 10 (Spring)
- Teaching period: Mid-February to Mid-April
- Teaching hours: 100h
- Language of instruction: French
- Coordinator: tba
- Instructor(s): Vincent Archer (Locala), Simone Fuscone (Locala), Nathan Rouff (Ekimetrics), Julien Bruno (Air France), Franck Chevalier (EY)
- *Last update 22/05/2026 by C. Pouet*

Brief description

This course unit is divided into four parts:

- **Quantitative marketing** (24 hours) taught by Simone Fuscone and Vincent Archer,
- **IA and decisions** (24 hours) taught by Franck Chevalier,
- **Applied data science** (24 hours) taught by Nathan Rouff and Antoine Winckels,
- **Data Project: modeling and validation ** (20 hours) taught by Sitraka Forler and Lirone Samoun.

Learning outcomes

- Know how to use data in a strategic approach
- Know how to present a model, its results and its insights
- Know how to assess data suitability to a specific issue
- Know how to model intertemporal strategic decisions
- Know how to combine model and data to take pricing decisions

Course content

Quantitative marketing

1. Introduction to prescriptive analytics
2. Interpretability and maching learning
3. Application to revenue management
4. Application to predictive maintenance

Data and macroeconomics

This course aims at giving a broad view of macroeconomic data. It is structured around three questions:

1. Can we measure everything?
2. Can we sum everything?
3. Can we compare everything?

These questions will allow to tackle multiple sources for macroeconomic data, their methodology, their limits, and to discuss their common applications. At the end of the course, students should have acquired enough hindsight to use pertinent macroeconomic data to answer a practical question.

Applied data science

1. Introduction to prescriptive analytics
2. Interpretability and maching learning
3. Application to revenue management
4. Application to predictive maintenance

Data Project: modeling and validation

1. Projects and models
    - The Bias-Variance tradeoff
    - Feature Selection
    - Feature Engineering
    - Defining a metric
2. Models and applications
    - Regressions (linear, polynomial, penalized and logistic)
    - Decision trees (random forest and gradient boosting)
3. Focus on Natural Language Processing (NLP)

Bibliography

You can check the availability of the books below at Centrale Méditerranée library.

1. Quantitatve marketing
    - Abiteboul, S., « Sciences des données : de la logique du premier ordre à la Toile », Leçon inaugurale du Collège de France : site de Serge Abiteboul au Collège de France (vidéo et documents de la leçon inaugurale)
2. Data and macroeconomics
    - INSEE
    - Eurostat
    - Datagora
3. Yield management
    - Sorger, G. Reference price formation and optimal marketing strategies, In Optimal Control Theory and Economic Analysis 3, G. Feichtinger (editor), Elsevier Science Publishers (North-Holland, 1988).

- Talluri, K. T., Van Ryzin, G. J., The Theory and Practice of Revenue Management, Springer 2004.
- Belobaba, Peter. 16.75J Airline Management, Spring 2006. MIT OpenCourseWare.
- Frumin, M., and Ben-Akiva, M. 1.201J Transportation Systems Analysis: Demand and Economics, Fall 2008. MIT OpenCourseWare.

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